

Second World Conference on National Parks

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NPS General

**Yellowstone and Grand Teton National Parks, U.S.A.
September 18-27, 1972**

Proceedings of a Conference sponsored and organized by the National Parks Centennial Commission of the United States of America; the National Park Service of the U.S. Department of the Interior; and the International Union for Conservation of Nature and Natural Resources.

Cosponsors: United Nations Educational, Scientific, and Cultural Organization; Food and Agriculture Organization of the United Nations; and Natural Resources Council of America.

Edited by
Sir Hugh Elliott, Bt., Rapporteur General

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Foreword

On behalf of the National Parks Centennial Commission, it is my honor and privilege to prepare this foreword to the Proceedings of the Second World Conference on National Parks. As explained in the introduction, it was this Commission which was given the authority to provide host services and general planning and support for the Conference by the Congress of the United States through President Richard Nixon. It was a signal honor for the Commission to implement this authority to conduct the Conference in the interest of worldwide advancement of the national park concept, and to meet and work with our colleagues from more than 80 countries and their territories.

But the Commission had much generous support and cooperation from many organizations and individuals in carrying out the mandate from the Congress. The Secretary of the Interior, the Assistant Secretary for Fish and Wildlife and Parks, the Director of the National Park Service, and hundreds of individuals under them who labored faithfully on preparations for, and the conduct of, the Conference were vital to its success. Moreover, the several divisions of the U.S. Department of State and its diplomatic missions abroad also contributed generously to the Conference. From the U.S. conservation community, the Natural Resources Council of America served as a cosponsor. From abroad, the International Union for Conservation of Nature and Natural Resources, as a joint sponsor of the Conference, was an essential part of the total effort. UNESCO and FAO gave their full support as well.

In the final analysis, however, it was the participants who made the Conference the success we all believe it to have been. To them, we extend our very best wishes and dedicate this publication to their continued success in establishing, protecting, and managing the world's heritage of national parks.

Edmund B. Thornton
CHAIRMAN
NATIONAL PARKS CENTENNIAL COMMISSION

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The Work Continues

Recommendation 27 of the First World Conference on National Parks held in 1962 reads as follows:

"WHEREAS the centennial of the establishment of Yellowstone Park in the United States occurs in 1972,

"AND WHEREAS the establishment of Yellowstone Park was the first such park in the world and created widespread response throughout the world,

"THE FIRST WORLD CONFERENCE ON NATIONAL PARKS recommends that this centennial be celebrated by publicizing the occasion, especially with appropriate publications in the various countries urging the formation and development of national parks, and by a conference to be held in Yellowstone Park and attended by representatives of all countries."

In the years following the Seattle Conference, this call stayed fresh in the minds of park leaders and international conservationists. Clearly, the proposed conference in the centennial year represented an opportunity to be grasped, for who could fail to appreciate the tremendous stimulus and the solid accomplishments in terms of new parks and park systems which could be credited in large part to that first meeting. Indeed, some experts now believe the First World Conference on National Parks was as significant to the international park movement as was the establishment of Yellowstone, the world's first true national park, 90 years before. Thus, there was tremendous enthusiasm and ready acceptance of proposals for a second conference when an invitation was issued by an Assistant Secretary of the Interior at the 10th General Assembly of the International Union for Conservation of Nature and Natural Resources in New Delhi.

The instrument devised to promote the conference in the context of a nationwide observance of the Yellowstone Centennial was created by Public Law 91-332, signed by President Richard Nixon on July 10, 1970. It established a National Parks Centennial Commission and authorized the Commission to provide host services for a conference, and to work with appropriate international organizations and others to plan and conduct the event. Then, under Edmund B. Thornton as Chairman, the Commission carried out this mandate with imagination, vigor, and effectiveness. The Commission staff was drawn from the National Park Service, as were almost all of the hundreds of people who took part in the organization of the Conference, and who made it function.

Planning was carried out by a steering committee representing the sponsors—in particular the U.S. National Park Service and IUCN, and the cosponsors, UNESCO, FAO, and the Natural Resources Council of America. In addition, officials from several U.S. groups took part at various times. These included the Department of State, the Council on Environmental Quality, the Smithsonian Institution, and the Conservation Foundation.

Beyond planning activities, basic preparatory work was divided between the National Park Service and IUCN. The NPS assumed responsibility for all physical arrangements, invitations, and work with participants. IUCN was concerned with the preparation, editing, and translations of the 32 background papers into English, French, and Spanish as required. Most papers were prepared originally in English.

There is no need to comment here on details of the planning and preparatory effort, but it must be noted that many groups and individuals, private and official, cooperated unselfishly to assure success of the meeting. All were caught up in the enthusiasm of the cause, and all concerned—staff and volunteer—gave far more of their time and effort than could reasonably be expected. The Centennial Commission and staff take this opportunity to express their thanks and deep appreciation to all of these people.

In the beginning, it was hoped that the Conference could be held at Yellowstone, but, after a careful survey of facilities, it was decided that nothing in the park was adequate to meet the needs of a large technical conference. Indeed, the only available building in any national park that could meet all requirements was the Jackson Lake Lodge in Grand Teton National Park, but even this extensive structure could accommodate only about 500 conferees.

It must be noted for the record that the colorful and exciting Yellowstone phase was planned months after the technical sessions had been organized. The Yellowstone activities were scheduled in response to widespread demands from regional and State park people, State officials, and residents of the region surrounding Yellowstone and Grand Teton, all of whom had a lively interest in the subject and wanted an opportunity to take part in the Conference.

Old Faithful Inn was selected as the focus for three days of activity preliminary to the technical meeting. Here a large number of people could be housed and cared for, and the inn used as the central point for a series of tours, meetings, and outdoor events. The formal opening of the Conference was held in the big recreation hall at the nearby Old Faithful Lodge, as were the panel discussions on U.S. park and conservation matters. The outdoor ceremony at which Mrs. Richard Nixon and Secretary of the Interior Rogers C. B. Morton rededicated Yellowstone National Park to the people of the world was held at Madison Junction, not far from Old Faithful, at the site of the 1870 explorers' campfire where the idea of a national park was conceived.

Costs of the Conference were met with funds appropriated to the National Parks Centennial Commission by the U.S. Congress, which were more than matched by donations from philanthropic organizations and individuals. One donation in particular, that of \$50,000 from the Ford Foundation, was earmarked for the publication of these proceedings in English, French, and Spanish.

Other donations, including gifts from 32 donors to a special fund in the National Park Foundation, financed part or all of the travel expenses of experts from 45 countries. Without this assistance these people would not have been able to take part. IUCN, UNESCO, and FAO assisted others to participate.

All of these gifts contributed greatly to the success of the Conference, and are gratefully acknowledged here.

Centennial Celebration at Yellowstone

In 1872, few men had vision enough to foresee that newly established Yellowstone National Park embodied not the end, but only the beginning of the *national park idea*. Few could have foretold that in 1972 the nations of the world would proudly count more than 1,200 national parks or equivalent reserves, all set aside in accordance with the idea conceived at Yellowstone for the benefit of present and future generations.

Such has been the international acceptance of this ideal that the centennial of the park's establishment was long anticipated as a time for celebration and rededication to the noble cause of preserving the heritage of natural wonders. Delegates to the First World Conference on National Parks, who represented 63 nations, recommended that another world conference be held during the centennial year. This call helped to bring about official action by the U.S. Congress and President which put the Yellowstone Centennial celebration into motion at the outset of 1972. A major event of the year was planned as the Second World Conference on National Parks, to be held at Grand Teton National Park.

As a prelude to this technical Conference, the National Parks Centennial Commission organized a large meeting in Yellowstone to celebrate the park's first 100 years. To be held in advance of the technical sessions, which were fully international, this meeting was primarily an American observance, a kind of gigantic birthday celebration.

Primary invitees were Americans who had made notable contributions to the national parks. Also attending were the representatives to the World Conference, many of whom had attended the 11th General Assembly of the IUCN held just before the Yellowstone meeting in Banff National Park, Canada. In all, more than 1,200 people came—scientists, conservationists, Governors, Members of Congress—a whole spectrum representative of the world's national parks. They came from more than 80 countries and 6 continents, and they brought a world of experience with them.

The registration of guests and participants took place in historic Old Faithful Inn in full view of Old Faithful Geyser, which displayed its magnificent plume of steam and water every hour as it has for centuries.

The first order of business for most delegates, particularly those from other nations was a look at Yellowstone itself. And the weather during the opening days could not have been better: blue skies, pleasant temperatures, and a hint of autumn at night. Planned as a commemorative celebration, the Yellowstone meetings were considerably

less formal than the technical sessions of the Conference which followed at Grand Teton. On the morning of September 19, the people assembled in a huge log-cabin meeting hall to hear Chairman Edmund B. Thornton of the National Parks Centennial Commission officially open the Yellowstone commemorative sessions, which were the first part of the Second World Conference on National Parks. Joining him in extending a welcome to the delegates were Superintendent Jack K. Anderson of Yellowstone; Secretary of the Interior Rogers C. B. Morton; Dr. Gerardo Budowski, Director General of IUCN and Cochairman of the Second World Conference on National Parks; and George B. Hartzog Jr., Director of the National Park Service and Cochairman of the Conference.

The morning's first panel—composed of top U.S. Government officials involved in Federal executive policymaking, including Robert Cahn, former member of the Council on Environmental Quality and Pulitzer Prize-winning author on national park matters—made clear the multitude of government responsibilities in the sphere of national parks. The fact that national parks must be administered by the central government which is responsible for defining their purposes and providing the needed funds for operations was brought home strongly in the next panel discussion on Congressional policy-makeup and appropriations. Congressman John P. Saylor of the State of Pennsylvania, followed by Congressman Joseph M. McDade, also of Pennsylvania, eloquently and forcefully reminded participants that in America the Congress bears the final responsibility for determining the role of national parks.

Another panel helped identify the relationship between national parks and those of regional, State, and local communities. Governor Andrus and Governor Hathaway of the States of Idaho and Wyoming, respectively, explained the roles of their States in national parks and all conservation programs. Congressman Joe Skubitz of the State of Kansas and Congressman Orval Hansen of Idaho stressed that a national park does not exist in a vacuum, that a healthy relationship with its external environment is essential to the preservation of the park's internal environment.

In one of many expressions of international goodwill which took place during the Conference, Dr. V. V. Krinitskii, Director of Nature Reserves in the Union of Soviet Socialist Republics, presented a carving and a mounted specimen of two native Russian animals and a book on Russian wildlife to Yellowstone National Park on behalf of the Russian people. He announced also that the U.S.S.R. had established five new national parks and nature reserves since 1971 in recognition of the Yellowstone Centennial.

A significant event of the concluding session at Yellowstone was the formal presentation to Centennial Chairman Thornton of the report of the Conservation Foundation entitled, "National Parks for the Future." The report was prepared for the National Parks Centennial Commission and reflected the views of a broad cross section of private citizens and conservation organizations on policies and programs to consider in planning for a second century of parks in the United States. All participants received a copy of this report for study.

The highlight of the Yellowstone meetings was the rededication, on September 19, of Yellowstone National Park at Madison Junction, where the Gibbon and the Firehole Rivers join to form the Madison River. It was here that the Washburn-Langford-Doane

Expedition on the same date in 1870 made its last camp during its momentous exploration of the Yellowstone region. Around the campfire that night the members of the expedition agreed that the wonders they had seen should be set aside for public enjoyment. The site marks the beginning of the national park movement.

Preceding the evening ceremony, the participants and several hundred guests were served typical American fare, a barbecue dinner handsomely prepared and served by the famous Chuckwagon Gang from Odessa, Texas. As the diners huddled around picnic tables in the campgrounds adjoining Madison Junction in near-freezing weather, darkening clouds and chilling winds suggested the ceremony might prove to be memorable for more than one reason.

First Lady of the land, Mrs. Richard Nixon, representing the President at the rededication ceremony, had arrived at Yellowstone during the afternoon. Welcomed by citizens, schoolchildren, and bands at West Yellowstone airport, she cheerily braved rain and sleet as she toured the Old Faithful area and greeted Conference members and park visitors.

From the platform at the amphitheater overlooking the 1870 campfire site across the river, the dedicatory program began. Several awards (*see app. B*), consisting of the Silver Centennial Medallion, were presented by Commission Chairman Thornton to distinguished international leaders in the world national park movement. Then, Secretary of the Interior Rogers C. B. Morton gave the Centennial address amid rain, hail, sleet, and snow. It was the only time, he told his audience, that he had ever had his glasses iced over during a speech.

Delivering a greeting to the Conference participants from the President, Mrs. Nixon held a torch and symbolically relighted the campfire that had been kindled 102 years before by the Yellowstone Expedition. Across the valley at the campsite, a fire blazed high as Secretary Morton rededicated the first national park to a second century for the pleasure and benefit of the people of the world.

The full schedule for the Yellowstone celebration is printed in appendix A.

Technical Sessions
of the Second World Conference
on National Parks
at Grand Teton National Park

SESSION I

CALL TO ORDER AND OPENING BUSINESS

At 9:10 a.m. on Friday, September 22, 1972, in the Explorers Room of Jackson Lake Lodge, Grand Teton National Park, Director of the U.S. National Park Service George B. Hartzog, Jr., Cochairman with Dr. Gerardo Budowski, Director General of IUCN, called the session to order.

After a brief reference to the magnificent job carried out by National Park Service personnel at all levels in making arrangements for the reception of participants in the Second World Conference, Chairman Hartzog called on the Superintendent Gary E. Everhardt of Grand Teton National Park to say a few words of welcome. In doing so Superintendent Everhardt expressed his confidence that the beauty and serenity of its setting would inspire the Conference and be an encouragement to ever-greater effort in the understanding and protection of the natural world.

Official greetings and good wishes for the Conference were then presented. First, on behalf of Secretary of the Interior Rogers C. B. Morton, Assistant Secretary Nathaniel P. Reed said that the Yellowstone phase of the Conference had served very well to set the stage, and to stimulate thinking and enthusiasm for the task of making the technical sessions really productive—a source of material to meet and surpass the challenges which face the development of national parks today. He was followed by Chairman Edmund B. Thornton of the National Parks Centennial Commission, who extended a welcome on behalf of the Commission as cohost of the Conference. He was sure that the coming week's discussions would bind all those present in friendship and in a common cause—a commitment to advance and improve the science, technology, and usefulness of the world's national parks.

After introducing the representatives of the organizations most closely associated with the Conference—Dr. Michel Batisse of UNESCO, René G. Fontaine of FAO, and Daniel A. Poole of the Natural Resources Council of America—Chairman Hartzog handed over the conduct of the business of the session to Cochairman Budowski.

Chairman Budowski began by recalling that the present meeting was taking place 10 years after and in accordance with Recommendation 27 of the First World Conference on National Parks held at Seattle. He then asked the President of IUCN, Prof. Donald J. Kuenen, to take the meeting through its formal business.

Agenda and organization. Professor Kuenen drew attention to the fact that, due to the length of the agenda, Sessions IV to XI would have to be held two at a time: participants

would have to exercise a choice but would save on their "homework"! The agenda and organization were approved unanimously.

Rules of procedure. The rules had been circulated in advance and covered the conduct of the technical sessions (with particular reference to time limits on speakers and, for record purposes, the submission to the Conference Secretariat of written texts of interventions). The rules were adopted unanimously.

Procedure for recommendations and appointment of the Recommendations Committee. Introducing this item, Professor Kuenen stressed that the intention was that the technical sessions should lead up to recommendations and not to formal resolutions. This rested on the fact that the status of participants was very variable, but all were linked by their common interest in or special knowledge of national parks. They would therefore be making their recommendations on their individual responsibility and formal voting procedures would be inappropriate; approval or disapproval of recommendations would be by show of hands and any individual or group was entitled to submit suggestions for consideration by the Recommendations Committee, provided they did so by noon on Sunday, September 24. The proposed membership of the committee had been circulated and was based on the special qualifications of the persons concerned.

The proposed procedure was adopted unanimously and the appointment of the following as members of the Committee on Recommendations was approved:

Dr. M. E. Duncan Poore, U.K. (Chairman)
Jesús B. Alvarez, Jr., Philippines
Kai Curry-Lindahl, UNESCO
Prof. Antoon de Vos, FAO
Baba Dioum, Senegal
Dr. Marc J. Dourojeanni, Peru
Dr. Wolfgang Erz, Federal Republic of Germany
Dr. Hugh F. Lamprey, Tanzania
P. H. C. Lucas, New Zealand
Theodor R. Swem, U.S.A.

Chairman Hartzog then explained that this concluded the formal business, since the remaining items in the published agenda had in effect already been covered by the honorary awards presented during the Yellowstone phase of the Conference. Before closing the session, he called upon Secretary General Roger J. Contor to review the general conference arrangements and facilities.

The session was adjourned at 9:45 a.m.

SESSION II

A LOOK AT THE PAST

Friday, September 22, 10:30 a.m. to 12:30 p.m.

ACCOMPLISHMENTS, SHORTCOMINGS, AND PROBLEMS OF THE WORLDWIDE NATIONAL PARK MOVEMENT

Chairman: Dr. Otto Soemarwoto, Indonesia
Rapporteur: Mrs. Paule Gryn-Ambroes, IUCN
Authors: Paper 1: Prof. Jean-Paul Harroy, Belgium
2: E. Max Nicholson, U.K.
3: Nathaniel P. Reed, U.S.A.
Panelists: Ivan Cibulec, Czechoslovakia
Jean Gahuranyi Tanganyika, Zaïre
John S. Owen, U.K.
Conrad L. Wirth, U.S.A.

RAPPORTEUR'S SUMMARY

A look at the past must attempt to strike a balance between the successes achieved and the failures or unresolved problems, and this was the stated aim of the Chairman in introducing the session and of the three authors in presenting their papers. In the short time available for presentation, there was a tendency to confine the review to the past decade or two, and this was also apparent in the comments of the panel members. John S. Owen, referring to Tanzania, believed that the lesson of recent years was that the two points which need to be stressed are the intrinsic value of national parks as part of the national heritage and the ethical arguments for their creation and maintenance. Panel Member Wirth felt that the major breakthrough of the past had been the concept of the comprehensive management plan. Panel Member Jean Gahuranyi Tanganyika warned against developments such as airports, tarmac roads, and accommodations inside park boundaries; but essentially every country must find its own solution and be guided by the principle of conserving the natural features of its protected areas. Panel Member Cibulec noted that in Czechoslovakia efforts were being made to develop the idea of protected landscapes in which certain forms of land use are permissible.

With this lead, the discussion which followed was more concerned with recent problems and future needs of conservation than with the past. The main division of opinion concerned the ethical versus economic arguments in promoting national park development. To some the advocacy of tourism as a source of income was "patronizing" and dangerous for conservation. Others regarded the "heritage" argument as one likely to be shared by a very small part of the population and only in a few countries. They felt that in the face of population pressure and the demands for economic development, ethical con-

siderations carried little weight with governments and decision makers, so that it was essential to stress the economic return from tourist development of parks. In either case, however, aid for developing countries in establishing and maintaining national parks and the need for educating leaders were considered to be priority requirements.

SESSION II / PAPER 1

A CENTURY IN THE GROWTH OF THE "NATIONAL PARK" CONCEPT THROUGHOUT THE WORLD¹

by Prof. JEAN-PAUL HARROY
Chairman, International Commission on National Parks,
44 Avenue Jeanne, Brussels, Belgium

It was with both humility and pride that the author approached the very great honor of preparing this paper to open the discussions of the Second World Conference on national parks. The assigned task is to aid participants in orientating their discussions within a framework which is as wide and as comprehensive as possible.

We are today celebrating the Yellowstone National Park Centennial for the dual reason that it was, and still is, a model.

It was a model because, historically, it was the first, and its very existence and the fundamental principles that enshroud it have stimulated imitations since 1872.

On the other hand, it is still a model because its organization most certainly places it among the best managed of the world's national parks; from this point of view, managers of national parks throughout the world can use it as an example and visit it to take lessons and obtain ideas.

Yellowstone National Park is also a model from another point of view: it contains virtually all the major types of problems that anyone responsible for a similar type of protected zone may expect to meet.

However, although it has produced followers for a century now, the imitation has often been extremely free, diverging from the model either because the objectives pursued were significantly different or because the geographical or administrative framework in which the imitation had to be fitted was not at all like that of Wyoming.

It is, therefore, precisely these diversities of outlook and biopolitical circumstances throughout the five continents and the past 10 years that this paper will attempt to highlight. Many of those who are well acquainted with Yellowstone will be well aware that there are a number of protected zones throughout the world which resemble this area

¹ Original: French.

and which also bear the name "national park," although they differ fundamentally from it either by what their managers wish to do or by what they are capable of doing.

It should be unnecessary at a meeting such as this to review the conditions under which the International Commission on National Parks of the International Union for Conservation of Nature and Natural Resources has, since 1960, attempted to introduce into the field of protected zones a minimum of order in classification and nomenclature. It first selected four criteria: status, size, staff, and budget. These were designed to allow the selection of areas which warranted citation, for a "roll of honor" created in 1959 by the Economic and Social Council of the United Nations. The Commission then published two versions of this list, French in 1967 and English in 1971, as the "United Nations List of National Parks and Equivalent Reserves." It worked for a long time to achieve a situation in which the General Assembly of the Union would agree to a text defining the concept of national parks. This was adopted in New Delhi in 1969.

This definition has five basic conditions: extensive area, outstanding contents, an effective system of protection, creation and management by the highest competent authority of the country, and authorization of tourism. These are all conditions which Yellowstone National Park met in their entirety in 1872 and conditions which will include the following three main motivations guiding the founders of a new national park:

1. To prevent human exploitation in order to conserve species, ecosystems, or areas of natural beauty;
2. To enable visitors to benefit at different levels (recreational, educational, and cultural) from the favorable results of this conservation; and
3. To benefit from this conservation by scientific studies which would be impossible elsewhere.

We also know that of these three motivations—the second—was dominant in the minds of the 1872 founders: "dedicated and set apart as a public park or pleasuring ground for the benefit and enjoyment of the people."

This then raises a question: why did this desire first find expression in the United States and not in Europe?

The fact is that Europe with its industrial and agricultural revolutions, which were stretched out over long periods, saw only small changes in its natural environment during the 19th century. Thanks to various factors, Europe had progressively adapted itself to the majority of their effects. At the most, hunting had, in certain cases, made game animals so scarce that certain monarchs or powerful aristocrats established their own personal hunting reserves which were strictly guarded against poaching. In doing so, these great land owners were in some cases unconsciously preparing the beginnings of subsequent natural reserves such as Fontainebleau, Rambouillet, the Royal Forests in Great Britain, or even the hunting grounds of the dukes of Savoy, now Gran Paradiso National Park. The situation was completely different in the United States. There stimulation came from enterprising pioneers who practiced little economy in their utilization of natural resources and whose already powerful technology had allowed them to make brutal inroads, of which, moreover, they were often legitimately proud: land clearing, construction of railroads, mushroom towns, industries, extermination of the bison, etc.

It was fundamentally to set up—at least locally in a region recognized as particularly

beautiful—a barrier to these acts of mutilation, unknown in Europe, that the promoters of Yellowstone National Park entered into combat and carried off the victory in Congress in Washington, thinking of the “enjoyment of the people” both of their own and future generations. And they were able to obtain satisfaction over a very large area because—and this is another condition that could not be met in Western Europe—near to the new frontier of the United States at that date there remained large unoccupied zones where such an imposed blockage of development was still possible.

Our task here is not to retrace the whole history of the national parks that have been established since 1872 in various parts of the world; the stages in this development have been covered in detail on a number of occasions. We intend to limit ourselves to a review of the new national parks that have been established since the First World Conference on National Parks in 1962. We shall also attempt to highlight the main problems now being encountered throughout the world by those whose responsibility it is to create parks and ensure their correct management.

Insofar as the quantitative enlargement of the world national park network is concerned, this period has been marked by four important factors: in the industrialized countries, public opinion has become clearly more favorable to the idea of the national park; in the developing countries, political leaders have started to realize that high-quality national parks can attract rich foreign tourists. In general, the outstanding factors have been the internationalization of these trends and the considerable increase in bilateral and multilateral aid. Finally, a new member has made its appearance in the ranks of the national parks: the marine park.

In a number of industrialized countries, establishment of national parks has been possible only because of the tenacity of certain leaders who struggled against powerful opposing interests and public indifference. Recent years have brought more favorable political environments, and it has been possible to find funds and mobilize action to convert into national parks some areas still relatively little affected by human exploitation.

This is, without any doubt, the situation in the United States where it has been possible over the past 10 years to incorporate in the U.S. National Park System 100 or so territories of different sizes, six of which have been given the legal status of national park. We owe thanks to public opinion which has been more sensitized to the right direction.

The same phenomenon has also been observed in Canada, in various States of Australia, and in New Zealand where vast Mount Aspiring National Park (272,796 ha.) was established in 1964. In South Africa, also, the group of six national parks has recently been further enriched by Tsitsikama Forest and Coastal National Park. In Japan the phenomenon has been less evident, since the last free spaces had been mobilized by 1962.

Various European countries underwent a similar development, but virtually everywhere population density prevented the establishment of national parks of the “New Delhi” type. Compromise solutions were devised. To accommodate constantly expanding social tourism, various areas were consecrated as “natural parks” in which agriculture and forestry, hunting and fishing can still be pursued but where urbanization and industrialization are barred. The Federal Republic of Germany, which does not have a national park in the “New Delhi” sense of the term, has a large number of *Naturparks*. The United Kingdom combines territories of this type—which strangely enough are called “national

parks”—with zones that are much more strictly protected: the national nature reserves. France has adopted an intermediate system with national parks and regional natural parks. The only European countries to have established national parks of the “New Delhi” type recently are Norway (nine) and Portugal with Gerez National Park. Eastern European countries have also established a number of new parks—in particular, Poland (Slowinski National Park, 1966, 18,069 ha.). In the U.S.S.R., the principle has been accepted of adding to the old type “Zapovedniki” the new idea and even the name of national park (Lake Baikal, 1,300,000 ha.).

Finally, the newest of the industrialized countries, Israel, has also made a significant effort over the past decade, placing under protective status 13 territories which warrant mention in the United Nations List.

The recent establishment of new national parks in the developing countries should be linked with two of the four general factors marking the past decade mentioned previously, namely, growing interest among political leaders of these countries in the economic and monetary advantages of international tourism, and the multilateral and bilateral aid offered to these leaders to help them in their efforts to establish, organize, and correctly manage their national parks. In the field of multilateral aid for national parks, the FAO, without any doubt, is proving the most dynamic and most generous organization. On Tuesday we will hear a report of these rich achievements.

It was the tourist statistics of Kenya, and later of Tanzania and Uganda, which were the most conclusive. As early as 1963, the Emperor of Ethiopia expressed the desire to imitate in his country the achievements that had proved so profitable for his southern neighbors, and it was international cooperation which led, first by the dispatch to Addis Ababa of a mission headed by Julian Huxley, then by various technical assistance projects, to the realization of important projects, in particular around the three centers of Semien, Awash, and Maji.

In Africa, an important stimulus came from a joint FAO/IUCN undertaking, the African Special Project, which first had two experts cover the ground in a large number of countries on that continent and then produced a series of local actions which may be considered the first signs of the increasingly active aid that the FAO is now devoting to the promotion of national parks throughout the world.

Various national parks have thus been established in Africa over the past 10 years by governments which have recently gained their independence, some by means of multilateral aid, others through bilateral aid, and others without any external assistance. We might mention among others, the national parks of Niokolo Koba, Basse Casamance, and Djoudj in Senegal; Boubandjidah, Benue, and Waza in Cameroun; Zakouma in Chad; Malawi National Park in Malawi; Ruaha, Tarangire, and Mikumi in Tanzania; Kidepo in Uganda; and Meru National Park and two marine parks in Kenya. We must not overlook the impressive series of 10 new national parks established, or soon to be established, in Zambia and recently completed projects in Lesotho, Botswana, and Swaziland. As far as the Republic of Zaïre is concerned, it is to the personal interest of President Mobutu that we owe the establishment at the end of 1970 of four new national parks covering a total area of 4,326,000 hectares.

Latin America, in turn, has over the past decade been a theater of intense activity in this

field. Interest is growing increasingly among the national leaders, thanks, in particular, to regional meetings organized periodically by a Latin American Committee on National Parks and to external action such as the previously mentioned undertakings of the FAO, similar work by UNESCO (in Bolivia and Jamaica), the OAS (the Peruvian Catebiriini project), the WWF, the IUCN, private organizations such as the Conservation Foundation (Dominica), and bilateral contracts—missions sent by the United Kingdom, and the dispatch of experts from the U.S. National Park Service. Mention should also be made of the indirect but very real role played in Ecuador by the Charles Darwin Foundation for the Galapagos.

Over the past decade Latin America has seen the establishment of at least 30 new national parks, the largest number being located in Uruguay, Peru, Brazil, Surinam, Colombia, Costa Rica, and Cuba. In Chile, efforts were directed in particular at consolidating the existing system. New achievements have also been marked up in Guatemala, Venezuela, Bolivia, and Argentina.

Leaving aside Siberia, remote-controlled from Moscow, and the People's Republic of China, where we know of the existence of nature reserves—as also in North Korea—but on which few details are available, the achievements of the past decade in Asia have not proved negligible either. Here, once again, we find international influence side by side with spontaneous local initiatives such as that in Iran which recently led to the establishment of a significant network of wildlife parks. In Turkey, it is bilateral aid which has proved most effective, leading to the establishment of about 10 national parks, and a National Park Service with its staff trained in the United States and guiding plans bearing the imprint of the U.S. National Park Service. Other similar examples of collaboration could be cited. International experts are operating in particular in Nepal and Pakistan. Missions from the International Commission on National Parks are at work in South Korea and Taiwan. WWF aid for the rhinoceros is being given to Kaziranga Wild Life Sanctuary in Assam and the Indonesian reserve of Ujung Kulon. Among the most recent founders of national parks are Nepal, Bhutan, and South Korea, without, of course, overlooking Thailand which, in its planning for a conference which the IUCN held in Bangkok in 1965, made a considerable effort by preparing six national parks, the most important being Khao Yai. Cambodia had also made praiseworthy efforts but the political situation has compromised further progress.

Finally, the reference to Thailand leads me to report that the regional conferences organized by IUCN to arouse support among whole portions of a continent for the general concepts of nature and natural resource conservation, have all had very significant fallout in the field of national parks. We had the Arusha Conference for Africa in 1961, the Bangkok Conference for Southeast Asia in 1965, the San Carlos de Bariloche Conference for Latin America in 1968, the Madagascar Conference in 1970, and various others, not least of which was the First World Conference on National Parks in Seattle and various IUCN General Assemblies (especially Nairobi in 1963 and New Delhi in 1969).

A short remark is now sufficient to conclude the account of this past decade's achievements, and this concerns the fourth innovation, the multiplication of marine parks. The "marine revolution" has, in fact, taken much longer than the industrial revolution to make felt its deleterious effects on the environment, to provoke reactions, to give rise to the prob-

lematic creation of effective coastal reserves, and to give birth to the idea of "Islands for Science." A part of our work will be devoted to this new aspect of our problems. The point here is to indicate that this aspect has attracted wide attention only since the Seattle Conference virtually pioneered the subject 10 years ago.

Now, to conclude, let us paint an overall picture of the most important of the innumerable problems that have been encountered over the past 10 years by those whose task it is to establish and administer the national parks. These are problems for which the deliberations of our conference will attempt to find solutions.

For the sake of order, let us itemize them. First, in relation to the three objectives at which such an establishment may aim: to conserve, to welcome visitors, and to act as a framework for ecological research; and, second, in relation to the fundamentally different situations of the industrialized and developing countries.

Admittedly, any national park is, *a priori*, confronted with the need to operate effective protection arrangements within its boundaries; but this operation may be either an end in itself—conservation for the sake of conservation—or it may be the means to another end—conservation for the benefit of the tourist or the ecologist.

Conservation for the sake of conservation can involve endangered species or ecosystems. Admittedly, this objective may be of local importance anywhere in the world. The Conservation of Terrestrial Communities section of the International Biological Programme (IBP/CT) has, for this purpose, instituted the important Check Sheet Survey, and has just come to an agreement with IUCN and the British Nature Conservancy for continuing this project over the coming years. However, on the whole, it must nevertheless be admitted that conservation for the sake of conservation is a task which is both more essential and more difficult in the developing countries than in the industrialized countries where species and ecosystems are, in general, if not less menaced then at least easier to protect. In an industrialized country, conservation for a national park will be considered primarily for the benefit of social tourism, whereas in the developing country it is more an end in itself, except in parks where the main attraction is the large animals, as is frequently the case in Africa. Alas, however, this is rarely the case in Asia or Latin America.

Having stated this principle of the basic motivation behind conservation, it should not be forgotten that the application of this motivation, that is the effective establishment of a national park, necessitates at least four basic conditions: (1) a firm political will on the part of the country's leaders; (2) a trend in public opinion which demands, supports, or at least accepts this official will; (3) the mobilization of the funds required to bring this will to fruition; and finally, (4) the intervention of an administration, in the widest sense, having the necessary effectiveness and competence to translate this will into action.

Here, once again, the contrast between the rich world and the poor world is flagrant. In the developed country, the social groups interested by the expansion of national parks are continuing to increase, and it has become possible, because these people are receptive for various reasons, to make them more and more conscious of what they should demand, knowing that their interests can be met. Here we have a circle operating in the correct direction: increasing political will and funds mobilized and then effectively used by a high quality administration.

In the poor country, on the other hand, even if clear-sighted leaders show some constructive inclinations, the circle operates in an opposite or vicious direction. Public opinion, comprising a majority of economically weak persons having interest neither in the conservation of species nor ecosystems, nor, alas, for any social tourism, remains uncomprehending and even, for the time being, uneducable (the current favorable example of the East African Wildlife Clubs seems to us to be an exception at the moment). If a decision is taken at a high level, the necessary credits are nearly always inadequate, if not ludicrously small. And even if they can be mobilized or obtained from outside, the administrative machine to which the execution of the task has to be given, will most often be inactive, inexperienced and rarely incorruptible. In the extreme case, unfortunately, in the past decade, many of the developing countries have experienced public insecurity fundamentally incompatible with the integrity of a national park (e.g. southern Sudan, Zaïre, Chad, and Cambodia).

The problems encountered in establishing and organizing national parks recur, but under new forms once establishment and organization have been achieved. And here, this duality of rich world and poor world takes on other aspects, with certain problems appearing relatively similar in the two cases, while others remain different, in particular as far as the factors mentioned above are concerned.

Aside from internal weaknesses which may result from a lack of resources or inadequate staff, the main difficulties with which a national park may have to deal result from various types of pressure acting to its detriment, some being at the service of external interests, others combined with the very use of the park.

Among the former, one immediately thinks of the amputations which are demanded in order to "return" these territories to economic exploitation. This phenomenon is not unknown in the industrialized countries but is perhaps even more frequent in the tropical zone. Serengeti National Park is, at the moment, experiencing this problem.

In addition, we could cite the roads, railways, high-voltage electricity lines, oil pipelines, etc., that some people would like to see crossing such and such a national park; or the airports, military installations, mining operations, etc., that some people would like to see established. Examples can be quoted in all five continents.

Another item of importance in this dossier is, of course, the dams that are so easily planned for construction in a national park because the water there is more abundant, more regular of supply and cleaner, and because the zones that are to be submerged are uninhabited and do not require expensive expropriation. Examples crowd to the mind both in industrialized countries—United States, Canada, Switzerland, Japan, Sweden, New Zealand, and Australia—and in the developing countries—Murchison Falls in Uganda, Los Alerces in Argentina, and Corbett in India.

In addition to these pressures which are exerted in legal ways by means of political intervention, there are the less legal, less publicized activities, such as the vast timber exploitations in Sumatra accorded by the local authorities to companies of large foreign capitalist countries. These occur more frequently in the developing countries, and while rare, they are not unknown in the industrialized world. For instance, land speculations in Abruzzi National Park in Italy are no secret.

Then there are the still less legal activities, quite contrary to the regulations of these

national parks, but which the authorities cannot or dare not suppress. In this latter category we have the innumerable poachings of rhinoceros and vicuña, to cite the most famous examples, or illegal forestry such as harvest of palmitos in Iguazu National Park, committed with impunity because the guards who should prevent them are too few in number, without firearms, and, at times, in connivance with the poachers. And there are infractions which the authorities dare not repress for political reasons such as the presence in the park territory of half-starved peasants accompanied by their equally half-starved cattle. No one would know where else to put them. Latin America and Asia offer the spectacle of these sad invasions more than Africa.

With a brief reference to some problems which may result in true "pollution" of national parks by external factors—atmospheric pollution, pollution of water entering a park, oil spillage on a coast, infernal noise from a neighboring airport (Florida), the ill-considered introduction of fauna (goats in Hawaii, the Galapagos, and 20 other national parks), rapid multiplication of deer, the tragedy of the rabbit in the Australian parks, etc.—let us now deal with the problems linked with the second great motivation: tourism.

Here the poor countries are privileged in relation to the rich countries. There is indeed the beginning of congestion in certain African parks, in particular when the presence of large animals contrasts with the long queues of vehicles. There was also a plan for the installation of a hotel in Ngorongoro crater which justifiably led to a campaign of protest. But these incidents are not serious compared with those potential ones which exist everywhere where tourist interests combine with those of organizations or persons who earn their living from this tourism.

The examples are abundant and I am sure each of you has a number in mind. You will think of the problems of concessions, transportation, accommodation, leisure activities, and services. In France, there was a battle to defend the Vanoise. Canada became passionately involved in the case of Lake Louise. The organizers of ski championships have looked covetously at Banff, Tatra, and Shikotsu-Toya. A recent symposium dealt exclusively with the problem of the snowmobile. These subjects will be brought up frequently during the present meeting.

Fortunately, the situation can often be improved by intelligent use of the national parks themselves as an instrument of public education. Once again, the United States has shown the way, in this direction, by successfully multiplying, in their protected zones, the information services, the museums, the campfires, and the signposted hikers' trails. However, we will not have finished till we have dealt with the third of these objectives that may motivate the promoters of a national park: the interest in ecological research. For political motives, this objective, in the case of a national park and not a scientific reserve, can scarcely be considered independently but must be combined with tourist objectives, and even shelter behind them to gain political acceptance, since the protected zone comprises small integral reserves submerged in vast sectors open to the public. These integral reserves have thus the appearance of a supplementary project, even if for the promoters they are the *raison d'être*. And here we have another topical problem, that of "zoning," the importance of which is everywhere becoming more and more perceptible. As early as 1967, by virtue of this zoning principle, the United Nations List accepted the Japanese national parks which, nevertheless, observe the ICNP criteria for

only half their areas. And, provided that enclaves of adequate protection can be provided, the same principle could, perhaps, one day lead to the listing of the British national parks and also the German Naturparks.

Coming back to the problem of systematic ecological study, the critical problem is to carry out this scientific research in the framework of an integrated program aimed at the systematic scientific exploration of protected ecosystems. In the past, a program such as this was carried out in Congo. Since 1949, this type of program has been operated in the British national nature reserves by the Nature Conservancy. In the United States, in spite of the progress following the desires expressed at Seattle, it seems that further progress is still possible. Countries which have made great advances in this sphere, due in particular to the abundance and quality of the permanent scientific staff used, are located in Eastern Europe, the U.S.S.R., Poland, and Romania.

Other problems could be raised in a related order of ideas, such as the value of this type of research for the correct layout of the national park, or for the rational development of the natural resources of the neighboring inhabited zones, which is so greatly needed by the Third World.

But the time has come to conclude.

In view of the recommendation made to this Conference that it should be wide-ranging in time, in space, and in the immense field of problems related to national parks, this introductory report cannot avoid being incomplete. Our discussions should aim at filling all the gaps that have been left.

SESSION II / PAPER 2

WHAT IS WRONG WITH THE NATIONAL PARK MOVEMENT?

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Early pioneers and their followers through the first century of development of national parks may be excused for thinking that they have seen the movement through its most difficult days. Nevertheless that will probably prove to be an illusion. It is during its second century that the movement will encounter the full force of pressing rival claims to land, of indirect dangers through pollution, of degradation through overuse by a too numerous and too mobile interested population, and of aggravated management problems as the parks become more isolated from other wild country. Compared with such complex and chronic difficulties, the problems of initially setting aside one or another tract from vast reserves of wilderness, and of guarding against encroachment of a still relatively sparse population will no doubt appear in retrospect as a soft option.

If the world's parks are successfully to weather their second century it can only be with the aid of much more effective public backing based on much clearer thinking and more professional management, assuring the basic integrity of the parks in face of a wider and more diverse range of uses. Without going so far as to cut the umbilical cord of tradition and emotional investment dating from the birth of the movement it must learn to move forward unfettered by its peculiar origins.

The "romantic movement" of the early 19th century has long worked itself out as a cultural dominant, yet, for many of their keenest supporters, parks are still viewed as a living embodiment of romantic values, and therefore as an unashamed anachronism in the modern world. For these resolute loyalists, national parks are the setting of an ardent love affair with wild nature, tapping passionate emotions and scorning the paths of reason in the service of the untamed, virginal, mysterious, and adorable beloved country, which takes its aficionados out of the world. Their attitudes and their energy have formed much of the strength and a growing part of the weakness of the movement. Their delicious dream is proving increasingly hard to reconcile not only with an ever less romantic and more crowded world, but with the realistic tasks of park acquisition and park management. Their values prove more and more nebulous and inconsistent as the need for giving practical effect to them becomes more insistent.

Yet it would be a tragedy if the very real contribution which they can continue to make were to be rejected by a new generation of more practical and pragmatic park managers and users, who will lose and suffer for it if they cannot somehow retain this guiding light. Somehow the oldtimers and their newer missionaries and disciples must be listened to within their peculiar realm of human values, while they must become content to leave to the scientific pragmatists all the day-to-day and down-to-earth aspects of winning, defending, and operating the parks themselves. To follow the alternative course of permitting the compulsively emotional champions to continue to dictate policy and to handle tactics would be to condemn the movement to go down into limbo among the great lost causes of history, which merely furnish romantic material for later storytellers and for show business. Somehow a peaceful means of guiding forward together these uneasy fellow travelers must be found.

A comprehensive system of national parks and equivalent reserves was far beyond the thoughts of those who, working far apart with eyes fixed largely on a single area, unknowingly laid the foundations for one. To this day, piecemeal and opportunist aims have remained uppermost, and the critical definition of categories, the precise formulation of management aims and programs, and the monitoring of intended and unintended change have been left to a minority. The price to be paid for this naive attitude has rapidly mounted as other human activities have begun to press more heavily and frequently on the parks.

It is far from clear how and why the term "park" came to be accepted as appropriate to describe large slices of mainly inaccessible wilderness. In its early English origins, "park" was applied to managed unproductive remote "forest" which did not necessarily have any tree cover. It may be assumed, however, that the adoption of "park" implied reservation for visitors, visiting from afar, on terms which would leave the area unimpaired for their successors. Noninterference, nonexploitation, and public access to enjoy

nature were central to the concept. The significance of the prefix "national" is more definite, but it is dual. In terms of quality it implies that the park displays features which are of more than local or even regional or provincial importance—they are among the best examples of their kind within the national territory and form a worthy contribution toward the world heritage as represented in that territory. As such, they merited selection, safeguarding, and guardianship at the highest national level, being held by the nation for the nation under provisions which place the utmost restraint in the way of their legal alienation or disturbance. This makes them national constitutionally also.

The detailed and manifold implications of these basic principles have only recently begun to dawn on many of those concerned. A single word such as "unimpaired" can involve a host of scientific and technical as well as legal and administrative complexities. In his monumental task of preparing the United Nations List of National Parks and Equivalent Reserves, Prof. Jean-Paul Harroy had to define and try to apply a series of basic standards in order to ascertain which of the world's so-called national parks could be accepted as real. This very necessary and overdue exercise revealed how many of those responsible had, consciously or unconsciously, adopted or acquiesced in practices and standards in conflict with the national park concept. For example, a number of purely suburban parks in metropolitan areas had been glorified by the prefix "national." In other cases, towns and villages, factories and farms, mines and timber plantations had been indiscriminately included. Some "national parks" were in the hands of provincial or even local authorities, without even the land being in public ownership. In many cases there was not only no management plan, but no adequate budget or trained staff. Even among the best-run parks some took for granted that showing spectacular wildlife was paramount, while others were content with grand scenery and others displayed magnificent trees—all worthy and excellent objects but implying a series of different types of park, with different qualities and problems, the significance of which was frequently overlooked.

The 1960's were the time when, following the First World Conference on National Parks in Seattle, the making of comparisons between parks in different countries and the interchange of professional experience between park men really got under way.

It became obvious that parks were not only of different characters but were expected to serve different and often conflicting uses, and to manage with different levels and ranges of resources. The very success of the United Nations List, and of other initiatives, in raising the prestige of national parks made it more difficult and embarrassing to discriminate. Some natural areas were held and managed primarily for scientific research, others for conservation of game or wildlife, others because of special geological, archeological or historical interest. Some others were mainly attractive for recreation of various kinds, and others for viewing scenery. Some were even underground or under water. These distinctions involved vast differences in size, in access, in facilities, in management, and in public control, and raised the question whether the upholding of a clear standard and image for national parks did not demand the recognition of a whole series of related distinct categories of protected natural or seminatural areas, which could not be lumped in with national parks if the credibility and essential character of the latter were to be maintained.

In what follows, it is assumed that means will be found for dealing separately with those kinds of areas which fail to comply with the IUCN definition of national parks, insofar as their requirements call for international recognition, advice, and aid. Such natural parks, state parks, forest reserves, strict nature reserves, game reserves, national monuments and other equivalent protected areas are equally capable of being usefully considered with others of their kind in different parts of the world, with a view to exchanging experience, improving standards and techniques, interchanging professional visits or postings, and coordinating publicity and their relations with other kindred interests. They are not, however, national parks, and well-meaning attempts to confuse these categories will only lead to trouble.

From the time of the earliest documents about Yellowstone, it was envisaged that, through active research, national parks would become areas about which our knowledge would be exceptionally full. Yet with such few shining exceptions as Parc National Albert (the subject of more than 500 scientific studies) these hopes have been badly disappointed. It is remarkable how little we really know about the majority of the world's national parks, and how little effort has until very recently been made to learn about them seriously. It is even difficult to assemble enough elementary facts, as we are attempting to do for the International Biological Programme, to make quite simple comparisons between the contents and conditions of a group of parks.

Where scientists or naturalists are included on the staff of parks, they are often too heavily burdened with talking to visitors, acting as guides and advisers, and writing publicity material to be able to undertake very serious survey work. Until quite lately, reactions of blank ignorance were encountered when raising the subject of ecological studies and facilities for conducting them with most park managements. An amusing illustration from East Africa occurred when a board of park directors at their annual meeting were invited to authorize the engagement of an ecologist. One old-style and slightly deaf member objected on the ground that it was unnecessary and unwise, to let an ecologist into the park; on finding himself unsupported, he conceded that it might be acceptable but pressed for the introduction of a pair, in the hope that they might breed. A young married ecologist was duly recruited, and not many months later the Parks Director was able to send that trustee a telegram with the joyful news "Ecologists have bred."

Given our current public overexposure to what is alleged to be ecology, such an incident could hardly happen now, but it remains true that the great and varied significance of information in depth about the natural resources and systems of each park is still badly underrated. Such information is essential equally for assessing management problems, as a basis for all interpretive services and material, and not infrequently also for resisting threats to the integrity of a park. Thanks to the modern expansion of the university graduate population and study programs, it is not infrequently possible to secure a great deal of free assistance in carrying out surveys and investigations, provided that the park administration is sufficiently on its toes and is able to make the right contacts on the right campuses. Many academic programs call for outdoor study areas, and where their conduct does not conflict with the preservation of the park resources there may often be a natural affinity between the two. While many parks have used college vacations to recruit temporary staffs there is much room for further development here.

This, however, can be no substitute for the parks themselves accommodating teams of ecologists, in some cases shared among a group of parks, to monitor and interpret what is going on. Even the largest parks are increasingly affected by the impact of external influences, such as airborne pollution, the influx of pest species, or demands to extend within them biological controls necessitated by blunders in agricultural and forest management outside. In such a world, it is imperative to make good without further delay the long arrears in equipping park systems with adequate scientific knowledge and advice in close and continuous contact with management.

Given such strengthening it becomes possible to identify more fully and exactly the great remaining gaps in the national and international parks network, which has arisen without any clear idea of the sum of natural values meriting inclusion within such a network, and has been opportunistically concentrated on a smallish number of areas exhibiting features so spectacular as to appeal strongly to the least informed, or fortunate enough to have attracted exceptionally influential support. We are entering perhaps the last decade in which it will still be possible to make successful initiatives to expand park networks with the object of systematically improving their coverage and balance.

At the same time, the existing boundaries of many parks need urgently to be reviewed (as is being done by a number of park authorities), both to conform to ecological realities and to add buffer areas in cases where incompatible developments just across the boundary would compromise the integrity of the park. In a few cases, where, for example, it proves that first-rate mineral resources have by chance been included in some unimportant peripheral area of a park, the converse process of redrawing a boundary to exclude them should be given thought in the interests of defensibility of the sacrosanct status of parks as a whole, but it is essential that this should not be left to be done under external threat; the initiative should have been taken earlier by the park authority concerned. A too literal-minded and rigid insistence on the unalterability of every park boundary is almost certain to prove untenable through the coming decades. It would be disastrous to give reason to think that no boundary will ever be adjusted by reasonable means, or on the initiative of a park authority, and that therefore frontal attacks with the maximum of bitter controversy and political tension offer the only possible path to review of boundaries, some of which are well known to have been hastily fixed for mistaken reasons in the past. It is in such situations that park administrators are liable to have to fight on two fronts, against charges on unreason and blocking human economic needs on the one hand and of treachery to the absolute inviolability of any *de facto* boundary on the other.

As long ago as 1955, when I had the privilege of attending an uninhibited dialogue between park and forest administrators and leaders of the National Parks Association, in Virginia, there was already some expression of concern at the public loving the parks to death. Every year now intensifies this danger, and makes more demands on the foresight, wisdom, and firmness of park managements. Using hindsight, we can now see that the maxim that more road space generates more traffic to overfill it is as true within parks as within cities. In too many cases, complexes of facilities—not all of them even related to immediate needs on the spot—have been permitted to develop in the most valuable and vulnerable sections of national parks—the Yosemite Valley and Seronera in central Serengeti being two familiar examples. It is now becoming clear that the better strategy

is to site accommodations, campsites, museums, and other major services at or near the edge, where visitors can be encouraged or required to leave their cars parked and to proceed into the natural areas either by buses (as at Williamsburg, Va.), or by horse-drawn vehicles (as at Bialowieza, Poland) or by boats, ponies, bicycles, or other ecologically innocuous types of conveyance. In older areas, where such principles were not followed earlier, much difficulty is experienced in backtracking to them, but the longer such adjustments are deferred, the more difficult they become.

Even so it has to be recognized that areas deserving of national park status will represent an increasingly scarce and vulnerable resource and that many recreational, educational, and even scientific activities hitherto regarded as legitimate must in future be taken care of by alternative areas managed for these purposes outside the parks. This raises the question of how far the hard-pressed Park Services should take the initiative and put in effort in the planning of such alternative relief outlets. Obviously, wherever this task can be effectively undertaken by others, that is desirable, but where it cannot, and the prospect is one of an indefinite build-up of extraneous pressures, it may be the lesser evil for Park Services to take some initiative themselves.

Modern trends and pressures call in effect for simultaneous and opposite responses on the part of the movement. On the one hand, it needs to concentrate its vigilance and its energies on the essential values and functions for which national parks strictly stand. On the other hand, it must, as the price of survival, help to encourage and develop a much wider and more effective group of organized interests for the safeguarding and managing of a series of nonpark environments—natural, seminatural, or, frankly, manmade—the existence of which is equally essential to satisfy the widening range of public demands and to siphon off the pressures which will otherwise overwhelm the national parks. Undervalued and underprovided as the world's national parks still are, they, nevertheless, constitute a dangerously privileged elite among a number of struggling kindred movements to provide and maintain land for science, education, recreation, and many other increasingly important modern activities requiring an outdoor setting. The success of these movements may well prove the determining factor in the long-term success of national parks in maintaining unimpaired for future generations the heritage which they represent.

Twenty years ago the idea of national parks would probably have been generally accepted as the spearhead of public concern for the environment. Is this still so today? Obviously in terms of immediate public preoccupation it has been overtaken by the struggle against pollution, while other great causes such as mastering the population explosion will rightly claim more and more attention. Against this background, is the national park movement destined to recede into a subordinate role, while the mainstream of environmental concern bursts into other channels? Signs are plentiful that this may well happen, unless a vigorous reappraisal is carried through without delay. In such a reappraisal, national parks must justify their existence not as ends in themselves but as essential components in a new, much more environmentally conscious society, which seeks to attain and vindicate harmony with the world ecosystem through many different means, all needing to be harmonized and integrated with one another. If the national park movement can be so rejuvenated, so refreshed in its inspiration and thinking, so much

more strongly underpinned scientifically, and so much more effectively and professionally run that it can play a leading part in this much larger and more significant new movement to reconcile man with his environment, its future can be looked forward to with confidence.

SESSION II / PAPER 3

**HOW WELL HAS THE UNITED STATES MANAGED
ITS NATIONAL PARK SYSTEM?
THE APPLICATION OF ECOLOGICAL PRINCIPLES
TO PARK MANAGEMENT**

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It is a distinct honor that we in the Department of the Interior of the United States of America are able to welcome you to this historic Conference. That these meetings should be in the form of an observance of the 100th anniversary of Yellowstone National Park was voiced by the First World Conference on National Parks through formal recommendation. No expression of felicitation at our National Parks Centennial can surpass the compliment you show us by being here today.

We would be deluding ourselves, however, if we did not recognize that with the joy of this occasion there is also sorrow over man's abuse of his lonely planet—and even well-founded foreboding over the future of man. We can take only momentary pride in the achievements of the national park movement's first 100 years when we realize that in the second 100 years the fate of mankind possibly hangs in the balance.

I wish I could say that we meet here today with great pride and confidence, assured in the belief that whatever the future holds man can deal with it. But you and I know that the second 100 years of the national parks will confront man with questions of such magnitude that our problems of the first 100 years will seem almost infinitesimal in comparison. How well has our experience equipped us to cope with the problems of the future?

Some of us here today will see the world population, at present rates of growth, increase in the next 30 years to 7 billion people and possibly in the following 30 years to 14 billion. Overcrowding in our national parks in recent years becomes a relatively small item against such a massive scale of future population pressures. There is no assurance that even a blueprint for survival will assure, or even prolong, the existence of mankind when we consider that the population of today—through demands that are increasing by ex-

ponential leaps and bounds—has already brought many of the world's natural resources near exhaustion.

Only the intelligence of man, mobilized in such a manner as we see it here today, might alleviate or alter this course. Whether the national parks of the world will have any bearing on this question no one can definitely say. Yet, if we have learned anything in the decade since the First World Conference on National Parks, it is that our parks have values far in excess of their recreational or esthetic values. Their relatively intact ecosystems may provide the clues or the bases from which man might better understand and maintain the biosphere. Of all the values which the national parks of the world possess, perhaps none are of greater significance than this.

Man has barely scratched the surface of ecological learning. A recent report of the National Goals Research Staff advises us that the formulation of environmental policy awaits more understanding, and a widening of our imperfect knowledge. The International Biological Programme's analysis of ecosystems is a major effort to widen that knowledge. The first of its six chief land-type studies, the grasslands study, is expected to be completed about 1980. The National Science Foundation is the Federal agency leading the IBP effort in the United States.

National park studies are giving us insight into ecological processes and ultimately will provide a sounder basis for decision making. From these studies we are beginning to appreciate the fact that an ecosystem does not function effectively unless it is in a reasonable degree of equilibrium. All such systems have built-in tendencies by which they reduce disorder in any transfers of energy. We are beginning to realize the need for maintaining ecosystems in their respective steady states. This often involves evaluating the role diversity plays in such systems.

We are only beginning to recognize that our ecosystems have optimal carrying capacities represented by the mass of organisms that can be carried while maintaining equilibrium, that is, without ecological damage. We are extending this concept to ascertain the carrying capacities of our parks with the hope that we can establish the optimum number of visitors which a park can tolerate without irreversible damage to the resource.

Present attempts at determining the carrying capacities of parks are based solely on empirical data. Many examples of these efforts exist, such as our attempts at experimental rationing of wilderness use in the Rae Lakes Basin of Kings Canyon National Park, Calif. Here, heavy use has resulted in local ecological and esthetic damage, especially in the camping area. Park scientists and other knowledgeable field men estimate 124 campers could be accommodated per night in the relatively few suitable campsites without resource damage during the 90-day summer season. However, experience has seen heavy concentrations of visitor use during certain short time spans. The present empirical Rae Lakes formula attempts to spread out visitor use temporally and spatially, and thus achieve the two fundamental objectives of park management: a reduction of human impact on park resources and an enhanced quality of wilderness experience.

The computation of the carrying capacity for visitors might be derived, however, from the resource and maintenance cost; it need not be arbitrarily assigned. A true wilderness probably has a carrying capacity for human visitors of near zero. Let one trail be cut and we have a tangible factor by which we can evaluate the cost of the new increased carrying

capacity. The maximum capacity of a parking lot is the number of parking spaces; in a hospital it is the number of beds. Each developed facility also has an optimum capacity, that point just before deterioration from overuse sets in.

Carrying capacity is thus an ecological relationship of people to facilities. In developed facilities of known capacity, with known rates of entry and egress and with established optimum use levels, the numerical carrying capacity of any park can be determined. The answer will relate to the capacity of the developed area of the park to contain people. A use of a facility would be limited when use degrades the facility faster than maintenance efforts can prevent it.

In this context, carrying capacity becomes a straightforward systems analysis problem. The role of the ecologist centers on determining the point of unacceptable degradation of natural environments. The carrying capacity is determined after developments are incorporated. Thus it is essential that park master planning reflect serious ecological thought in determining the location of initial developments. We certainly have not done well enough in this respect.

The establishment of carrying capacities in this context will only prevent irreversible degradation of the natural resource. Such capacities may or may not relate to those capacities which provide a "quality park experience."

Hopefully, national park success in using the carrying capacity concept could lead to its application in broader ecosystems and in the management of nonpark environments. The point at which a residential neighborhood becomes a ghetto might be ascertained before the tragic day arrives. Population pressures could and must be identified before they override a community. Sound planning, with full use of our computerized technology in determining carrying capacity, could ration man in accordance with the resources necessary to sustain him.

Every nation represented here today is encountering serious environmental problems, both inside and outside its national parks. The loss of every leopard in Africa, every alligator in Everglades, and every polar bear in the Arctic is a loss to all nations.

Here at Yellowstone and Grand Teton National Parks, the prolific elk (*Cervus canadensis*) has been a problem for many years—or rather, man has been the problem by not knowing, at the start, how to manage the expanding herds. Not that our park managers and biologists haven't tried. They simply were pioneering in a field which never had been adequately researched, with a problem that had been dealt with primarily through herd reduction by shooting or by live-trapping and removal.

Until 1968, surplus elk were trapped or shot. Then, on the northern range of Yellowstone National Park, the National Park Service initiated a "natural regulation" policy, the principal mechanisms of which appear to be high death rates and low birth rates, largely caused by severe weather along with heavy competition for winter forage.

The elk range supports several other ungulates and nine mammalian and avian carnivores, including scavengers. The objective is equilibrium, but will this be achieved by an increase in predator numbers in response to an increased food supply for them? It is too early to find explicit answers, but I believe we are on firm ground in giving this new management approach a thorough analysis.

How vital is predation in elk population control? Until recently the wide-ranging and

indiscriminate predator control on most public lands made it difficult to answer this question. However, President Nixon, recognizing that predators help maintain ecosystem integrity, issued Executive Order 11643 last February restricting the control of predators by eliminating the use of chemical poisons, thus increasing the probability that basic questions on their role in ungulate population control will be answered.

In a sharply contrasting environment on the barrier islands of Cape Lookout National Seashore, N. C., we have found that our dune stabilization could be ineffective and even harmful. An ecological study of this seashore proposes that man, not the sea, is the barrier island's worst enemy. Man interferes with built-in natural mechanisms which enable the island to survive enormous oceanic forces. Hurricanes and other major storms are significant factors in the existence of the Outer Banks. Storm waters annually wash completely over these low islands into the sounds behind and recede through inlets cut in the weakest link of the barrier chain. Unhindered, this process has maintained the island's integrity for perhaps 5,000 years.

The study found that the saltmeadow cordgrass (*Spartina patens*) is essential to survival of this island ecosystem. This grass thrives under continuous bombardment by oceanic aerosols, frequent salt-water flooding, surface erosion, and even frequent burial. Few known plants have such characteristics. The role of this vegetation, often called "high marsh," is to dissipate wave energy during overwash periods, trap overwashed sand behind frontal dunes, stabilize the sand surface, and quickly revegetate it. The net result appears superficially to be a movement of sand from the front of the island to the back or bay side. However, this annual environmental "shock" maintains the island and adjacent salt-water marsh vegetation community in its early stages of succession which are not the most diverse but are the most productive and beneficial to the adjacent marine animal community.

National park ecosystems have changed our thinking in many other respects. Forest-fire suppression has not always been in the parks' best interest. Understory growth among the giant sequoias (*Sequoiadendron giganteum*) of Sequoia and Kings Canyon National Parks has accelerated under National Park Service protection. Our biologists now realize that a fire in this luxuriant undergrowth would be a holocaust and could destroy the ancient trees. Before establishment of the parks, the sequence of natural fires reducing the understory, coupled with the thick, fire-resistant sequoia bark, eliminated the danger of crown fires, at the same time providing an optimal mineral soil for seed germination. Park managers are now reintroducing fire as an ecological factor for the preservation and maintenance of the fire-climax sequoia forest.

Fire has been used as an ecological tool for many years in Everglades National Park where it is necessary to help mineralize the vegetative mat and to provide the "shock" needed to maintain the early stages of plant community succession.

Our ecologists at Yellowstone National Park believe that natural fire may have had a significant effect on the ungulate winter range vegetation. Individual fires there have been dated as early as 1525. Preliminary tabulations indicate a mean interval between fires of about 60 years, although the interval may be less than that. The deterioration of aspen (*Populus tremuloides*) on the winter range and changes in stream hydrology affecting willow distribution may have resulted from the absence of natural fires for

periods much longer than 60 years, owing to fire-suppression policies. By reintroducing fire to the ecosystem, these hypotheses can be tested further, and the use of controlled fire on an experimental basis is now a fact in both Yellowstone and Grand Canyon National Parks.

Any candid appraisal of park management must conclude that ecological factors often have been ignored in park planning. Some campgrounds, for example, have been located unintentionally in the seasonal habitats of grizzly bears. Such campgrounds should be closed and more suitable sites chosen.

Back-country overuse has brought suggestions for a permit or registration system. Local overuse in such areas does merit attention. How much more effective our efforts would be, however, if we could apply our carrying-capacity concept rather than limit access arbitrarily. Especially needed is a management decision altering visitor use in terms of both time and space. Such a solution would be worthwhile even if it allowed only one more person to visit an area without degradation of the resource.

National park problems in other continents, in other biomes, certainly will not be identical with ours, but the principles which we are applying in meeting our problems may prove applicable in your parks. Recently, in delineating the public lands that should be withdrawn in Alaska, the Secretary of the Interior cited the need for "ecosystem thinking." Instead of moving to acquire the smallest possible area, we must now consider the maximum feasible area, then delineate management boundaries with a full consideration toward maintaining ecosystem integrity. However, these boundaries will prove successful only if full consideration is given to the use of adjoining lands by the public land-managing agencies concerned.

We have just such an example of conflict in conterminous land use. Today we are battling in the political, social, biological, and fiscal arenas to acquire Big Cypress Swamp in south Florida. The swamp is a source and guarantor of the slow, sheeting water action upon which Everglades National Park is utterly dependent. Today, long after establishment of the original park boundaries, we are attempting to acquire the swamp through a dozen cooperative actions designed to shore up the crumbling edges of this rare tropical system.

This patchwork process of park building will probably be an increasing phenomenon in the international park movement. It clearly shows the need for stepped-up efforts to establish ecology as a mature science and to make it fully understood and appreciated by the public.

In this pursuit, the National Park Service is stressing an environmental education program both in the parks and in the public school systems. The main thrust is through the National Environmental Education Development (NEED) program. NEED is designed for use in public school systems more as a process of teaching many subjects than as a designated course. It has evolved as our first attempt to relate the immediate and more distant environments to our dominating urban population.

The NEED philosophy has taken on new meaning with the rapidly rising interest in urban parks. Our population is now more than 70 percent urban, and the best way to create an environmental awareness or understanding is to start in the home territory. The urban environment has some unique characteristics, but they are related to, and,

in most instances, governed by, the same ecological principles we so readily perceive when removed from the urban area.

A wise interpretation of both urban and nonurban park environments will broaden our understanding of the awesome forces that define the evolutionary physiological limits within which the human organism must remain.

I suggest that we concentrate on thinking of our diverse national parks as ideal vehicles for promoting education toward a diversity-based global environmental ethic. This concept was proposed inspiringly last year by Dr. Gerardo Budowski, Director General of the International Union for Conservation of Nature and Natural Resources (IUCN) and former Programme Specialist for Ecology and Conservation, United Nations Educational Scientific and Cultural Organization (UNESCO).

In calling diversity "the most salient feature of a global ethic and a basis for world citizenship," Dr. Budowski has, to my mind, defined one of the highest purposes that could unite the worldwide national park movement.

He stressed "diversity found in the environment—particularly when it is closest to its natural state" and maintained that these diverse natural environments would help "all people to feel that they are the recipients of a world heritage which has been passed down through millions of years and will continue to be passed down in the form of landscapes, wild animals, and plants, for which Man is merely the current, ephemeral guardian."

Dr. Budowski, who credited a 1970 paper by Théodore Monod as the inspiration for this observation, commended diversity not only as a stabilizing ecological factor, but also as the basis for the richest set of human options. He made a strong plea for education as a necessity for spreading environmental awareness and appreciation of diversity, and he spoke movingly of "the amazing receptivity found in youth throughout the world." I have traveled extensively in my country's parks and I have found this hunger, longing, and response in the youth of this and other lands in our National Park System. Nature may no longer convince us that she is our present natural habitat, but she can be totally persuading as the basic model for accouterments of our civilization, which has been patterned after and spun by us out of nature.

Lewis Mumford, in his mighty work making "myth" of the machine, points out that technology—although needed—is, at best, only a faithful copy and, at worst, a caricature of natural forces. The young recognize this. The parks are their ivory tower and their laboratory. They are rediscovering themselves and their world and the relationships that link them to the parks, the parks to the world and the world to themselves.

The parks have an emerging world role that is more vital than any they have ever yet been called upon to fill. By using parks everywhere as resource displays, the oneness of life and the habitat a park shares with all other life can be presented at a folk-knowledge level against the backdrop of the park environment. The special knowledge that can be studied in schools can be blended into that which can be studied in the parks. The result can be a new brand of husbandry, on the planetary order of earthmanship.

Environmental education can take place with meaning and relevance to any man if it is presented in this combination—as the interface where man lives, between the natural world and the world of rampaging technology. The former represents unbreakable laws

that govern fragile systems; the latter represents powerful, uncontrolled extensions of man's needs and greeds.

Wise interpretive use of park environs could heighten awareness of the powerful forces with which we deal, leading us into a new day of enlightened balance.

National parks are splendid tools for successfully carrying out this delicate mission. We must be wary, for we have run out of time to explore dead ends. The human young, one of many endangered species on this planet, are waiting to see what we will make of our treasure.

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DISCUSSION

Dr. Otto Soemarwoto (Chairman): While the first paper, in particular, has given some account of accomplishments, especially in the past decade, our attention has quite naturally been directed to shortcomings and the many problems that have arisen, some as a direct result of successes achieved. Some of these problems still have to be solved, so that it is difficult to make a clearcut distinction between the past, present, and future. Nevertheless this session should, as far as possible, be oriented toward the past and to the question of how we can maintain the impetus of the inherited national park movement.

Prof. Jean-Paul Harroy (Author of Paper 1): I have concentrated in my paper on the past 10 years, the period since the First World Conference on National Parks in Seattle. Four salient points are worthy of special note during this period: the swing of public opinion in industrialized countries toward supporting those responsible for national parks; the emergence of tourism as a very powerful motive in the Third World for promoting the establishment of national parks and reserves; the increasing flow of bilateral and multilateral aid at the international level; and, finally, the rapid growth of interest in marine parks, the idea of which was born at the Seattle Conference. Against the background of these developments, my paper aims to draw up a balance sheet between accomplishments and problems.

E. Max Nicholson (Author of Paper 2): Historically, we have done justice to that Yellowstone campfire and can now view it in perspective. Frederick Law Olmsted should not

become the forgotten man of the parks movement. It was his genius and pioneer efforts in Yosemite in the early 1860's, which transformed the old European concept of a private or city park into a new model applicable to the conservation and management for the public good of large natural areas. It was his son, another outstanding landscape designer, whose words about handing on the parks, unimpaired, to future generations have been enshrined in the U.S. National Park Service and taken up by park people throughout the world. The embryo of these ideas can be detected in the earlier civilizations of the Middle East. I have the privilege of being associated with a project for a large national park at Azraq in the Eastern Desert of Jordan; here, a millenium and a quarter ago, the Ummayyad rulers of the first Arab empire used to come to relax in the tranquil desert and to enjoy its wildlife. Their doings are pictured in murals which have lately been carefully restored and guarded by the Jordanian Department of Antiquities.

I hope that Dr. Qasem, head of Biological Sciences in the University of Jordan, will have something more to tell us of the project to which I have referred, but although we probably all wish to concentrate on the present and future, I venture to make one more reference to the past. I suggest that the birth of the world movement at Seattle in 1962 will rank as a landmark no less decisive than the campfire at Yellowstone. There, through the vision and leadership of Harold Coolidge and the practical generosity of the National Park Service, was launched a close-knit world network of parks and of parks people, bound by ties of common interest, cooperation, and friendship. It represented a fresh and vigorous mutation of the utmost importance in the national park organism. We can no longer afford to be merely narrow technicians; we are operating at the meeting point between the land (with all the resources of the biosphere) and man (with all his potential and need for fulfilment). In the struggle to harmonize these two, there will be three main lines of development: the application of science to the problems of coexistence and wise land use; the elaboration of park systems and management; and the transformation of human attitudes through interpretive services, education, and participation. The last of these is perhaps our greatest task in the next two decades. If the green line of national parks is to be held, it will be because of the quality of the thinking, the research, the planning, the training, the management, and the mutual support we succeed in initiating here.

Nathaniel P. Reed (Author of Paper 3): My paper stresses my belief in the intrinsic values of national parks to man, not only as an educational tool, but as a blueprint of our past and of our hereditary link with the animal kingdom. I discuss the problems of use and overuse and suggest that a detailed examination of Yellowstone National Park, despite the impact of human visits to the campsites, the hotels, the hostels, and the geyser basin, will prove that the ecosystem is in good health. Nevertheless, I strongly support the National Park Service's investigation of such questions as: What is carrying capacity? How do you arrive at figures and means of regulating use? What tools work and which don't? How do you encourage wise use and discourage unwise use? I refer to current management problems in our National Park System and, for example, the long overdue fire-evaluation studies at present being undertaken; the American people have been conditioned by Smoky the Bear to view fire with dread and alarm; we the park managers must view it in the perspective of environmental history and ecological impact. My paper discusses educational opportunities within parks, both supervised and un-

supervised, together with many of the problems that have to be faced if the world's population and the uncontrolled consumptive use of natural resources continue to expand. But I remain confident of the future of national parks in their second century. Man has the capacity to think and reason and I believe that park supporters can build a worldwide constituency into an even more important and meaningful example of the wisdom which man has the capacity to develop.

John S. Owen (Panel Member): I would like to make two points based on the experience of establishing a park system in Tanzania. First, in building up support for national parks by the public at large and political leaders in particular, it is essential to emphasize that national parks are to safeguard a national heritage, something which belongs uniquely to the people of the country, of which they can be proud and which is or will be the envy of the rest of the world. It is this which gives the parks greater strength than any other image, such as an image based primarily on income from tourism. Money counts, of course, but it is not the end-all or be-all, and it is a mistake to act as though it were. Too often money arguments conflict with the basic ethics of national parks, which makes it all the more important to base the main appeal to public opinion on ethical grounds. Secondly, it is most important that everyone in industrialized countries and, especially, the aid agencies, recognizes that if efforts to assist are concentrated exclusively on development, with no aid going to conservation, it will amount to perpetuating, on a global scale, mistakes made in the aid-giving countries. It is one of the mistakes of the past, which must be remedied in the future, that this point was never made strong enough.

Conrad L. Wirth (Panel Member): Some people may have gotten the impression that we made a lot of mistakes in the past, but many of these mistakes led to a great step forward. One of them, of which I first heard when Tom Vint and his colleagues came up with the idea, was the making of a complete master plan for every area, covering not only the siting of roads but the handling and study of a park's wildlife and all the other problems of management. But, secondly, the biggest problem is to put the master plan into action and here I feel that the basic conditions, the crux of what has been learned by administrators of national park systems, are admirably summed up in Paper 1, where the author sets out the four necessities for the effective establishment of a national park.

Jean Gahuranyi Tanganyika (Panel Member): A point which needs to be stressed is that, just as the recreational use of parks results from the intrinsic natural value of these areas, so it must never be allowed to result in turn in an invasion by ever greater installations and facilities. The concepts of the utilization of nature and man and of respect for the resources of nature demand, for example, that accommodations should be located outside the borders of the parks, although facilities for access can be tolerated so long as they fit in with the prevention of erosion and due regard for climatic conditions. The fact that this rule has not always been followed in hyperdeveloped countries is no guide. Developing countries must find their own solutions and, in the field of conservation, notions which are good for some countries are not necessarily good for others. As the President of my country has said, "We want to be sure that, when the experts have turned the living world into an artificial environment, there will still in our country be examples of Nature in its pure state." He also remarked that to clean up a polluted river is always a costly operation and will seldom restore its original purity.

Ivan Cibulec (Panel Member): Czechoslovakia is proud to have in the Boubin Virgin Forest of the Bohemian Forest range one of the most ancient nature reserves in the world, established in 1858, so that studies and documentation of the area extend back more than 100 years. Since then, three national parks have been established, but we also have 11 "protected landscape areas" in which conservation management does not exclude such forms of land use as forestry and agriculture, although always subject to the maintenance of sound ecological balance. The point I wish to make is that the urgent need to save what remains of the world's natural and cultural heritage makes it undesirable to spend too much of our time and energy on arguing about the terminology of park systems or about the strict observance of criteria. The priority should be to secure some measures of constructive conservation, although we do not want to have a mere "fire-brigade" policy and in Czechoslovakia aim to incorporate conservation in all long-term planning and eventually manage about 12 percent of the country under special protection. In this context, the value of the small protected areas should never be disregarded. Basic, of course, to the whole problem is the environmental conservation education of every citizen, youth in particular, in which national parks and all other categories of protected areas have a very important role.

Perez M. Olindo (Kenya): Since fires are not confined to countries inhabited by Smoky the Bear, I would like to hear more from the author of Paper 3 about policy on the use of fire as a management tool. I would also appreciate Professor Harroy's comments on the negative aspects of tourism.

C. Warren Bonython (Australia): In relation to the use of unconfined fire as an ecological tool in park management, the aim of fire-fighting authorities in Australia and holders of land adjacent to national parks is to prevent fires at all costs, so that they often blame national parks as a potential fire threat and would certainly insist on the earliest possible suppression of uncontrolled fires.

Rocco Knobel (Republic of South Africa): In Kruger National Park, fire is recognized as a management tool, and for 20 years some 3,000 plots have been set aside and burned in rotation, to determine the good and bad effects of fire. It will need another 10 years of such experimental work before we will be able to say when and how often certain vegetation types found in large parts of southern Africa should be burned.

Nathaniel P. Reed (Author of Paper 3): No definite policy conclusions about fire have been reached in the United States and the experience of other countries will be useful. It is worth noting, however, that in Florida only the parks remained in good condition (having been previously burned at the right time), when wildfires ripped through the rest of the State causing great damage. The evidence also suggests that in tundra ecosystems, the tracks made by bulldozers and other heavy vehicles are a greater menace than fire.

Prof. Jean-Paul Harroy (Author of Paper 1): In reply to Perez Olindo, the threat of pollution is one obvious negative aspect of tourism, but, on the whole, is likely to apply more to the future than the past.

John E. Clarke (Zambia): The importance attached in Paper 1, and emphasized by John Owen, to the use of conservation or ethical arguments rather than commercial or economic arguments in favor of national parks, is very welcome. In Zambia, although the Minister for Lands and National Resources has stated that national parks should be regarded not as commercial enterprises, but as a public service, like national museums and art galleries, too many people still value them only as sources of foreign exchange, and this attitude continues to be encouraged by some visitors from abroad. In my view, this is both patronizing and unhelpful to departments concerned to establish conservation and national park concepts on a firm basis.

Albert L. D. Mongi (Tanzania): The difficulty remains that in many countries the majority of the people need the concept of the "national heritage" to be quantified if it is to carry any weight in the face of economics and conflicting interests, whether these are customary or the results of development.

Allem Berhanu (Ethiopia): The distinctions between the many different categories of protected areas are confusing. In particular, it would be helpful to know more about the considerations on which the decision to establish wilderness areas rather than national parks is based, especially if it is accepted that a highly developed road network in a national park is undesirable.

Nathaniel P. Reed (Author of Paper 3): The decision is always a difficult one and each case must be looked at on its own. The U.S. system is to decide between more facilities and more undisturbed wilderness, by a succession of public hearings.

Dr. José Candido de Melo Carvalho (Brazil): As mentioned by John Owen, one of the main shortcomings of the past is that national and international development agencies and aid programs have lacked any understanding of the role played by parks and reserves in the social and economic welfare of peoples, and of the importance of preserving natural ecosystems. The earmarking of a percentage of aid funds for environmental purposes is the best contribution to the "One Earth" and "World Heritage" projects; so organizations such as the World Bank and UNDP should be constantly encouraged to provide funds for conservation of parks and reserves. I also believe that in developing countries, at this stage, it is necessary to make the decision makers—the leaders of the legislative, executive, and justice departments—the main target of conservation education.

Théodore Hounto-Hotègbé (Dahomey): Given that there is now very wide agreement on problems of conservation and their relevance for humanity, the main question seems to be how best to encourage and facilitate assistance by the wealthier countries to the developing countries, whose governments have made up their minds that action must be taken in this field, but simply lack the necessary means.

Dr. Gerardo Budowski (Director General, IUCN): The last speaker is quite right, and a special session of this meeting, Session XIV entitled "Help," has been set aside for the discussion of the problem.

Prof. Jean-Paul Harroy (Author of Paper 1): The successful creation of a national park needs capital and recurrent financial support; applications for aid in either of these categories, which need to be kept distinct, are readily supported by IUCN's National Parks Commission, but too often are given such a low priority by the governments concerned that they have no chance of success.

Dr. Marc J. Dourojeanni (Peru): It is for the last-mentioned reason that I would disagree with some of the previous speakers in believing that, at least in the Latin American context, the economic rather than the ethical arguments must be stressed.

Derek Bryceson (Tanzania): Experience in my country suggests just the opposite, as John Owen has said. We are doubtful about the real economic value of tourism, whereas we have actually before Parliament at this moment a request from the people of one area to give full protected status to a certain piece of land for the sake of their children's children.

Hugo Francisco Morales Rojas (Guatemala): The question I would like to ask is how a developing country can possibly afford the highways needed to give access for tourism, whether at the international or local level, in those places which have great potential simply because up till now they have been virtually inaccessible.

Nathaniel P. Reed (Author of Paper 3): One solution would be to site your parks as near as possible to population centers, and another approach is through the schools, interesting young people in the parks and in getting to know them, even if facilities are primitive or accessible only on foot.

Ivan Cibulec (Panel Member): In High Tatra National Park of Czechoslovakia there is a deliberate policy of restricting access in certain sectors to walkers only.

George Burton Priddle (Canada): Nathaniel Reed suggested that more national parks be located near cities, but the traditional concept of a national park cannot easily be reconciled with the pressures involved. The outlet for the latter should be found in other categories of recreation areas, whether under national or, more probably, local authority control.

Alfredo Ascanio Guevara (Venezuela): It is doubtful whether the institutional aspects of national park services in developing countries have yet been considered in sufficient depth and, in particular, their inherent weakness in the face of the tourist industry.

Dr. Kenton R. Miller (FAO): The last speaker has pointed to one of the key issues in Latin America, where conservation interests are often not represented at all on National Planning Boards.

Ponsiana Ssemwezi (Uganda): A final point worth mentioning is that closer collaboration between the park services of neighboring countries is desirable, would help to strengthen their position, and is definitely one of the lessons to be learned from "looking at the past."

SESSION III

A LOOK AT THE PRESENT

Friday, September 22, 2 to 5 p.m.

PRESENT-DAY PARK VALUES, PROGRESS, AND PROBLEMS AS SEEN FROM A WORLDWIDE VIEWPOINT

Chairman: Dr. Luc Hoffmann, World Wildlife Fund
Rapporteur: Hanno Henke, Federal Republic of Germany
Authors: Paper 4: Perez M. Olindo, Kenya
5: Dr. V. V. Krinitskii, U.S.S.R.
6: Italo N. Costantino, Argentina
Panelists: Jesús B. Alvarez, Jr., Philippines
Georges Ramanantsoavina, Malagasy Republic
Raymond L. Freeman, U.S.A.
Neville C. Gare, Papua New Guinea
Teobaldo Mozo Morron, Colombia

RAPPORTEUR'S SUMMARY

The wide-ranging papers and discussions of this session indicated the differences of opinion on national park aims and functions and hence the definition of the name itself. On the one hand, some people feel that the evolution of the parks should be allowed to continue for some time longer, before it is necessary or even possible to agree on definitions; meanwhile a commonsense attitude should be taken and a willingness to understand and accept the different approaches and viewpoints, which are likely always to exist. On the other hand, others adhered to the view of Panel Member Ramanantsoavina that a further effort, perhaps embodied in an international convention, should be made to harmonize the various definitions, with representatives of all organizations which have taken an active interest in the problem being invited to take part.

Among the present-day trends which were welcomed, was the setting up of regional organizations between countries of a similar cultural or economic background; the development of public conservation education, to strengthen public support for the parks; and the increased awareness on the part of the wealthier industrialized nations of their responsibility for assisting countries which have an abundance of the resources needed for national parks but lack the financial and technical means of developing and implementing sound policies for the conservation of these resources in a park system.

As much of the assistance referred to is encouraged, channelled, or managed by three international organizations—UNESCO, FAO, and WWF—the session ended with the Chairman calling upon the representatives of these organizations, ending with himself as Executive Vice President of the World Wildlife Fund, to make a short statement on their respective activities and objectives.

PARK VALUES, CHANGES, AND PROBLEMS IN DEVELOPING COUNTRIES

by PEREZ M. OLINDO

Director, Kenya National Parks, Nairobi, Kenya

While considering the subject of park values, changes, and problems in developing countries, I discovered that I had accepted a mammoth responsibility and my paper stood a good chance of being rejected by a number of developing countries as not being representative of their values, considerations, aspirations, problems, or, even, changes. Over the past 12 months or so, I have visited several countries in Africa to avail myself of the opportunity to meet representatives and consolidate views and opinions, and also see for myself what was being done in the African region. I have also had the opportunity of attending several international conferences where I took the chance to discuss this subject with representatives from Latin America and Southeast Asia. I have otherwise written to and received replies from colleagues in developing countries and all these contacts have made it possible for me to prepare this paper. I record my gratitude to all who have made its final production possible.

I wish, however, to take full responsibility for the paper and, in particular, any direct statements that may touch on sensitive topics. If the paper serves a useful purpose, I can only share in a small way the credit of compiling it.

Park values

The unanimous view in the developing countries is based on firm agreement that there cannot be a different "standard" for national parks in "developing" countries and in "developed" or industrialized countries. It seems to be agreed basically that developing countries have a better opportunity of establishing national parks than the nations in Europe, or even now in the United States. This view is also consistent with the U.N. effort to standardize the terminology of national parks and equivalent reserves.

The "national park" concept began to develop more than a century ago, when it was observed in certain countries that, due to human needs and pressures, certain species of plants and animals were beginning to disappear and that features of geological and archeological eminence were being disrupted by many forces. The national park concept then provided for large tracts of land set aside as wilderness or natural areas. It was deemed then that such lands, with their varieties of birds, animals, and different vegetation belts, left to themselves and devoid of all human influence, would eventually strike a "balance of nature." The objective was to accord complete protection to representative areas in an environment that was rapidly changing. At that time, the environment in most developing countries was relatively unaffected by the impact of industry.

Animal resources—skins and by-products—did not feature as important commodities in world commerce or, if they did, most of the attention and discussion still centered on the slave trade and its disrespect for human dignity. Today, however, public awareness and concern about the quality of the environment is so high that one feels confident that there is a basis for a coordinated international effort that will become fruitful, giving answers to a very wide range of problems we are facing and, better still, maintaining the universe in a condition "habitable" on a continuing basis. The 19th century also stands out as a significant period of active exploration in many parts of the world. Human population was quite low, and many peoples of the world lived by hunting, fishing, or simply collecting honey, fruits, roots, and vegetables. Wild animals moved far and wide along their traditional migration routes without many obstacles. The tools which were used for hunting were of a crude nature and could not therefore be dangerously used to a point where any species was threatened or endangered through hunting. Man's advancement in weaponry and its use—the discovery of the gun—meant the beginning of a new era for wild game and man. Nothing has remained the same since.

It is true to say that whereas communities once fished or hunted just to supply themselves and their immediate families with food and clothing, commercial exploitation today threatens the very existence of many fur- and trophy-valuable species at both the national and worldwide level. The effects of industry on the way of life—the pressure for more land to be occupied for human use—have gradually but definitely reduced, and indeed disrupted, ecosystems for migratory and nonmigratory wildlife to a point where it has become increasingly necessary to set aside, for posterity, representative areas as sanctuaries for birds, plants, and animals. Today, this same pressure is prevalent in developing countries only to a lesser degree to what is experienced in the "developed" countries.

In many parts of Africa, the national park concept has been greatly influenced by the London Convention of 1933, which tended to stress that, as far as possible, total exclusion of all human activity would keep parks intact and substantially unchanged. This approach to preserve natural areas has not stood the test of time. It is a biological fact that healthy populations of plants and animals move toward a climax and, all along, natural changes in vegetation and fauna ensure that after a few years, no area actually remains the same. Even in the case of museums, monuments, etc., the policy of "leave alone" does not ensure the preservation of dead specimens! It is this continuous process of change in nature and the few mistakes that have been made by the developed countries that have led the developing countries in many parts of the world to emphasise "resource management and research" as a relevant aspect of the national park concept. This happens to be the unfortunate point at which many "experts" and "advisers" who go from developed to developing countries introduce some rather confused concepts about national parks and try to develop the parks with facilities or along lines which really destroy the values for which they were established or intended to be established. In their enthusiasm, the experts often disregard the existing authorities and viewpoints and make some rather unsound recommendations. Sometimes they are "so nice" that the best they do is to repeat what the local people have told them. We feel that we must appeal for a professional and realistic approach to problems even to the point of intro-

ducing new methods or the confirmation of existing ones to achieve desired results—not predetermined ones.

Many developing countries have learned early that conservation at times permits the management of habitats and eventually of the ecosystem to achieve and maintain specific plant and animal communities. In East Africa, we have accepted the national park concept as a functional aspect of the development of our respective countries. National parks are established in areas where man can enjoy, as a privileged visitor, the plants and animals that are indigenous to the environment under conditions as little affected by his presence as possible. The Trustees (a body of guardians established by law) hold each park in trust for the benefit of future generations as well as for the present.

The foregoing idea permeates the basic policies that guide the management and research activities in our parks, so that Africa is now recognized internationally as having one of the best national park systems in the world. We have established functional marine national parks and reserves as well, and in doing so have realized that taking a lead internationally or being considered as having that status is one of the most difficult positions to uphold—yet we continue to do our best and count on the support of others. It is recognized that to embark on a sound program of conservation of wildlife and other renewable natural resources, scientific research and knowledge must constitute the basis of reference. Any national park system, existing or intended, can only be provided with this information if it has a research service which generally operates so as (1) "to keep a continuous record and check on the changes taking place within given ecosystems and animal populations in the Park(s)", and (2) "to direct research on specific problems related to the fauna and flora of the park(s) such as food preferences of the important animal species, population dynamics, reproductive behaviour, digestive physiology, pathology and the parasites of different species."¹

On the basis of knowledge acquired through research and general observations, guidelines should be formulated to constitute a management plan. Such a plan should never be considered as a "blueprint" because no natural situation is static long enough to have a blueprint.

It should be noted that plant succession is a continuous process and as vegetation communities change, so do animal communities. A case in point is Tsavo National Park, which is the largest park in Kenya, covering some 8,024 square miles, which, for many years was a dense woodland area. It is the home of some of the largest land mammals existing today—elephant, rhinoceros, giraffe, buffalo, and hippo. What is generally referred to as the "elephant problem" has caused grave concern to the Trustees of the Kenya National Parks for more than 13 years. To the rest of the world, it is a controversy full of confusion and sentiment. Many discussions have been held and much has been written on this subject. Studies of elephant population dynamics and reproductive rates have been made; 300 elephants were shot as a research sample in 1966 and this shooting exercise was called off when it was recommended that 2,700 elephants should be killed in the course of further studies. This recommendation was not accepted because a profit motive was detected in the proposals. It, therefore, becomes extremely important that

¹ From "Management Policies in the National Parks," by A. Starker Leopold. Tanzania National Parks. 1968.

each research project be carefully studied before authorization is given. It is further considered mandatory that a depository should exist in every country to which copies of all reports on the research carried out within its boundaries are submitted before any particular research job or project can be considered as completed. Research policies must always remain the responsibility of each sovereign state. This same principle applies to projects for the utilization of resources, including wildlife.

The most obvious and urgent problem in Tsavo National Park is to discover just what effect elephants are having on their habitat and what long-term results are likely to be established, both on the elephants themselves and upon the other important herbivores within the park. One effect has been that sections of the once dense, thick woodland have become grassland. It is only fair to mention a further factor, fire, which it is thought, has also played a significant role in the habitat changes in Tsavo. Thus far it has not been possible to quantify and assign any accurate amount of responsibility either to the elephant, fire, or the normal plant successional changes. We continue to monitor the changes taking place, but when a solution is found to assure the continued existence of elephants in a world beset by human pressures, it will go down in history as a significant contribution to science and man.

In the meantime, it has been said that as a result of the effects of elephants on the vegetation, Tsavo National Park is well on the way to becoming a desert, unless immediate action is taken to reduce the elephant population. It is true that during the severe drought of 1961 which hit all of Kenya, it appeared as if the park and other areas in the country outside the park were becoming deserts, but the situation is very different now. Because of an upward trend in annual rainfall and the destruction of *Commiphora* and other trees by elephant and fire, a new vegetation pattern is emerging with a higher carrying capacity in spite of a very large elephant population—larger than has existed there since 1948 when the area was gazetted a national park. In addition, more plains animals are appearing such as oryx, zebra, eland, kongoni, etc. and the variety of species seems to be increasing¹. It is hoped that as a result of the ecological studies under way, enough information will become available to formulate a workable management plan for Tsavo National Park within the next 3 years. However, because of the inherent variability of natural processes, biological problems are seldom easily or quickly solved and long-term studies are necessary. This is the basis on which I would very strongly recommend that research projects into the various aspects of national parks and the total environment should continue for many years to come. It is also necessary that the scientific efforts of developing countries be strengthened and diversified. I have dwelt on this problem because it is a common feature in the management of parks in Africa.

In order to implement habitat studies in national park areas, it is necessary to:

1. Undertake soil surveys, covering soil analysis, soil moisture, and soil temperatures;
2. Study plant sociology by establishing transects and using aerial photography to discover vegetation trends by comparing photographs taken at different seasons;
3. Study the effects of fire, its uses, and how to control unwanted fires;

¹ Glover, P. 1972 "Two verdicts on the Tsavo Problem", *Africana*, Vol. 4, No. 9, p. 10.

4. Study root systems to discover what influence they exert on the presence of grasses and other plants;

5. Undertake meteorological studies in different vegetation types including rainfall, air temperatures, relative humidity, saturation, deficit, and wind (direction and speed); and

6. Undertake studies of animal ecology which will include as many species as possible. It is only after extensive information is available to the park authorities that they can make responsible decisions leading to good conservation practices. In Kenya, the parks have been in existence for 25 years while the national park concept has been developing over the past 35 years or more. The effort now is to involve the public through conservation education in order to generate widespread support for future policies in this field. The National Park System of Kenya was established on the basis of the London Convention of 1933 which tended to emphasise complete protection, but it has been discovered over the years that although complete protection was necessary and is still recommended in cases where new parks and reserves are established, conservation is a much broader concept and includes the management of ecosystems and proper utilization of resources; it is now seen and accepted as a more realistic and practical course of action, not only for Kenya, but for other parts of the world as well.

Economic circumstances have demanded that wildlife conservation and the setting apart of reasonably large tracts of land should be justified in a manner that can be understood, appreciated, and, if possible, accepted by the common man. We have been very fortunate in East Africa to have basic wildlife attractions protected by law and, over the past few years, a deliberate effort has been made by our respective governments and by travel organizations to build up an industry surrounding this basic resource. It is gratifying to note that this effort has proved very successful in Kenya where the tourist industry constitutes the largest single source of foreign exchange for the country. The present degree of success and the prospect of a very bright future would seem to more than justify the requests received by the park authority for more areas to be set aside and be fully protected as national parks to meet the demands of the future. But coming back to the question of preservation, it must again be stressed that continuous changes take place in the environment and strongly suggest that protection from human activity is absolutely inadequate by itself and contains no built-in guarantees for the maintenance of a desired community of plants and animals.

In Kenya, the National Park System is set up to cover most of the representative geographical zones. There are mountain parks, e.g. Mount Kenya—the area above the 9,500-foot contour which rises to the summit at over 17,000 feet. We have moorland and mountain forest parks, savanna-type parks, woodland sanctuaries, tropical forest reserves, and marine national parks and reserves. This comment is made with the hope that other countries which are able to declare parks in representative ecosystems, will see their way to doing so. The basic policy everywhere should be to set up, as far as possible, definite sanctuaries in representative habitats. This policy is really the ideal goal, which in many cases may be difficult to achieve depending on the degree of willingness to surrender privately held land for conservation purposes. Within a national park the interests of animals and plants must be paramount and, as far as possible, these areas should be free of any human settlement.

Park problems

It is not until ecological problems are detected that definite knowledge becomes a prerequisite to achieve needed solutions. The tourist boom is not an unmixed blessing. While it brings foreign exchange into the country, visitor pressures increase and definite problems begin to emerge. The most far reaching, perhaps, is visitor impact on the ecosystem. Good examples are: Amboseli Game Reserve and Nairobi National Park in Kenya where the destruction of delicate habitats and ecosystems by visitors driving all over the parks in search of the different species of animals like lion, cheetah, leopard, and rhino has reached a stage where definite action has had to be taken to safeguard their habitats. Reserves and parks are established in perpetuity for the enjoyment of present and coming generations, but in the very effort to popularize such areas for the public to utilize and enjoy, the increasing tendency to congregate around a lion or some other attractive animal has the effect of temporarily urbanizing the wilderness to the extent that a conflict of objectives seems to arise: on the one hand there is the aim of protecting the wilderness and, on the other hand, that of converting it into economic entities that must justify their continued existence as wildlife areas in a manner that is seen to be practical. Problems such as this must be tackled as they are identified.

The effort to create a uniform system of operation for national parks on a worldwide basis has met with many problems of different types concerning values, administrative systems, etc. In many countries, national parks, other wildlife matters, and conservation and management of these resources fall under the aegis of forestry authorities. In the United States and some other countries, national parks and wildlife are a direct responsibility of government departments, while in East Africa, Australia, etc., authorities established by law as National or State Trusts exist for the conservation and preservation of wild animal life, wild vegetation and objects of esthetic, geological, prehistoric, archeological, historical, or other scientific interest. In many cases, trusteeships are established and have a number of duties to perform. The first is clearly to conserve and safeguard all objects within a national park, whether animate or inanimate, and, as far as possible, to ensure that the places forming this trust will remain unimpaired for the benefit of man. There are many supporters of the national park concept who express strong sentiments to the effect that the trust lands set aside as national parks should remain unimpaired for the benefit of the animals. I feel the differences are a matter of emphasis, which may vary from country to country. It must be accepted that if conservation of wildlife or any other resource in developing or developed countries is not seen to be within the context of human welfare and the well-being of the total environment, then the future for such a resource cannot be bright.

Having seen what development has done to natural areas, the developing countries seem to have gone all out to lay down policies based on sound scientific findings and are currently trying to avoid mistakes that have been made elsewhere. National environmental conservation education programs have been successfully instituted, to share the values of national parks and justify their continued existence for coming generations. The level of understanding and appreciation of the value of national parks and similar reserves continues to increase on a worldwide basis. It has brought about a noticeable drop in

poaching activities in East Africa and, elsewhere, definite international action for the conservation of threatened and endangered species. An increasing number of countries are also taking positive action to safeguard representative ecosystems with special emphasis on those in which the endangered species are found.

The problems of water pollution and siltation in rivers which originate outside national parks are posing very formidable problems in many countries and the hippo and crocodile, among water-loving animals, face imminent danger of being expelled from their normal surroundings inside national parks. Concern for the quality of the total environment (the human environment) must be stepped up and funds located to guarantee the quality of water, air, and soil. This problem faces national parks mainly because of human activity outside protected areas. It is worth emphasizing that any effort to make national parks into isolated islands will not succeed, in any case not in Africa. If, through education, we succeed in turning the conservation idea into a way of life, then a secure future will emerge. If, on the other hand, insufficient effort is made to enlist the support of the general public, then the national park idea must be seen as being transitional and of no serious consequence to future generations.

The idea of developing national parks for the interest, advantage, and enjoyment of the people must be seen to constitute a conflict with the animal and, at times, vegetation interests of these areas. Mediators have tended to reconcile the conflict by advocating that man and his activities in park areas should only be a privileged element. The question really is whether this goal can be realized. Or should we be satisfied with relative qualities in the apparent process of continuing deterioration in the quality of the environment? In Kenya, we try to maintain policies based on scientific findings and these policies are passed on to the people through a national environment/conservation education program, to ensure that they appreciate and thereby understand the foundation on which conservation is based and the reasons why it should be continued.

One problem developing countries have experienced may not be intended at all. In a number of IUCN Bulletins there has been a tendency to put undue emphasis on archeological and historical parks for some countries but not all countries. This has caused a lot of trouble to field officers and it might be expedient to stick to agreed criteria and nomenclature with the Commission on National Parks acting as watchdog. In some cases, there are national parks in existence, which, for one reason or another, are excluded from the U.N. List, and park authorities have been taken to task, even to the extent of having to explain such omissions to the heads of state! It has not been clear whether this was a genuine error or an instance of partial consideration, and the countries with whom I have consulted while preparing this paper asked me to raise it in the hope that corrective measures will be instituted.

In many countries, road development and staff matters have constituted two of the major problems facing park authorities:

Roads inside national parks. During the earlier stages of park development, roads tended to be established on the ridgetops with the aim of taking the best advantage of high ground for viewing purposes. But we know today that this consideration is not in harmony with proper park development. Roads should, as far as possible, follow natural contours without having a disruptive influence on important ecosystems or habitats. From a

practical point of view, it is necessary to regulate the speed of vehicles used by visitors. This necessitates the need to build relatively narrow roads with curves designed to lead visitors to predetermined locations at predetermined speeds. Roads also act as firebreaks and, therefore, constitute a built-in safety measure. When they cross dry riverbeds, a little extra effort can result in the development of a series of small catchment dams at no extra expense.

Staff planning. Perhaps man-management is one of the most complex issues there can be. However, for a park to function and for a system of parks to take shape with a noticeable impact on the economy and the way of life in any given country, proper man-management is mandatory.

It is therefore considered absolutely essential that continuance in the service of the national parks should be on merit and require a clear understanding of basic natural history principles and the respective legislation in the countries concerned. This applies to both the senior and junior members of staff.

Visitors

We have accepted the concept that a national park is an area set aside where man can enjoy, as a privileged visitor, the plants and animals that are indigenous to that environment under conditions as little affected by his presence as possible, and the trustees of a park hold it in trust for the benefit of future generations as well as for the present.

This brings us to the question of visitor management which should be provided for by way of legal notices setting out specific regulations of what can/cannot or should/should not be done inside a national park. It has become abundantly obvious in Kenya that visitors should not be allowed to drive off the roads. In the case of Amboseli Game Reserve, this practice of driving anywhere in the sanctuary has caused much damage to the ecosystem. The same has been the case with certain areas in Nairobi National Park as mentioned above, but to a lesser degree—due mainly to differences in soil types.

To obtain entry into national parks in many parts of the world, visitors are charged entry fees. The revenue that arises out of such fees should be reinvested in conservation projects and also provide salaries, housing, and other facilities for park employees.

When visitors pay to enter an area, they expect to make the best use of such an opportunity and they do not take kindly to rules and regulations which are not tactfully presented. However, park regulations should be compulsory under the law if they are expected to give the desired protection to given areas. Otherwise, apart from specific cases, visitors should be disturbed as little as possible. This calls for a very high degree of good public relations by all employees of national parks. Accurate guidance should be given to park visitors, which means that park authorities and their employees should learn as much as possible about their parks and country so that authoritative information can be provided to visitors about animals, plants, road conditions, finance, social welfare, immigration, etc. Visitors also like to know many other things about the country they are visiting, which demands a very careful staff-recruitment policy. The question of communication arises and a number of countries are now encouraging certain members of their park organizations to learn other languages commonly used by tourists. All in all, visitors should be

given personal attention. The result is that a satisfied visitor becomes a very good ambassador of the parks and the country. It is along these lines that the Kenya national parks have built up a tremendous number of friends all over the world. These friends support our conservation programs, mainly financially. They act either individually or persuade foundations, societies, and other organizations around the world to give support to a course we believe to be vital to the future well being of the human race.

Many countries have established a tradition of trust, not only by the wise decisions they have made over the years, but also by their meticulous policies on financial administration, with the result that this feature of growing goodwill has earned the national park concept a strong position in national and international circles.

To ensure that visitors to Kenya shall be looked after properly, the Kenya National Parks has announced a syllabus, geared to the training of tourist guides, couriers, and tour drivers. This will mean that a tourist guide, courier, or tour driver who does not qualify, or who breaks any rules or regulations in a national park or game reserve, will, under the law, not be allowed to handle or have anything to do with the tourist industry. Those who are qualified will prominently wear a badge which will always remain the property of Kenya National Parks, the latter reserving the legal right to issue and withdraw these badges. It is believed strongly that only after a carefully prepared course of instruction can a high quality of presentation of facts to our visitors about conservation and other programs be achieved.

Location of tourist facilities

The trend in Kenya over the past 10 to 15 years has been in the direction of establishing game lodges inside national parks and game reserves. In fact, these facilities have been located in areas of high wildlife concentration and it must be accepted that their impact on the ecology of the areas concerned has been disruptive. It has been found that to every one bed in a game lodge there is an average of two people in residence in the lodge compound. This includes lodge staff, their families, and the actual guests. Assuming that a 100-bed lodge is built, then an average of some 200 people may be expected to be in the precincts of the lodge most of the time, naturally moving back and forth in the course of viewing wildlife and other attractions, while the staff supplies the lodge with food and other requirements.

The need for recreation, schools, and hospital facilities, a shopping center, gasoline station, and garage is evident. What begins as a simple campsite and then a small lodge, eventually develops into a small village and then a township inside the park! Many countries which have made these mistakes in the past are now being encouraged to adopt corrective measures, while consultation on the future well-being of national parks and equivalent reserves continues.

PROTECTED AREAS IN THE WORLD'S INDUSTRIALLY ADVANCED REGIONS: IMPORTANCE, PROGRESS, AND PROBLEMS¹

by Dr. V. V. KRINITSKII
Director of U.S.S.R. Nature Reserves,
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The implementation of scientific and technical innovations in industry, agriculture, and transportation and their utilization for domestic purposes entail a mounting consumption of natural resources—raw materials and power—over increasing areas. Consequently, industrially advanced areas progressively assume an essentially new aspect; the climate changes, as well as inland waters, atmospheric composition, soil cover, and wildlife.

Man has so greatly changed his environment as to render it, in a number of cases, harmful to himself. This explains why many people are so eager to reach natural beauty spots which, with modern transportation, are readily accessible. With an invasion of tourists, nature has been largely disturbed in these areas.

The above situation is characteristic of the whole of Europe—all the way to the polar circle; of North America, particularly in the east; of some regions of Central Asia; Southern Siberia; Japan; and of a number of other areas.

Even at the initial stage of man's encroachment on nature, farsighted people took measures to fence off individual areas and objects of nature to save them from destruction. The history of nature conservation in our country and in other countries extends into hoary antiquity. Nature reserves existed hundreds of years ago and sometimes their allotment was accompanied by a special ritual.

The modern concept of nature conservation in our country retains old national traditions.

Tula protection forests formed in the early 18th century, world-famous Belovezhskaya Pushcha, Drachenfels on the Rhine, Hammelsmor in Denmark, Zofin forest in Bohemia, Yellowstone National Park in Wyoming, and others are all well known.

Until the end of the 19th century the setting aside of land for nature reserves was for the most part occasional.

Nature reserves were not originally set aside to conserve whole natural complexes; rather, their aim was to preserve individual components of nature which man threatened with extinction: plant and animal species, minerals, and, sometimes, individual phenomena such as waterfalls and geysers. The main concern was to preserve the habitat of the leading object of conservation, not the entire complex. At that time the landscapes adjacent to areas of preservation, though differing from untouched country, did not seriously affect the natural aspects of the reserve. The main objective here was to prevent

¹ Original: Russian.

any human intrusion. But even then the initial task of preventing any interference in the life of the preserved natural complex was in contradiction with the task of protecting the main objects of conservation, e.g. the loss of control by predators over their prey in the protected territory, the excessive population growth of the species under protection, and scarcity of food. This resulted either in the cessation of the further growth of stocks of the protected object, or in the disturbance of the natural structure of a complex in which the said object occupied a definite place. In order to conserve individual features or species it was necessary in one way or another to interfere in the life of a natural complex and disturb its structure (destroy predators, raise the nutritional value of the protected lands, etc.).

It has now become clear that not only natural objects and landscape components disappear from the face of the earth but whole natural complexes also. Preservation of complexes (and many individual species) can be effective only over large protected areas, in which the entire terrain is included and the complete natural biochemical cycle of matter—i.e., a stable inner biocenotic balance—is ensured.

The spread of civilization has reduced many nature reserves to islets (oases) lost amid the mass of anthropogenic landscapes which are not only foreign but sometimes even hostile to the complex under protection. This has greatly reduced the capacity of preserved complexes for proper natural self-regulation and self-reproduction. Structural integrity of a complex would be disturbed (particularly if its territory was reduced or had originally been small and inadequate) and consequently, its regulatory mechanisms would be impaired. The biological cycle in natural ecological systems would be disrupted; the flora and fauna would be invaded by synanthropic species; the animals from disturbed areas would flock to protected islets; and it would be more difficult for species breeding within the preserve to spread across the adjacent territories transformed by man. All this gave rise to the task of protecting (isolating) the complex against outside influence. The so-called buffer zones were set apart around nature reserves; special measures were undertaken over unprotected sectors adjacent to but outside the reserves. They included the allotment of fire-prevention zones and mown areas, fencing, measures to control weeds and prevent invasions of harmful insects, and measures to keep off undesirable animal species.

Measures were also taken inside the protected complex to regulate those processes which nature could no longer control. These included the mowing or burning of high-grass lands; the grazing of cattle (in lieu of wild ungulates) to preserve the natural multitude of plant associations; the restoration of indigenous forest types being supplanted by secondary communities; the control of wild animal populations in the reserve by trapping, shooting, and diverting away from the reserve any redundant animals; the control of enemies and competitors of certain species and populations; and land improvement schemes.

Man's help should be thoroughly thought out; he should not lightly and arrogantly recarve nature. His part is to carefully help nature discharge those functions which can be clearly regarded as disturbed because of the inadequacy of the complex itself or human interference.

The present state of nature conservation in industrially advanced countries is charac-

terized by a multitude of diverse parameters which makes it difficult to examine the ecological systems in detail. The total number of protected areas is considerable, running into thousands; protection regimes range from almost complete prohibition of interference by man to the unlimited use of the territory for recreational purposes; areas range from several hundred square meters to a million hectares; protected areas may be administered by state departments, research institutions, universities, public organizations, and, in nonsocialist countries, by private owners; the aims and means of protection are also widely different.

There is no adequate classification of protected areas or natural objects. The existing plurality of forms and categories of protected natural areas, including national parks, landscape regions, reservations (general and specific), nature reserves (general and specific) including strict and special reserves, and natural monuments, does not furnish objective criteria for classification. The objectives and legal status of all these institutions are understood in different ways; there is often a confusion of notions (national park, nature reserve, reservations). Need has arisen to define in a uniform manner the specifics of every category of protected areas, the aims pursued, the regime of protection, measures to preserve natural complexes, and the forms of permissible utilization.

It has now become crystal-clear that it is necessary to preserve the entire genetic stock and specimens of all biocenoses including those which have undergone anthropogenic transformation but are still "seminatural", i.e. the ecological systems which operate despite their disturbance but which are not yet disrupted.

This need is obvious also because the questions of studying the mechanism of man's influence on the biosphere, of exploring the possibility of forecasting this influence and, finally, of developing measures to counter negative effects, have long become pressing. It is likewise clear that the sweeping program entitled "Man and the Biosphere" cannot be fulfilled without a system of protected areas.

Within an integrated system of nature reserves we would consider it appropriate to single out the following categories of protected areas dedicated to different aims and having differing regimes:

1. **Strict nature reserves**, aimed at preserving valuable natural complexes capable of self-regulation. The natural complexes of wildlife reserves are examples of pristine nature landscapes, they are repositories of the genetic stock of animal and plant species in their natural environment. In the U.S.S.R. the following nature reserves, among others, possess such adequate ecological systems: Altai, Barguzin, Caucasian, Kronotsk, and Sikhote-Alin. Isle Royale and Mount McKinley National Parks of the United States can also be placed, according to data we possess, in this category.

2. **Managed nature reserves**, aimed at preserving natural complexes which are renewable but incapable of self-regulation either because of the limited composition of ecological systems or as a result of a powerful anthropogenic influence exerted by surrounding territory. In this case vigorous intervention by man is necessary; man assumes the functions of regulating and reproducing the missing elements of the natural complex. Managed nature reserves can be used to conserve separate groves, small lakes, and similar places.

3. **Natural monuments**, aimed at preserving inimitable natural wonders: caves, waterfalls,

and groups of living organisms and their individual specimens. The object is protected while it exists.

4. **Special nature reserves**, where individual plant and animal species are protected, sometimes during definite periods. Measures are taken to improve habitat conditions for the protected species. Other natural resources can be exploited but their exploitation should accord with the aims of the special nature reserve.

5. **Nature parks**, aimed at conserving nature areas intended for recreational purposes. For this reason it is forbidden to disturb the characteristic features of landscapes constituting the recreational value of a park. Along with protective and restorative activities, measures are taken to adapt the locality for recreation and tourism.

It is quite possible for a strict nature reserve, a managed reserve, natural monuments, a special reserve, and a nature park to coexist within the same territory, each of the said categories pursuing its specific aims and having its peculiar regime.

The above-indicated diversity of parameters affecting the organization of nature protection is to be seen on a world scale. In this regard, advanced countries have a distinct feature in common: over comparatively small areas of a country or even in their separate sectors, it is possible to find simultaneously all the above-mentioned diversity of forms of nature preservation. This chequered pattern of conditions is explained by the specifics of each country's economic development. It should be noted that in advanced countries virgin or almost untouched nature still exists in mountainous (medium and high-altitude) regions difficult of access and along inhospitable seacoasts. Maps of nature reserves illustrate this point. Many of the most valuable reserves are in the Caucasus, the Carpathian Mountains, the Balkan Mountains, the Rocky Mountains, on the spurs of the Tien Shan and the Sikhotealin Range, or nestle on the islands off northwestern Europe.

The rising pressure of anthropogenic influence on wildlife reserves poses new challenging problems for nature conservationists. Man's activities adversely affect unprotected areas; but nature reserves, too, can no longer remain isolated. The pollution of the air and running waters, the construction of manmade storage lakes, the drainage of flood plain and marshland, river regulation, vegetational changes, and other factors drastically affecting the regime of a whole region are bound to affect nature reserves within that region.

These problems confront many, even the biggest, nature reserves the world over. They call for essentially new forms of protective activities: active human intervention in the life of natural complexes, a set of measures to counter destructive influences, and the creation of man-controlled complexes imitating natural phenomena peculiar to such complexes in their wild state. The task of modeling the behavior of flood-plain complexes in connection with reclamation schemes and the task of modeling deltafication processes in river deltas transformed by the construction of hydraulic facilities may serve as illustrations.

The U.S.S.R. and some other European countries have approached this essentially new and inevitable stage. Let us indicate some problems on which the Soviet nature reserves are now engaged.

The controlled flow of the Volga and the essentially changed hydrological conditions in the lower reaches of the river have induced changes in natural processes: an increase

of the delta and formation of more spits, formation of reed thickets and willow forests, changes in the content of organic matter in the water and the state of waterplants in delta branches and in the foredelta. All this gives rise to the tasks of restoring within the reserve the flood conditions existing previously, of restoring the waterflow in the foredelta, and of preserving areas flooded in spring as spawning grounds for fish and a home for colonies of birds of the heron (*Ardeidae*) family.

The contemplated amelioration of the Meschshera lowlands gives rise to the task of constructing a flood-plain area inside a nature reserve. The project will include the simulation of flood conditions and the preservation of a complex of oxbow lakes and associated protected species (including the Russian desman, *Desmana moschata*), flood-plain forests, and meadows and their complexes.

It is necessary to approach the solution of such problems with caution for it is easy to commit an irreparable error. Consequently, the task of major importance (and of high urgency for some reserves) is to study the principal laws governing the functioning of their ecosystems, and the peculiarities of these processes inside protected nature complexes. It is necessary to have a clear understanding of the turnover of matter and ecological interrelations and to use this knowledge to reveal those links which are disrupted as a result of anthropogenic influences, and to explore ways of artificially reconstructing the disrupted processes.

These problems can be solved only on the strength of a differentiated approach to protected areas, and only through creating different types of nature reserves having different regimes of protection: strict, managed, and special reserves; sanctuaries; national parks; and natural monuments.

It is safe to say now that many types of nature transformation, including construction of water reservoirs, drainage of marshlands, introduction of animal and plant species, and use of poisonous chemicals, could have much earlier been viewed in a different light if the results of investigations of the mechanism governing the interaction of elements and forces of nature had been widely known. But such investigations are impossible without preserving representative biogeocenoses (ecosystems) in which practically no interference by man is allowed. Thus, wildlife reserves play an important role in the solution of complex problems relating to the scientifically sound use of natural resources.

The U.S.S.R. state *zapovedniki* are in effect research institutions called upon to reveal the laws governing wild nature, develop basic principles for a rational utilization of natural resources, and raise the productivity of land. Such nature reserves are, as a rule, extensive areas of typical landscapes with their peculiar physiography, vegetation, and animal life. They conserve natural complexes which have been developing for centuries and now provide permanent habitats for valuable plant and animal species, as well as for relicts, endemics, and rare species. Nature reserves have been instrumental in preserving and reproducing game and fur and other valuable animals, many of which were all but extinct, such as sable, beaver, desman, elk, deer, saiga, mountain antelope, bison, tiger, eider, and flamingo.

The reserves comprise sectors of virgin forests of the Caucasus, the Far East, the spurs of Tien Shan, and other regions; tracts of land overgrown with virgin steppe vegetation;

wintering and breeding sites for birds and spawning grounds for fishes; and genetic stocks of the country's wild flora and fauna. A number of problems of high economic importance have been solved by nature reserves; many students have gained their field experience in them; they have helped train many outstanding scholars.

The problem of conserving standard examples of wildlife in industrially advanced countries is a formidable one, and the difficulties involved are twofold. On the one hand, it is difficult to find in these countries (except mountain regions) sufficiently extensive areas with adequate ecological systems which still remain unaffected by man's economic activities. On the other hand, in a number of countries the national economy is choking within national borders and there is a reluctance to yield any significant territory to science because too much time is required before the results of research can be implemented in the economy. It is possible to mitigate these difficulties in a measure by solving the problem of artificial regulation of individual elements in natural complexes which will make it possible to reduce the size of protected territories. Also helpful can be an efficient use of national or natural parks, which have hitherto been designed primarily for public use and enjoyment.

In most cases a national park is divided into several functional zones ranging from a strict reserve to the use of the natural wealth for recreational and even production purposes. Such zoning can in a number of instances promote the organization of new nature reserves. But in so doing, it is necessary to bear in mind that the reserve should function as a representative biogeocenosis or control sample.

Meanwhile, in many parks such an attitude toward strict nature reserves is not given sufficient attention. In some countries negligibly small pieces of land within national parks, which have total areas of thousands of hectares, are set aside as strict reserves. Doubts naturally arise as to whether it is possible to obtain inside such inadequate areas any serious evidence concerning the natural course of wildlife processes.

At the present time, duality in the activities of national parks is being widely debated: on the one hand they conserve wildlife areas, which demonstrate the beauty and diversity of territories, vegetation, and animal species; on the other hand, they use their scenic resources for recreational purposes and take the consequences. The excessive influx of visitors to national parks poses the question of controlling attendance and of using adjacent sectors of national forests for public enjoyment. It was urged at the international symposium "National Parks—the Property of Civilization," held 3 years ago in Tatra, that the number of visitors to national parks should strictly correspond to the parks' capacities. It is possible to solve this problem by increasing the number of parks and their areas to a maximum; the recreational use of a national park should correspond to the capacity of each protected sector; a rational distribution of various functional zones inside the park presupposes the allotment for a nature reserve of an area which would ensure the preservation of a biogeocenosis or ecosystem as a valuable sample.

In nature reserves proper, it is possible to assign excursion itineraries, set up "living museums," and use other forms of acquainting visitors with the wildlife and the reserve activities. But the said recreational elements should not adversely affect the bulk of the reserve area and disturb conserved wildlife.

The number of visitors and the extent to which they use the protected area should be

strictly controlled and limited to cognitive interests. Recreational facilities should be provided outside the preserved territory.

Coordination of activities of protected areas across the world is an urgent question bearing on the conservation of representative ecological systems. A considerable part of the world's animal populations make seasonal migratory movements from one country, or even continent, to another.

Only if we elaborate a uniform approach to the regime of protection of the places where migratory animals concentrate (wintering and breeding sites of migratory birds, seasonal pastures of hoofed animals, spawning grounds of fishes, etc.) will we be able to assess properly the characteristics of their existence under nature. In this respect, it would be useful to conclude bilateral or tripartite agreements concerning the regimes of appropriate groups of nature reserves in different countries; such agreements could also provide for setting up nature reserves jointly administered by neighboring countries under a single coordinated program. The first attempts to set up jointly administered reserves in East and West Europe are encouraging. The setting up in different countries of "twinning" reserves spaced wide apart but having similar physiographies and functioning under identical programs involving their protective regime, land-use, and scientific investigations would do much to increase the volume of information regarding the natural processes unhindered by man, and the interaction of the elements of ecological systems under nature. It would also help substantiate conclusions with regard to the productivity of the biosphere in various regions of the world.

The following conclusions are offered:

The present task of creating an integral world system of nature reserves meets with great difficulties which are caused by socioeconomic and bioengineering factors.

The socioeconomic difficulties arise whenever a territory or a water area is withdrawn from a farm or a factory that used to exploit these areas, to become a nature reserve, or whenever (in a capitalist country) an area is withdrawn from its private owner.

The bioengineering difficulties arise from our ignorance and inability to protect nature reserves against negative effects induced by surrounding territories and developing tourism.

The answers lie in the solution of the following problems: (1) the definition of the types of protected areas and organizational forms of their activities; (2) the elaboration of scientifically sound principles underlying the distribution and size-determination of protected areas; (3) the substantiation of measures to neutralize the influence of the anthropogenic factors on protected areas; and (4) the promotion of international cooperation, including bilateral and tripartite agreements to form contiguous nature reserves and twin reserves.

It is above all necessary to take stock of the existing categories of protected areas and determine the specific regime of each sector.

The effort made in this direction by the International Commission on National Parks has already borne fruit. The brief descriptions of nature reserves initiated by IBP help determine their place in the biosphere. On this basis it would be easier to elaborate a master plan of the world's protected areas.

PRESENT TRENDS IN WORLDWIDE DEVELOPMENT OF NATIONAL PARKS¹

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There is no lack of bibliographical material concerning worldwide development of national parks. Only to list it would require an extensive document. So let us, by way of an introduction, recall that if we start with the establishment of the first national park (1872), worldwide development has been marked over the years by the interest which various countries have evinced for the conservation of nature.

It would be difficult, not to say impossible, to find out exactly which country first had natural reserve areas, and even more so to discover what their purpose was. But the fact is, history shows that interest in the conservation of renewable natural resources has, for a long time now, been the constant concern of many countries as well as public and private organizations.

If doubts may persist regarding who first had the idea of setting up natural reserve areas, there is no problem regarding the establishment of the first national park. This was done by the United States, which set aside Yellowstone in 1872.

One hundred years have passed since then, and now national parks have been set up all over the world. The ideal and aim expressed by the visionaries who selected Yellowstone², the centenary of which we are commemorating at this important meeting, have gradually become firmly rooted in many countries all over the world.

In a century, 140 countries have acquired a total of 1,204³ national parks and equivalent reserves. It is to be hoped that many other unspoiled areas will be added to a system which so splendidly characterizes the conservation heritage with examples of various types of climate, islands, seas, marshes, terrain, or places of scenic beauty.

The term "national park," whose definition has been debated at practically every meeting or congress held on the subject (London, Washington, New Delhi, and others), has been applied or employed with a particular meaning or scope according to the country concerned. This has led to confusion and doubts, which of course by no means contribute to a clear and definite policy for selecting and administering nature reserves.

¹ Original: Spanish.

² Lt. Gustavus C. Doane, who commanded the U.S. Army expedition to Yellowstone stated: "As an area for observers it has no rival; as a field for scientific investigation it promises important results in the fields of geology, mineralogy, botany, zoology and ornithology. It is perhaps the greatest laboratory nature has provided on the face of the earth."

³ United Nations List of National Parks and Equivalent Reserves, 1971, Hayez, Brussels.

In the 100 years which have elapsed since Yellowstone was set aside as a national park, many others have been established for the same purpose: preserving areas untouched by human activity for the enjoyment of present and future generations. But other places and sites have also been termed national parks, which, although of great cultural, historical, and even recreational worth, in no way manage to include those natural factors which correspond to the theoretical conception of what constitutes a national park.

It was in order to avoid conceptual confusion and ensure uniformity in the preservation of genuine national parks that the Secretary General of the United Nations, through the Economic and Social Council, entrusted the IUCN with the task of preparing a worldwide list of national parks and equivalent reserves. It is easy to see from an analysis of each of the areas included in the list that whereas many of them clearly meet the requirements, in the case of others, adjustments are needed in order to eliminate factors which reduce or even invalidate their claim to be called such. Still others, because of their position and makeup, can never be included in a list of national parks, either now or at some future date.

The latter are areas or spaces set aside for other ends, i.e., town parks, recreation areas, wildlife sanctuaries, and scientific study reserves. Some of these areas or reserves were designated as national parks simply because the true meaning of the term was not known or had been misinterpreted, or because their administration fell to a particular governmental department.

The existence of true national parks and those which are termed such but whose aims and function are different has led to much confusion and discussion among precisely those who ought to agree: conservationists and experts on the subject. Such discussions are still continuing, but I believe it can be hoped that precisely at this meeting, in view of its subject, we shall succeed once and for all in defining clearly and exactly what a national park is and ought to be in reality.

In order to clarify the discussions mentioned above, we must compare the arguments representing both points of view. Ever since the First World Conference on National Parks, national and international experts have been concerned with encouraging and helping countries which still have wilderness areas, and either rare or endangered species, with a view to protecting their habitat and setting up national parks, as well as with developing standard nomenclature and work methods, which may be used in countries with similar renewable natural resources.

With a view to achieving such goals, regional conferences have been held and international agreements drawn up (the Washington and the Africa Conventions, etc.).

Some countries, in order to relieve tourist pressure, which increases every year, have set aside natural areas which are also called parks and which they encourage large numbers of vacationers to visit. In some cases, national park administrative services themselves are responsible for these recreational areas, whereas in others, conservation agencies, such as the forest service, or even particular townships or departments are in charge of them.

In the four Latin American Work Sessions on National Parks, held in October 1971 in Medellín (Colombia), emphasis was given to the need to maintain reserved areas

around existing and planned national parks as buffer zones, in order to reduce the effects of neighboring human communities or other factors.

Diego Arria stated at the conference on tourism held in Caracas in 1971: "We feel that the growth of tourism is certain, and that it has tremendous possibilities in the country if we manage to bear in mind, as our constant guide, the need for particular care in planning the growth of the sector; that is, the need to establish planning standards for regulating the growth of our cities, wilderness areas and resources. We must remember that nature is important to the country, but in tourism it is linked to an economic factor: to the extent that we affect natural resources, we affect the raw material which supports and furthers national development of tourism. It is sad to see innumerable parts of the country, which offered extraordinary natural conditions, both as regards beauty and location, irremediably spoiled by the indiscriminate and disorderly proliferation of hotels and tourist resorts, owing to lack of controls and regulations."

Justifying the maintenance of national parks for tourism is much in vogue. It is well known that in the African countries, particularly Kenya, tourism is one of the main sources of foreign currency. Recognizing the economic importance of tourism, the International Development Bank held its First Seminar on Tourism in 1971 (Washington). On this occasion the value of wilderness areas as centers for attracting tourists was stressed.

The problem posed by the increased number of visitors to national parks is reflected in the demand for a larger tourist infrastructure, which always has a negative, and sometimes a disastrous, effect with regard to the landscape as well as the protection of its flora and fauna.

The influx of tourists is readily apparent today in countries such as the United States, Canada, and Japan. Consequently, they are also the ones which are giving special attention to finding a solution to the problem, which will protect their national parks and ensure their continued existence as what they were intended to be.

The desire of many national park administrators to satisfy their visitors has led them to participate in the setting up of hotels in the areas of which they are in charge. This has led to a confrontation between them and tourist promotion officials. The result has been that whereas those responsible for protecting national parks are interested in, and concerned with, encouraging tourism in their natural areas, the directors of tourism claim to have the administration of national parks under their jurisdiction.

Happily, in recent years, courses have been given to park and tourism officials with the express aim of enabling each sector to gain a clearer concept of its function and how they can cooperate in ensuring the necessary protection of natural reserves.

Although, ideally, every national park should be a self-regulating biological unit, this is seldom the case. The effect of adjacent areas is considerable. Even where there are buffer zones, a change in any part of them makes itself felt.

Using the water which supplies a national park, or building a hydroelectric dam in its neighborhood, contributes to environmental change and brings about various modifications, either reducing moisture or causing inundations, which leads to the disappearance of many plant and animal species and the emergence of alien varieties in their place.

The introduction of exotic species into areas adjacent to national parks or the presence of animals released into the wild has caused serious problems in reserve areas in Hawaii, the Galapagos Islands, Argentina, etc. The problem becomes even more serious when, rather than try to exterminate them, hunting is allowed and, under heavy pressure from sportsmen, efforts are made to increase their numbers.

Also, areas adjacent to national parks can be affected negatively when animals from protected areas invade human settlements damaging crops, and, even, endangering lives (Africa, India).

Pollutants affecting national parks may arrive from adjacent areas. These include town or industrial smoke, pesticides or blight control products, and polluted industrial water. Unfortunately, pollution is also brought directly into national parks by the cars of visitors. This is how the air of Yosemite National Park became so polluted that it was considered to be worse than Los Angeles smog. In order to correct this situation, the U.S. National Park Service has proposed to replace automobiles with electric vehicles in its parklands. Nevertheless, many North American conservationists fear that the introduction of these vehicles (tramways), and the necessary power stations, will create new problems. The alternative solution of visiting on foot is possible in most national parks, but it is true that in some, where visitors want and should be able to see wild animals, such as lions and tigers, in their natural habitat, safe transportation must be provided.

With the rapid decrease of ecosystems all over the world, the scarcity of areas for scientific investigation is becoming more and more acute. The national parks can and ought to serve as laboratories for carrying out scientific observations. They should also be used in making comparisons with other natural areas subject to different management (lumbering, water use, hunting, etc.). But scientific investigation can only be carried out on a limited scale in national parks, as it is unthinkable that such undertakings could include extractions and processings, which affect the integrity of nature—the park's foremost feature.

The educational value of national parks has been recognized and furthered by most countries. In the last decade it has become fashionable to use these reserves as open-air schools. In those countries with large urban areas, in which young people have either lost touch with nature, or never had it, the relation between man and nature has been promoted by means of education in national parks.

Even though many support this trend, others would prefer that educational activities should be guided toward areas specially selected and appointed for conservation studies (ecology and other natural sciences). From the educational point of view, it is as important as it is desirable for both the instructor and the student to be able to observe and gather the material they need.

National parks represent collections of different wilderness ecosystems in specific regions of the earth. As such, their sociocultural value is of signal importance. They constitute the substratum from which those factors issued that gave rise to the local or regional culture.

The theme of the IV Latin American Work Sessions on National Parks stressed the above with these words: "they (national parks) are genuine symbols of Latin America."

It is common knowledge that indigenous tribes still live in many of the national parks, and that in some parts of the world such reservations are set up to protect the primitive Indian's way of life. These indigenous reservations, which are adorned with the title of national parks and apparently set up with a humane intent, present serious problems without providing the solutions or reaching the goals at which they were aiming.

The indigenes are condemned to living according to norms laid down by the administrative authorities of the national park, whether they like it or not. On the other hand, human food requirements affect flora and fauna, inasmuch as the limited reserve area makes it necessary to introduce domestic animals or certain crops. This detracts from the unspoiled nature of the national park and, consequently, from its *raison d'être*.

Many experts affirm that primitive man and his way of life do not change the environment, as he always forms a part of it. This was true as long as his methods of hunting, fishing, and fruit gathering remained primitive, and only ensured his subsistence. But with the introduction of more advanced technology, especially firearms, the picture changed considerably. Not only did it become easier for him to slaughter animals, but the coming of the white man also brought with it an inducement to kill and capture more of them. The fur trade, scientific institutions such as museums and universities, and zoos are buyers of wild animals and good customers of poachers, who frequently raid national parks.

Very often, allowing scientists to slaughter large numbers of animals causes local inhabitants, who do not understand the reason for it, to rebel at not being allowed to hunt themselves.

Up to now, we have dealt with problems created by the advance of development and agriculture, brought about by individuals for touristic or scientific ends and technological progress. But there are also problems which result from the fact that when national parks were set aside, ecological knowledge was still in its infancy.

Although the intention was to preserve the ecosystems that existed at the time the national parks were established, it was overlooked that, in many cases, an area was being set aside which, even under complete protection, was going to continue its natural course of development and later on become another type of natural area. Some ecosystems reach a climax and will remain more or less unchanged for hundreds and, even, thousands of years. There are others which when left alone rapidly transform themselves (marshes, second-growth woods, etc.). In order to solve such problems, it ought to be decided whether complete protection should be given to the national parks or whether, through suitable management, it is more desirable to constantly maintain the present state of the plant and animal community.

Other problems have arisen during the 100 years that have elapsed since the establishment of Yellowstone; among them, that of setting aside marine national parks. Since the First World Conference on National Parks and in accordance with its 15th recommendation, marine national parks and/or national seashores have been set up, and others planned, in the majority of countries with coastlines. The establishment and management of these new natural reserves entail many problems, which happily can be solved through earnest international cooperation and, above all, through the exchange of ideas.

Although it is certain that every region has its own particular problems, and that the administration of those national parks whose main feature is wildlife differs substantially from that of others mainly concerned with plantlife, bodies of water, etc., there is no doubt that general problems exist requiring cooperation among officials in order to avoid repeating errors, and to find, through exchanges of opinions and talks, solutions to the particular problems and questions that arise. This contact is particularly necessary between countries which share renewable natural resources.

For some time now, people have been announcing the establishment of international parks, based on natural phenomena existing on the borders of several countries. At present, there are few examples of genuine international parks. But even where the name does not exist, cooperation is to be noted between neighboring countries concerned with preserving natural areas which come under their respective jurisdictions. Through joint staff training, similar administrative norms and legislation in two or more countries which share the same natural resources, the protection of the latter can be ensured without its being necessary to declare the area an international park, something which the concept of national sovereignty makes difficult in any case.

National parks located on borders and administered identically will have a great educational impact on the inhabitants of the countries concerned and their visitors. Confusion of concepts contributes more than anything else to vandalism and lack of respect for national parks. When visitors know what to expect and the reasons for the restrictions placed on their visit, they will learn to appreciate and enjoy national parks more.

For those who are still not ready for the direct experience of the wilderness, alternatives should be offered, such as the opportunity to visit other types of open-air parklands. From city parks to wildlife sanctuaries and national parks, there is a vast range of areas protected by various authorities. Solid coordination of all these areas and their administrators is required for them to constitute a genuine system in which each of them has a well defined and well understood purpose.

DISCUSSION

Dr. Luc Hoffmann (Chairman): In keeping with the terms of reference of this session, I suggest discussion should be focussed on present-day problems, with particular reference to the coordination of policy, planning, and management at the international level. **Perez M. Olindo (Author of Paper 4):** In presenting my paper for discussion, I would like to emphasize that park values and park problems are essentially the same everywhere, regardless of the degree of development of the countries concerned. That this view is becoming generally accepted is shown by the increasing trend towards regional consultations: thus, following the Latin American example, Tanzania hosted a joint East African meeting in 1971, while, at the international level, the present meeting and the aid programs, for which I take this opportunity of expressing thanks, should all help toward that coordination of which the Chairman has spoken.

Dr. V. V. Krinitskii (Author of Paper 5): It is already clear that our points of view are in agreement on many basic issues and I believe that the development of national parks

and reserves will depend upon the successful application of unified viewpoints to specific topics. From among those mentioned in my paper, I would regard three as deserving of special consideration: first, the elaboration of a common general system of classification, and of better definition of conservation measures and their objectives (the work of IUCN on the United Nations List makes a very good start, but shows that there are still wide differences between areas accepted as "national parks and equivalent reserves," in respect of their objectives, conservation management, and use); second, the solution of the conflict between interference and noninterference by man in the natural processes of protected areas (much that we have seen at Yellowstone and in Grand Teton deserves study, in this connection, particularly the examples at Yellowstone of the capacity of nature for self-regulation and ecosystem rehabilitation). Finally, I would mention that in the U.S.S.R. we are now organizing a system of national parks with aims similar to those of the United States, using the experience of the latter in providing services for millions of visitors. We do not, however, believe that these are in any way a substitute for our existing system of *zapovedniki*, the large areas of virgin nature in each of our geographical zones, established both for the investigation of the biological productivity of natural ecosystems and as a basis for recommendations on the restoration and rational use of the natural resources of that zone. Both kinds of protected areas are necessary.

Italo N. Costantino (Author of Paper 6): I have only one small addition and one point to emphasize in my paper. It is of significance that at the present time as many as 12 new national parks a year are being established in Latin America. The point I would emphasize is that there is really only one purpose for these and all other national parks, wherever situated, and that concerns the conservation or wise use of natural areas.

Jesús B. Alvarez, Jr. (Panel Member): Concepts of the use and development of national parks, though based historically on a common rationale, have been modified by such variable influences as culture, social values, degree of development, and land-use priorities in relation to geography and development. In the long run, however, the concept of use of a biotic community without impairing its integrity is the one most likely to benefit a country and the world environment. The recognition of the scientific value of ecosystems or biotic communities and its relationship to man's survival is quite recent: most existing national parks were established as stop-gap measures against the rush of natural resources exploitation or, in more special cases, for esthetic, historic, or cultural values, to provide a semblance of a more mature approach to resource management. The dynamic equilibrium of nature is not in conflict with the basic principle of integral protection of national parks and indeed these areas provide a place where the processes of dynamic equilibrium may continue. My conclusion is, therefore, that the major consideration must be the preservation of the integrity of national parks: modification or dynamic change should be left to nature and not introduced by man, although in Southeast Asia it is true that land-use priorities and other needs have, to a certain extent, forced us to change our approach. But the importance of the fauna and flora in maintaining the quality of the environment, which can often only be realized in national parks and equivalent reserves, is fully recognized.

Georges Ramanantsoavina (Panel Member): The first of the three points I want to make concerns the difficulty experienced by a country such as mine, whose national parks

were based on the London Convention (1933) as brought up to date and adapted to modern African conditions by the OAU Convention of 1968, which the Malagasy Republic ratified in 1970. Recent attempts, such as those of the IUCN General Assembly at New Delhi, to modify the definition of "national park" have led to some confusion, which is why my country has suggested that an international convention on the subject be prepared and brought into force as quickly as possible.

Second, the International Conference on the Conservation of Nature held at Tananarive in October 1970, drew attention to the criteria applying to the existing Malagasy parks and reserves, which tended to have too much of a botanical bias. When we tried to reclassify the reserves, we found that an essential prerequisite was a general ecological survey of the country: only after the ecosystems have been determined, would it be possible to select, on the basis of their particular interest, the zones needing protection. Economic as well as philosophical, scientific, and cultural criteria would enter into the choice, and in each of the reserves thus constituted it would be necessary to undertake detailed research, properly coordinated by the government, to ensure that resources will no longer be squandered. It follows, thirdly, from all this that in an island such as Madagascar, in which due to long isolation so many features are unique, yet, like ecosystems elsewhere, are threatened by such things as shifting cultivation and bushfires, we must depend on the help of other countries and international organizations. We have received good advice on the problems involved and are duly grateful for it, but we now find ourselves faced by the heavy responsibility and the exciting but often difficult and thankless task of protecting ecosystems which are part of the world heritage as well as a national asset. We must, therefore, appeal to the more technologically advanced countries to take their fair share of the responsibility; there is much to be said for setting up a special emergency fund, within the World Wildlife Fund, aimed specifically at safeguarding ecosystems of recognized world value which are in danger of disappearing.

Raymond L. Freeman (Panel Member): Paper 4 stressed the importance of conservation education, but as we shall be discussing this in detail—and participating in some actual fieldwork—during Sessions XI and XII, I will pass on to ask the question whether, when speaking of "the benefit" of future generations, Perez Olindo includes "enjoyment" and "use." The emphasis in Paper 5 on preservation of the whole natural complex rather than individual features is very welcome. All three authors refer to the problem of defining the term "national park." I am not sure it is possible or even necessary to do so. A relevant point mentioned in Paper 6 concerns the preservation of parks in relation to the economics of tourism. Somehow in each case, a balance must be achieved. In many areas tourist facilities can be allowed just outside the boundaries, but other areas are so large that this is simply not feasible without a good system of mass transportation. Another point which it would be worth discussing is the extent to which, in developing a park system, the U.S. practice of "theme classification" could be usefully applied.

Neville C. Gare (Panel Member): The experience gained in Papua New Guinea, where under the Ordinance of 1971 work on establishing two national parks—Wariarata (2,600 acres in the Astrolabe Range, 30 miles from Port Moresby) and McAdam (5,000 acres between Wau and Bulolo)—is in progress, seems relevant to many of the

problems raised in the papers given here. The main issue, when acquiring the land and reconciling the acquisition with customary ownership of the land and the traditional belief that "land and water is life," has been how to get the people themselves fully involved. This has proved to have five main aspects. First, the whole operation must form part of the overall regional planning and be covered by the appropriate priority and funding. Second, in the planning and development of the park itself, the important points are employment of local people, the use of traditional styles in the construction of facilities and the opportunities afforded for the prideful display of cultural exhibits and activities, through personal renewal of land and cultural ties in the use of the park. Third, the local people must be assured direct major benefits from controlled visitor access to the park. Fourth, the development must be phased, on the basis that traditional hunting and food gathering will be allowed to continue under agreed regulations as long as they are needed by the original owners of the land. Last, the legislation for the park must bring together the local people and central government in such a way that human dignity and pride are preserved and the people can, from the start, regard the park as their own, where land ties are strengthened and not lost.

Teobaldo Mozo Morron (Panel Member): In Colombia, where the number of national parks has been increased from one to seven during the past decade, we have so far followed a concept similar to that adopted by IUCN at New Delhi in 1969, but are keeping an open mind on the subject. No serious problems have yet arisen with tourism.

Zafar Futehally (India): Paper 2 at the previous session made a plea that we should take a scientific and practical, rather than a romantic, view of national parks; it was suggested, as an example, that if minerals are discovered in a park, the park authorities themselves should, if necessary, take the initiative in revising park boundaries rather than wait to be overcome by outside pressures. I feel that this idea is a dangerous one. In India, for instance, copper has been found in the Sariska reserve, but, while little harm would be done to India or to the world if it were left underground, a great deal of harm would be done to the park movement and to the nation if the integrity of the Sariska is destroyed. Only 0.4 percent of India's land is protected in parks and reserves, and every square yard needs to be zealously guarded.

Harold J. Coolidge (U.S.A.): I strongly support the previous speaker; any tendency to "de-declare" national park land could be a very dangerous practice.

E. Max Nicholson (IBP): The point I was trying to make is that national parks themselves are a form of land use and the use, moreover, of scarce resources. It is surely better for those responsible for the parks to make the initial and informed assessment of any possible changes or modifications, rather than, perhaps, to be ignored when assessments are drawn up by others. The vital thing is that they should exercise foresight and anticipation.

Zafar Futehally (India): My other point concerns a remark in Paper 4, where it was suggested that the government concerned should be the "repository" of all research

undertaken in its national parks. This is unexceptionable if it implies that the government should be responsible for executing policies suggested by the research, but should not be allowed to place bureaucratic restrictions on the research itself. We know so little and there is still so much to learn.

Perez Olindo (Author of Paper 4): Perhaps the point I was making was not clear. Freedom of research is essential and the basis of sound management, but it follows that the results *must* be made available without delay to the country in which the research is conducted. Too often research workers have simply "vanished" and never submitted their results. This does not, of course, mean that copies of these results could not, with advantage, be lodged in one or two central "repositories" or scientific libraries specializing in this field, but obviously it is the country concerned which must have the first call. **Prof. Mohamed Hyder** (Kenya): In support of my colleague's remarks, I would add that it is also essential in countries such as Kenya, where research workers are few and funds for research scanty, to keep control of the research, make sure it is carried out by qualified people and, above all, take account of the priorities, concentrating on the work which will give answers to the most urgent problems. I would also like to refer briefly to the question raised by Panel Member Freeman about the "benefit of future generations." In our view there is no question but that enjoyment must be consistent with conservation: there can be no enjoyment, if the exercise of it destroys the very thing enjoyed.

M. K. Ranjitsinh (India): In the emphasis on public participation and the recreational value of national parks, the importance of specialized parks, with perhaps no great appeal to a mass public today, but aimed at safeguarding a rare or unique ecosystem, natural phenomenon, and species or, even, subspecies of plants or animals should never be overlooked. Every country has a responsibility for seeing that these rarities are protected.

Albert L. D. Mongi (Tanzania): I would go further than the last speaker and say that the real purpose of national parks is to prevent man from destroying his environment rather than to provide a place for recreation.

Raymond L. Freeman (Panel Member): Surely the answer to both the last interventions lies in the establishment of a park system.

Ruhi Çinar (Turkey): I am not quite clear how archeological and historical parks fit into the system and what special criteria apply to their establishment.

Prof. Jean-Paul Harroy (Belgium): This raises a rather controversial question, which the World Heritage Trust project has been designed to solve.

Perez M. Olindo (Author of Paper 4): The African Convention of 1968 did not take account of archeological and historical sites and it is doubtful if they fit very well into the national park system.

Peter Dohrn (Italy): I would take a contrary view and advocate a formula sufficiently elastic not to exclude the archeological and historical sites or relegate them to an "accessory" position. Possibly, this should be on a regional basis, applying for example to the Mediterranean zone to which Ruhi Çinar was referring. It would be based on the importance of archeological discoveries for the dating of events of interest to the natural sciences, the common concern with the effects of pollution, and the general strengthening

of conservation measures which would result from close liaison, especially as in many of the countries concerned the historical sites are already protected by effective legislation. The important principle involved is that the "quality of life" includes manmade as well as natural values. The park movement will be reinforced if this is fully recognized. **John T. G. Page** (Republic of South Africa): Much unanimity and common cause obviously exist in this matter, but I believe that insistence on using, for example, the same approach, the same definitions, and the same standards for "historical" parks as for natural areas is essentially impractical. What we need most is an appreciation of the different needs of others, a willingness to understand different approaches and a readiness to accept inevitable differences.

Magdaleno B. Cortez (Philippines): What emerges from this discussion is that the common factor lies in national parks of all kinds being for the benefit of man now and in the future. The sad fact remains that it is man himself who, through carelessness or ignorance, is the worst enemy of protected areas—witness the destruction of an ancient forest by the throwing away of a cigarette. It is in this context that the remarks in Paper 4 on education and training are of special importance and should certainly be reflected in the conservation programs of international agencies.

Edgardo Sevilla (Honduras): I represent a country which still does not have a national park, but is interested in establishing them. We realize that to begin now will be more difficult than it was in the past because of the pressures to use all available resources for economic development, the greater threats of pollution, and the views of those who regard parks as merely a tourist attraction. On the other hand, the conservation and wise use of resources is at least now regarded as beneficial not only for the country concerned but also for humanity.

Prof. Donald J. Kuenen (Netherlands): Honduras presumably still has some undisturbed natural areas. In my country these do not exist; everything has been changed by man, but there are still enough natural elements to make their conservation worthwhile. We cannot fit our reserves easily into any system, because of our special circumstances, but we would still like to see such a system developed on an internationally agreed basis and then try to adapt our terminology accordingly.

Francisco de Sola (El Salvador): In some areas, such as those of Central America, efforts are continuing to establish a "common market" and this may eventually provide a means for promoting national park objectives.

Raoul H. Beloso (Philippines): A point not yet mentioned is the importance of having an independent park service. In countries where the administrative or executive authorities understand little of the national park concept and the parks themselves are under the control of the foresters, a situation may develop such as that in the Philippines—here timber exports come only second to sugar and the conservation of forest areas takes second place. The big problem is of course financial and the poverty of the people, but a firm stand must be taken against encroachment and against the kind of development, such as badly sited roads, which leads to erosion.

Alfredo Ascanio Guevara (Venezuela): This raises the whole issue of the accurate quantification of the effects of various forms of development, as compared with those of maintaining parks and reserves. The cost/benefit ratios are too often miscalculated.

Bal Siew Ramdial (Trinidad and Tobago): The purist arguments in favor of parks and reserves are difficult to accept in countries such as mine, where the population is increasing and is now nearly one person per acre and where no one can see any reason for sacrificing himself to preserve areas either for the sake of the past or the future. Emphasis has been laid in the discussion on the ill effects of tourism, but at least it stimulates the local population to become more aware of its national assets and it has an educational value for the tourist himself, which helps to give parks and reserves an international status. Providing tourism can be promoted without ecological damage, it is worth doing so.

Ju-Suck Koh (Republic of Korea): Two points which ought to be looked at in developing a methodology concern the differences between inspiration and enjoyment and between foreign and local tourism.

Perez M. Olindo (Author of Paper 4): Referring to the remarks of the last two speakers, I do not believe there is any clearcut answer to the point made about the independence of the park service. In Kenya we have been trying to find the best formula for the past 2 years. However, one principle we adhere to is that the parks are *for* the people, which means that we attach most value to local tourism; foreign tourism is incidental, although admittedly it brings in the money.

Dr. Alceo Magnanini (Brazil): The fact that there are still great numbers of undisturbed ecosystems of which no example is yet protected in parks or reserves needs more emphasis.

Dr. José Candido de Melo Carvalho (Brazil): The reference in Paper 6 to the position of aboriginal inhabitants in national parks has not been discussed. The attempt to reconcile this with the conservation of natural resources, which was made in Brazil, has been abandoned and Xingu National Park and Tumucumaque National Indian Park have become reservations under the control of the National Indian Foundation. Our belief is that aborigines cannot be kept in a primitive state but must inevitably be encouraged to develop toward full participation in national life, so that reconciliation with the aims of park management is impossible.

Dr. Luc Hoffmann (Chairman): Although few of the questions discussed have been fully resolved and, in most cases, some compromise may be possible, one point which is accepted is that international aid has a most important role. To conclude the session, I propose to call on their representatives for short statements of the aims and policies of UNESCO, FAO, and the World Wildlife Fund.

Dr. Michel Batisse (UNESCO): Throughout its history, the special interest of UNESCO in conservation has been reflected by its sponsorship of and cooperation with IUCN, the development of institutions such as the Charles Darwin Foundation, the sending of missions, and the organization of technical meetings, culminating in the Biosphere Conference of 1968, where conservation was recognized as an essential element in the rational use of resources and the MAB program was launched. UNESCO has, in short, been rather successful on the scientific aspects but has probably not given enough attention to educational and cultural aspects of conservation. However, the stress is now placed on social and human aspects of development, the relationship of man and nature and concern for the quality of life. As noted by several speakers, the success of the national park movement must largely depend on education, and UNESCO's activities in environmental education at all levels are bound to develop rapidly. National parks

—a concept that has widely different interpretations—can only be assured of permanency and support if they are integrated into the cultural and ethical framework of the country concerned and are thus fully accepted by the public.

René G. Fontaine (FAO): The activities of FAO in the field of national parks and wildlife management date back to 1960, though a specific Conservation and Wildlife Branch in the Forest Resources Division was not established until 10 years later. The periodic meetings of FAO's Regional Forestry Commissions have provided a forum for the discussion of national park problems and working parties have been set up to make a more detailed study of various policy and technical issues. FAO has also, for example, studied the methodology for forecasting recreation needs, for utilizing wild protein, and many other objectives, and for assessing their importance. Fieldwork, with the assistance of the UNDP, bilateral aid, and private foundations, has been greatly developed: between 1960 and 1972, some 50 projects have been undertaken and more than 80 qualified experts appointed. At this moment, 22 projects with 47 experts are in operation. At first the emphasis was on wildlife management and education, and FAO has been instrumental in developing two training schools in Africa for French- and English-speaking national park and conservation personnel. We aim to establish a school in Latin America and similar facilities at university level in the Far East. There are, of course, several other sections of FAO besides my own which make a contribution in the field of interest of the present meeting, such as the Fishery Department, the Division on Animal Production and Health, and the Legislation Service.

Dr. Luc Hoffmann (Chairman): Speaking in my World Wildlife Fund capacity, I recall that at the time the First World Conference on National Parks was held, WWF had just been established and support for it was recommended in recommendation 1 of the Conference. Since then the Fund has been established in 17 countries and has given financial support of the order of \$10 million to 734 projects throughout the world. Priority has been given to projects which are likely to generate further support, so that the 10 million represents a much greater input of funds into conservation. Many of these projects have concerned national parks, either in respect to establishment or the acquisition or enlargement of land or in respect to consolidation and equipment. WWF's impact in the coming decade should increase, as its financial strength grows; its role will, however, be that of the pioneer, introducing new ideas and new developments, rather than that of a large-scale operator, which would duplicate the activities of governments and the intergovernmental agencies.

SESSION IV

A LOOK AT THE FUTURE

Saturday, September 23, 9 a.m. to noon

SOCIAL AND SCIENTIFIC OPPORTUNITIES AND A LOOK AT PROBLEMS ARISING FROM INCREASING POPULATION AND ECONOMIC PRESSURES

Chairman: Dr. José Candido de Melo Carvalho, Brazil
Rapporteur: Richard M. Leonard, U.S.A.
Authors: Paper 7: Kai Curry-Lindahl, UNESCO
8: Michio Oi, Japan
(presented by Hajime Shubiki in author's absence)
9: Dr. Joseph L. Fisher, U.S.A.
Panelists: Zekai Bayer, Turkey
Dr. Stefan Myczkowski, Poland
Anthony Wayne Smith, U.S.A.
Phairot Suvanakorn, Thailand
Claude Fatoux, France

RAPPORTEUR'S SUMMARY

In a discussion which was mainly focussed on planning for the future of national parks, the dilemma of whether to give priority to preservation or to use was debated by 40 speakers, and more than 12 more interventions were excluded because of lack of time. The great majority strongly felt that preservation of the natural values of parks and equivalent reserves was the higher priority. In fact many nations, such as the Soviet Union, do not permit tourism or recreation in their nature reserves. Even those who advocated more use of national parks agreed that this should preferably be based on a gradation from the parks of urban or settled areas, through nearby regional parks, to the great natural parks aimed at preserving important series of biomes.

It was pointed out by a lawyer that the National Park Act of the United States clearly provides that use and enjoyment of national parks is only to be "in such manner and by such means as will leave them unimpaired for future generations." Thus it is clear that preservation has priority by law over any use that would "impair" natural values. However, the United States and some other countries have obscured this clear priority by placing recreational parks under the same administrative agency as the great natural parks which conform to the most widely accepted definition of "national park."

Paper 8, in noting that "the various roles of national parks . . . revolve around the two principal roles given to [these] parks 100 years ago . . . the preservation of natural landscape of national importance and its utilization for recreation purposes," goes on

to suggest that "A national park has by no means a predetermined and unalterable role to play. It changes and grows in response to the changing social and economic requirements of the country." This suggestion of a changing role raised several objections. Participants from Costa Rica and the Malagasy Republic expressed dismay at any suggestion of a departure from the prime role of the preservation of nature, which they pointed out was enshrined in international conventions. They urged caution in opening parks to people, except perhaps in perimeter areas. This was supported to the extent that the view expressed in Paper 7 met with general approval, namely that it would be a disastrous policy to accept unlimited development in national parks to meet all popular demands. The slogan "parks are for people" implies that they should be so for all time and not just for the present generation.

The point is made in Paper 9 that human pressure on national parks involves supply and demand. Requirements of demand can be met in part by limiting the length of visits and, eventually, rationing visits by a system of advance reservations. On the other hand changes in the supply of the national park experience could be more flexible, and the conclusion supported on all sides was that it is therefore essential to increase the number and variety of national parks. Japan, which has been densely inhabited for centuries, had nevertheless been enabled, by flexible land management, to set aside since 1931 some 5.3 percent of its land area for a somewhat "civilized" type of national park; but, since 1957, it has brought the total up to 13 percent by adding a class of "natural" parks to the protected areas. In contrast, the United States with its vast land mass has reserved a smaller proportion of its land as "national parks," but in its wilderness areas has established "equivalent reserves" of equal extent and variety. The general conclusions reached strongly supported the preservation of natural ecological values as the primary objective of true national parks.

SESSION IV / PAPER 7

PROJECTING THE FUTURE IN THE WORLDWIDE NATIONAL PARK MOVEMENT

by KAI CURRY-LINDAHL
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The past 100 years of national park history have seen an unprecedented accelerated development due to demographic, economic, and social growth. A hundred years ago, when Yellowstone National Park was established, was an idyllic time without serious

pressures on most of the world's major biomes. The vision of those who were inspired by the magnificence of Yellowstone led to one of the greatest contributions to civilization, namely the concept of national parks for the benefit of mankind for all time.

What could not be foreseen at that time was the tremendous habitat deterioration which has characterized the past 50 years of human existence. But the human aspirations for which the conservation-minded people of 1872 were fighting are still basically the same. Their action was prompted by esthetic impressions of nature's grandeur and by spiritual concern for contemporary and future generations of mankind which should be given opportunities to share their impressions. Today, reasons of quite another dimension must be added to why national parks must be established. As humans we are in biological and ecological need of diverse and vast networks of national parks. We need them for our mental and physical health and well-being as a counterbalance to urban life and social stress. We need them as sample areas for comparisons with regions which have or are being modified by man. We need them as living laboratories for studies of biological productivity, evolution, population dynamics, and so on. In fact, the most significant results of biological field studies have emerged from national parks or equivalent reserves or from intact biocommunities. We need them as gene banks for wild plants and animals. We need them for rehabilitation of destroyed areas. We need them for educational and historic purposes. It is indeed difficult to understand why it should be more important for humanity to preserve at immense costs dead monuments of the past than living treasures of bygone days—plants, animals, and intact biocommunities. It is often claimed that historic cultural sites are more valuable to preserve than natural regions, because the former reflect how man lived in the past. True, but living biocommunities (even if they are in perpetual evolution) were the homes of our ancestors for more than 2 million years before any buildings existed.

We are, at present, in a period when it is necessary for the survival of man to plan the environment ecologically. Such ecological planning must cover the whole earth and national parks need to be included.

Protection of national parks

National parks give protection but they also must be protected. There are few countries with national parks, where the latter have not been threatened by being overrun, reduced, altered, or even destroyed by external pressures. But there are also internal ones such as overuse by visitors. The United Nations List of National Parks and Equivalent Reserves (1971) lists 1,204 areas in 140 countries. They form the basis for a future, expanded global network of national parks which hopefully will be a part of the ecological planning during the next decades. It is a great but necessary task to protect the already existing national parks, because they represent some samples of the world's major habitats, biomes, and ecosystems. However, these samples must be completed so they cover a wide spectrum of the world's natural areas.

One of the most pressing problems of many national parks of today is how to cope with the increasing number of visitors seeking recreation in pristine environments. Several national parks in the United States and South Africa have been forced to limit

the number of visitors to their areas at any one time during peak periods. Other national park systems are discussing whether they have to reduce the number of visiting tourists by charging such high prices that they can stem the flow of visitors and in this way maintain the environmental quality. A more sympathetic and perhaps also more rational method would be to increase the number of national parks so they can absorb at the same time the number of visitors wanting to go to these areas. The dispersal of tourists to many parts of a country is an advantage for the country concerned, because it spreads the benefits to local populations involved in the infrastructure of the tourist industry. This is particularly so in developing countries, for instance in East Africa where the tourist industry is based on the national parks and their animals.

However, the problem is general. Whatever country or national park with which one is concerned, it would certainly be a disastrous policy to accept an unlimited development in national parks and equivalent reserves in order to meet the demands of all people. The primary purpose of any national park must be to preserve and not to be developed to take care of a mass of visitors who would destroy the very values for which the national parks were established.

The proposals to keep the number of visitors within a national park to such proportions that it does not hamper its wilderness quality has been challenged by those who advocate that this approach is undemocratic and that "national parks are for people" and not just for a few who appreciate virgin or untouched nature. I believe that these "few" in reality are not so few. Perhaps they will soon become the majority. This is a sound evolution and should be encouraged. For those who want outdoor recreation without "natural quality," there are always plenty of areas where they can satisfy their needs. Moreover, just the fact that "national parks are for people" implies that they should be so for all time and not only for the present generation. If we destroy or mismanage what we have in custody today, we are irresponsible towards coming generations.

Therefore, I repeat that the number of national parks and equivalent reserves needs to be increased in relation to the public demand and their carrying capacity to receive visitors without being damaged. Obviously this kind of land use must be compatible at national level with other kinds of land use necessary for the country. This is again a part of ecological planning.

This problem highlights the necessity of ecological land use surveys as a basis for the long-term planning of the renewable natural resources of each nation or region. In such a scheme national parks have to be considered as a form of ecologically, economically, and socially sound land use. One of many useful results coming from such surveys is a firm background of ecological knowledge of the interactions between habitats and biomes inside and outside national parks. Such a knowledge will be tremendously helpful for land planners when delineating national park boundaries. Moreover, the introduction of scientifically based conservation and management principles having an ecosystem dimension is as important within national parks as outside them.

Toward a new dimension of national parks

Hitherto the selection of sites for national parks in various countries has been a rather disparate process. The motivations have varied greatly from country to country but usually they have had one common denominator, namely that the area set aside as a national park did not constitute for the time a so-called economic sacrifice. Therefore most national parks of today are located on marginal lands or in remote and inaccessible areas or on what was considered as wasteland. Fortunately, many of these areas harbor a rich animal life and, at the present time, function as refuges for many endangered species.

An approach to the selection of areas for a national park system, based on ecological criteria at national level, in order to create a network of representative ecosystems in each country has been emphasized, for example, by the African Convention on the Conservation of Nature and Natural Resources, signed by the African Heads of State in 1968, especially Article X on Conservation Areas.

The obligations in the African Convention may lead to a fair representation of ecosystems in each African country and hence, on the African continent. This is an example to follow for other continents because it is now high time that the national parks and equivalent reserves of the world should represent the different continental and oceanic ecosystems and major biomes. In their approach to national park systems and criteria for selecting areas for such reserves, the world's nations must now, together, go beyond national boundaries to create a representative global network of national parks which will give humanity a complete pattern of various natural ecosystems and major biomes. All these areas must be sufficiently large to be ecologically self-supporting (or at least as much as possible). Such an aim means that many ecosystems and biomes of the world have to be restored. It may be said that such an ambitious scheme is a luxury and that many countries cannot afford to participate in it. In reality, most nations cannot afford not to participate in such an effort. Far from being a luxury, the scheme will be of immense benefit to mankind, and perhaps of survival value to humanity. The values of a global network of ecosystems preserved by national parks are manifold but the most important one is that they will assist man to understand his environment and give clues to ecological problems of which the solutions may support posterity instead of leading to disaster.

Perhaps the most fundamental lesson we can draw from a normally functioning ecosystem is its productivity, based on complex interrelations between all its components. The rate of creation, consumption, decomposition, and recycling is of immense importance for humanity to understand properly. Too often we neglect to recognize the simple fact that natural communities are the most effective systems for utilizing energy and chemical materials available in the environment for continued production of living organisms. This is the result of a long evolutionary history, from which man can learn much.

All this means an increased utilization of national parks. They will no longer function only for recreational, esthetic, and ethical reasons or for preserving endangered plants and animals. They will have an even more important role, a role of paramount impor-

tance, namely to serve as ecological sample areas for our guidance in managing the world's renewable natural resources.

The importance of national parks for human well-being and prosperity will in the future certainly increase to dimensions far beyond the present conventional estimate.

A new system of national parks hopefully will emerge through international arrangements and cooperation. There will probably be more "international parks" located on both sides of boundaries between nations.

The era of ecological illiteracy will be succeeded by ecological consciousness. People will begin to understand that the depletion of natural diversity and deterioration of environmental quality are symptoms of a culture in decline. That overexploitation of the environment generates an accelerating process of destructive forces. Collapse of ecosystems has led to the fall of civilizations. Elimination of natural areas makes the study of man's biological heritage impossible. Man's behavior is intimately linked to his heritage. Moreover, for man's cultural and spiritual advancement, diverse living landscapes are essential. If all these facts are realized by nations and people, then there will be a renaissance of natural ecosystems on this globe of ours.

The global network of ecosystems and major biomes must be based on worldwide inventories. Useful material already exists, thanks to the International Biological Programme and the efforts of E. Max Nicholson, Convener of its Section on Conservation of Terrestrial Communities. Also, Projects MAR, AQUA, and TELMA of IUCN provide lists of areas of international significance. Many countries still have peripheral wilderness areas worth preserving. Other regions, previously occupied by humans but at present abandoned, are restoring themselves to wildlands. This is the case in many temperate countries in the northern hemisphere, particularly in areas of Canada, the United States, and Scandinavia, where an early rural economy for subsistence has faded out with the emigration to urban and industrial areas or to lands offering more fertile soils. An example of such an abandoned area in the United States is the Catskill Mountains in the Appalachians of New York State. Deserted by farmers about 50 to 60 years ago, the wilderness is now reconquering the Catskills and restoring an ecosystem to its former shape and efficiency. The same process is going on in proposed Adirondacks National Park, also in New York State. Given some cooperation and time, nature's ability to heal the wounds inflicted by man is remarkable. This gives us hope of restoring many damaged ecosystems and biomes around the world. It is in the interest of each nation to plan and execute such restoration of representative landscapes so that they include an array of natural areas of significance. It has to be done before it is too late.

In global ecological planning, the already existing national parks will play an important role as a base on which to build and to complete. Even many existing national parks have to be restored, because in many of them habitats have been or still are too much influenced by human activities and therefore are altering their character. As we are dealing with dynamic entities and situations a great deal of this restoration will take place by itself and such self-restoration is much more efficient than human attempts. Spontaneous recovery of disturbed natural habitats should be given priority even if it takes some time. However, many such restorations cannot be made adequately, even by nature itself, without revision of national park boundaries, based on ecological

necessities in order to have viable nature reserves. The boundaries were often conceived under past conditions—including a different national park concept. To deal adequately at the present time with the full range of pressures and competing demands for land and water, it is necessary to reevaluate the status and use of areas surrounding national parks. In cases where important areas cannot be added to national parks, the latter should at least be surrounded by buffer zones, where all human activities are controlled as is stipulated by the African Convention on the Conservation of Nature and Natural Resources. Such control should be based on an appraisal of the total environment of surrounding areas with emphasis on the physical, biological, and social systems of which they are parts.

An adequate zoning of areas within national parks will certainly be an important trend in the next decades. This means that some areas will not be visited at all except for scientific research (strict nature reserves); others will be visited by hikers in restricted numbers (wilderness areas); a third zone will have tracks and roads; a fourth, other kinds of tourist facilities; and so on. This zoning could be flexible in time if necessary, for example by excluding visitors from fragile areas during the breeding season of birds. In the establishment of a global network of national parks, it should not be forgotten that the most common natural areas are also important to preserve. How far downward in the environmental hierarchy have we to go in order to preserve? We have so far mentioned again and again ecosystems and biomes but we have spoken very little about habitats. Obviously it would be ideal to have protected samples of all representative natural habitats of the world but they are virtually innumerable and they will not be easy to define. In the desert of the western Sahara, for example, Théodore Monod (1964) identified no less than 33 habitats! Hopefully most biotopes will be included in the future network of national parks and major biomes covered by national parks or equivalent reserves.

It is imperative that living examples of all species of plants and animals be able to survive and that large areas representing all major types of unmodified world biota, both aquatic and terrestrial, be preserved in order to permit present and future generations of mankind to understand the potential ecological diversity of natural ecosystems and the dynamic population ranges of their organisms as contrasting examples to monocultures and other manmade habitats.

Future growth and trends in national parks

It is obvious from the experience of the past 10 years that national parks will play an increasingly important role in the social and economic development process of the world, due to their scientific, educational, and recreational functions. I have already mentioned the scientific aspect in the form of the immense importance a global network of national parks will have in providing ecological (bioeconomic) guidelines for the future use of lands and waters.

Much of the economic value of national parks will be in the form of nonconsumptive use such as research, education, recreation, and protection of gene pools. Surplus animals will disperse to surrounding areas, if the latter are suitable, where they can

be cropped for protein and hides. Protection will be given to migratory birds along their flyways, and, in due time, this will also yield protein and recreational opportunities outside the preserved areas. Protection of coral reefs will indirectly favor lagoon and offshore fishing, because the coral reef biome functions as a spawning ground, a nursery of larvae, and habitats for juvenile stages of numerous marine species of fish which as adults live in the open sea. These are just some examples of what national parks yield indirectly.

National parks and research. This subject is of such fundamental importance that it deserves a few more words.

Continuous scientific investigations are essential for the maintenance of a national park because it is on research results that policy, management, assessment of vulnerability of the area, limitation of visitors, and so forth must be based. A general rule should be, depending on the degree of ecological autonomy of the ecosystem covered by the national park, that management or manipulation should be kept to a minimum and, if possible, even totally excluded. I have discussed this point in one of my contributions to the IUCN gift volume to the United States, to which I refer (Curry-Lindahl, 1972). Besides these elementary research needs as a basis for national park systems, science needs national parks as "pure areas" where biological research that is essential for understanding the environment can produce significant results. The role of national parks in this context was emphasized by the UNESCO Intergovernmental Conference of Experts on the Scientific Use and Conservation of the Resources of the Biosphere in 1968, from which an international research program, called "Man and the Biosphere" (MAB) emerged. To this program, research on ecosystems in various parts of the world is basic and, to a very large extent, it has to be carried out in national parks. The Biosphere Conference recommended that governments "accelerate the establishment and protection of national parks and wildlife sanctuaries." Scientific research in national parks is not necessarily incompatible with tourism. The latter should never use more than a fraction of the total national park acreage. However, it should not be forgotten that researchers may also sometimes cause serious disturbances in the environment, so a green light should not automatically be given to all kinds of investigations in national parks.

National parks and education. Ecology in action can best be studied and learned in national parks where short-term and long-term environmental processes stand out more clearly and more positively than in areas disturbed by human activities. Schools, colleges and universities need natural areas for the teaching of biology. So far, relatively little attention and understanding have been given by education planners to this elementary need in any educational system. Yet, the success of our species may depend on how young people understand the environment and man as a component of it. If we do not react, through knowledge, against factors ruining land and water, then human future is in jeopardy.

The most important educational value of national parks is perhaps, according to Pimlott (1969), "related to the 'joy of discovery' that can occur in so many different ways and at so many different levels of comprehension. The educational value is, I think, that when it occurs it creates an atmosphere of thought that brings the person closer to an

awareness of man as part of nature—makes that person more ready to face the problems and perhaps help with the solution of problems associated with our use of the environment."

The interpretative services of national parks are important means to get the educational conservation message across to visitors and to make each national park visit meaningful. So far only a few of the national parks in the world, except for those in the United States and, on a minor scale, in some other countries, have developed this potential instrument of education at all age levels.

It is likely that education centers in national parks will in future years be important in the combat against ecological illiteracy. They will be a useful antidote against the dangerous philosophy that technological progress alone will solve all problems of mankind.

To accomplish this, interpretation programs in national parks must be directed in a more general way to the total environment and the function of a living landscape rather than the elucidation of exceptional features.

National parks and recreation. There is no doubt, if present trends continue, that the recreational role of national parks will increase tremendously in the future. In 1970 the national park system of the United States was visited by 172,004,600 people and those of East Africa (that is, Uganda, Kenya, and Tanzania) by 571,457. This trend is a positive force speaking in favor of national parks, but it also increases the pressure on the national parks. This dilemma is briefly discussed in the beginning of this paper. I believe that with an increasingly enlightened understanding of the environment and of the lessons we can draw from it, it will be easier to defend the prime purpose—that is, preservation—of national parks and equivalent reserves as irreplaceable areas against political pressure from governments, states, provinces, counties, and municipalities to develop them for mass recreation.

The overall, real recreational values of national parks are difficult to assess. The physical and mental health of segments of human populations are certainly dependent on outdoor recreation in natural areas not overcrowded by humans. The esthetic enjoyment of such visits signifies for many people a tremendous inspiration, the value of which to society should not be underestimated. There is a quality in wild nature that is irreplaceable and that has always inspired and enchanted man. This aspect must be considered as an integral part of human culture.

National parks and conservation. It must be generally recognized by all nations that the prime aim for national parks is to preserve the whole environment in the most natural conditions possible. All other purposes must be regarded as secondary. The reasons for so doing are all beneficial from social, scientific, economic, and educational points of view. A particularly important conservation role for national parks is in the protection of species that are elsewhere endangered. National parks and equivalent reserves constitute the most direct and rational way to protect endangered and rare species of plants and animals through habitat and ecosystem conservation. It may be argued that species extinction is an age-old phenomenon that has occurred for eons before man appeared on the scene. Therefore, it is sometimes asked, why bother to do anything against extinctions? This question overlooks the sad fact that man, through

artificial population increase (due to the medical revolution) and technological advancement, has accelerated the process of extinction by exterminating species every year and by pushing hundreds of other species to the verge of extinction on a cataclysmic scale. It would go beyond the scope of this paper to discuss the manifold reasons and advantages to humanity of doing the utmost to preserve endangered and rare species. The most efficient way of doing it is through national parks.

National parks have further an important conservation role in the protection of migratory animals, including mammals, birds, and fish. This conservation function requires special considerations since it affects the location, size, and boundary locations of all parks. It is not possible to review these considerations here in a limited space.

National parks and marine habitats. During the past decade, marine national parks and nature reserves have become increasingly popular. This is indicated by the growing number of visitors which come from far away to skindive and goggle at coral reefs protected by established reserves. For developing countries in tropical and subtropical regions this kind of attraction involving a nonconsumptive use is indeed an important source of income.

Experiences from submarine national parks and equivalent reserves in Florida, the Bahamas, the Virgin Islands of the Caribbean, Costa Rica, Kenya, Ceylon, Japan, Australia, and many islands in the southern Pacific show not only the tremendous potential of these reserves, but, also, that they are easy to run, provided the control does not allow such damaging activities as dynamiting for fishing, spear fishing, and collecting of shells, corals, and other invertebrates. The latter activities are so destructive that they sabotage the whole meaning of a submarine national park, as has unfortunately been the case in Kenya.

Coming decades will undoubtedly see the establishment of many new marine national parks. They are, in principle, as important as terrestrial reserves for science, education, and recreation, but obviously tourism will initially be the driving factor.

National parks and human populations. It is essential that the establishment of national parks and equivalent reserves shall not be imposed on human populations living in and around these areas by the authorities of a country. Bitter experiences have shown how important it is that local populations understand from the beginning how the setting aside of a national park may produce long-term improvements of their own life conditions both at individual and collective levels.

The problem of compensation to local populations directly concerned with the activities of national parks is a tricky one. One of the most important things is to eliminate the antagonism that local populations in developing countries often have against national parks. This negative attitude, in most cases, is induced by psychological and economic reasons. As adviser in ecology and conservation to almost 40 African governments, I have discussed this problem with government officials in quite a number of countries. According to my experiences from other continents, the situation is very similar in developing countries outside Africa, but perhaps less burning than in Africa where the revenues from national parks are usually higher and more visible than elsewhere due to a flourishing tourist industry. This is particularly the case in East Africa.

In most cases, local populations living in the neighborhood of national parks feel that

it is their land which has been "taken away" from them, although, in every case I know, these people or their chiefs or their villages or their county councils have been compensated in various forms according to deals which have been agreed upon after long and often complicated inquiries, hearings, and negotiations. Both the colonial regimes and the present governments have, in the cases I know, been meticulous to settle all land ownership problems before a deal was concluded. This means that, from legal aspects, the populations concerned have no reasons to complain.

However, after having understood that some national parks are gold mines yielding considerable revenues, many individuals, village groups, and tribes living close to national parks feel that they get very little out of it. Even if they did not virtually live in the national parks prior to their establishment, they often used them for hunting, fishing, charcoal burning, and so forth. Therefore, they consider the area as their land that, in many cases, had been used as hunting grounds by their ancestors for hundreds of years.

The fact that the local people no longer have the right to utilize the land that they consider was once theirs, but see it frequently visited by foreign people, brings psychological reactions. Most local leaders realize the benefits and advantages that their county councils (or similar units) receive from national park revenues, but individuals do not. The local revenues from national parks are often invested in building of schools, hospitals, roads, and other communal services. The very fact that the local benefit is collective makes it inconspicuous to the individuals of the community, particularly since they feel that these social investments should be made anyway, as is the case for communities located far away from national parks where there are no revenues at all from the park. On this point the people are right, without doubt.

In addition to the problems just mentioned, comes the pressure from the people to get land for cultivation and livestock grazing. Ecologically and economically it would be disastrous to convert marginal lands (on which most national parks are located) to such a land use, which automatically sooner or later leads to overcultivation, overgrazing, overtrampling and, finally, an ecological collapse with a ruined landscape as a result. But socially, politically, and psychologically it is difficult for governments and county councils to withstand human land hunger. This is, of course, ultimately a population problem which can only be solved by long-term planning of populations.

As it is essential for the future of national parks in developing countries that the people do not consider conservation areas as antagonistic to national and local interests, I have often in my discussions with governments taken up the very important subject of how to channel national revenues derived from national parks to local populations living in the areas directly concerned.

As it is quite clear that most people living within the sphere of a national park feel that they have no advantage from it despite the building of schools, hospitals, etc., it seems to be important psychologically that each head of family or adult village citizen receive some form of individual compensation as a token of the benefit coming from national parks. As in most cases the majority of the people concerned have such a low annual income that they do not pay any taxes, the compensation cannot be in the form of reduced taxes. Therefore, I have suggested in discussions with several African govern-

ments a system of annual cash compensation. I believe that such a concrete contribution at individual level will have a considerable psychologically positive effect and will make local people sympathetic to "their" national parks. Moreover, it is important to make clear to the people that all public buildings, roads, and other communal facilities, which have been developed from national park revenues, really have derived from this source. A well-displayed plaque reminding people that a school or a hospital exists thanks to the revenue from the national parks or come "from the animals of X National Park," would certainly, in the long run, contribute to making people understand that it is to their benefit to live close to a national park.

There have been different reactions in various countries to the proposal of a cash compensation at individual level. Some government officials have welcomed this suggestion and feel that it is feasible; others are against it for reasons of principle.

In my view, a flexible approach to this problem is necessary, because, in some countries, local animosity against national parks may jeopardize their future. This would, in the long run, undoubtedly be a tragic loss not only to the region concerned but also to the nation and the world.

Particularly in the tropics but also elsewhere (for example in Hokkaido) primitive tribes are living in or just outside national parks. Should they be allowed to occupy national parks or to use them for collecting, fishing, and hunting? In my opinion they have to be permitted to do so if they so wish and provided they utilize the environment in the same way as Indian tribes in the Amazonas, the pygmies in the equatorial lowland rain forest of the Congo, the negritos in Mount Apo National Park in Mindanao of the Philippines, the Papuans of New Guinea, and the aborigines of Australia. All these groups make use of the environment as collectors, scavengers, and hunters in exactly the same way as wild animals; they utilize resources without destroying them. They are a natural part of the ecosystem.

Wilderness areas and strict nature reserves

In the following I refer only to wilderness areas located in national parks and equivalent reserves.

At the Conference on "Canadian National Parks: Today and Tomorrow" in Calgary, Alberta, 1968, Roderick Nash (1969) drew the attention to a symptom that he labelled "an index to culture." His example was that "Hertz Rent-A-Car" had in that year launched an advertisement campaign based on the slogan "Even before a single resort was built there was an America worth seeing." In other words, an advertising agency was willing to stake a million-dollar account on a particular theme that, in this case, was that wild lands still exist. "And when North America's major purveyor of rented cars, not just an ambitious number two company, puts its money on the desirability of seeing what civilization has left untouched, you can be sure appreciation of wilderness has, in a sense, come of age," Nash commented.

The increasing appreciation of wilderness is a good sign, but let us hope that it does not develop into a mass movement, because a wilderness area will cease to be wilderness if invaded by too many people at the same time. Its qualities will simply be trampled

down. On the other hand, the growing public sympathy for wilderness areas might politically balance the present severe pressures on wilderness lands. Therefore, one should not be too restrictive in allowing hikers access to wilderness areas located in national parks. Since each wilderness area differs from another, it must be the special values, functions, accessibility, and degree of fragility characterizing each area that determine the number of visitors during different seasons of the year. Many areas can probably absorb more visitors in autumn than in spring. A flexible system synchronized with the seasonally variable environmental capacity to receive visitors without habitat disturbances should be worked out, guided by research. Thus a zoning system, both in space and time, may avoid damage.

A global network of national parks

The desirability, not to say the necessity, of establishing a global network of national parks and equivalent reserves has been emphasized in this paper. The advantages of such a system have been explained. An idea conceived in the United States is that of a world heritage trust or system to safeguard for all time outstanding natural environments, by preference at an ecosystem level—or at least representing natural units. This will be discussed at length in another paper at this Conference.

In 1971 His Imperial Majesty the Shah of Iran announced in his inaugural message to the International Conference on the Conservation of Wetlands, in Iran, a governmental decision with the following words: "To emphasize the depth of our convictions that our natural environment must be protected and that all nations are interdependent in the attainment of this goal, we wish to state that Iran is prepared to place one of her wetland ecosystems of special global significance in joint trust with a suitable international agency, such as the United Nations Organisation, to conserve and administer for all mankind."

Although not related directly to the concept of a World Heritage Trust, this is an outstanding and pioneering example of conservation leadership and international spirit. Hopefully Iran's example will be followed by other nations.

Essential to the success of a World Heritage Trust is the concept of integrity of national parks. This concept has been in existence since the very first national park was established 100 years ago. It is not a new philosophy. Yet, numerous governments have violated this concept by exploitation leading to serious destruction.

The integrity of national parks

Even in the United States, where the idea of "perpetual preservation" was born, a dam to provide water for San Francisco was proposed about 70 years ago. The proposal was fought by conservationists throughout the country, led by John Muir and the Sierra Club. The fight went on for years, but, in 1913, the Congress passed the bill and the dam was built. That was the last time a dam was authorized to be built in a U.S. national park. Since then the United States has respected the integrity of national parks. Unfortunately, other governments have shown less responsibility by exploiting national

parks for hydroelectric purposes with consequences so grave that they have destroyed for all time irreplaceable values. Private conservation organizations have fought bitterly against their governments' lack of foresight and wisdom but usually without results. Irreversible destruction, caused by governments, has taken place in national parks and equivalent reserves in, for example, Australia, Canada, Italy, Japan, Rwanda, Sweden, and the U.S.S.R.

It is obvious that national parks and equivalent reserves must be protected against all human exploitation of their natural resources and against all other derogation of their integrity resulting from human activity.

It is time in our stage of civilization and after 100 years of national park activities in the world, that all nations declare their acceptance of the integrity of national parks as a universal act of solidarity. Manmade major modifications in national parks must be banned in the interest of humanity. It seems to be particularly appropriate to make such a plea at this Conference and at this place where we are celebrating the centenary of Yellowstone National Park, a natural area that so convincingly has given an example to the world of the eternal values of national parks.

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SESSION IV / PAPER 8

THE ROLE OF NATIONAL PARKS IN SOCIAL AND ECONOMIC DEVELOPMENT PROCESSES

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Nineteen seventy-two marks the 101st year since the world's first national park was established on a lava plateau of the Rocky Mountains in western North America. During the ensuing 100 years, most of the nations of the world have established national park

systems with a view to protecting their unique natural landscapes and providing their people with recreational facilities. Needless to say, national park systems vary from country to country, depending on the administrative framework of their management, natural resources, and, more broadly, the state of land utilization, their people's outlook on nature, and a myriad other factors.

National parks of each country have played varying roles depending upon their social and economic development at different stages. In some countries, for instance, the major thrust of the management of their national park systems is being directed toward protecting the wildlife and its habitat, with the result that the novelty of the wildlife in these countries thus preserved attracts large numbers of tourists from abroad, whose spending helps the host countries to earn foreign exchange and strengthen their economies. In others, emphases are being placed on preserving some of their most spectacular natural landscapes, which are open to the people so that they can satisfy their emotional needs for awe-inspiring beauty, normally inaccessible in their workaday lives. Thus, national parks play a vital role in the enrichment of their spiritual life. In still others, the ecosystems of certain pristine areas, which are still in natural balance between plants, animals, and micro-organisms, are preserved for study. While they may be of lesser value in terms of scenic beauty, they serve as important sources of ecological information. The theme which I am assigned to discuss is the various roles which different types of national parks play in the social and economic development processes. However, I would first like to review their general role as a group at various stages of their history, rather than those played by specific national parks in any particular country. I shall then focus my discussion on the peculiarities of the national park system of Japan, together with an analysis of the role it has played.

A national park has by no means a predetermined and unalterable role to play. It changes and grows in response to the changing social and economic requirements of the country. It therefore follows that any study of its role should be pursued with a historical perspective. Consequently in my discussion of the roles played by Japanese national parks I shall take this approach, starting first with a review of the roles they have played in the past, and then analyzing their present and likely future positions.

General role played by national parks

Whatever approaches countries may make toward the management of their respective national park systems, they have one thing in common: the core area of a national park consists of natural landscape not exposed to human interference. Indeed, it may be said that natural landscape is the basic element of a national park. How long ago was it, then, that man really began to take interest in natural landscape, not an economic interest but esthetic and emotional interest? It belongs to a very recent past measured in terms of the 2 million years of man's known existence.

It is said that it was during the Renaissance that the Europeans first took an active interest in natural landscape, and about the beginning of the 18th century that their interest took the form of organized thought. Around that time, the industrial revolution was in its infancy, primarily in England, and European countries began to overexploit

their natural resources. Lamentation over the impairment of natural environment, expanding urbanization of their communities and the sense of resistance against the wave of mechanized civilization evoked a craving for nature. This, in time, matured into the idea of natural environment protection whose cause found articulate advocates in a growing number of men of letters and artists. However, the idea needed more time before it finally evolved into a nationwide system.

As mentioned earlier, the establishment of a viable system of natural environment protection dates back to the latter half of the 19th century, when a national park was first established in the United States. This was the period when industrialization, urbanization, and land development on a nationwide scale were being actively pursued in the United States. As a result of this accelerating land utilization, the wilderness receded into remote areas all over the country at a dismaying speed.

At this point, I would like to emphasize the importance of another element of the United States background at that time leading to the establishment of national parks: the development activities of frontiersmen who fanned out throughout the length and breadth of the North American continent. Initially, frontiersmen looked at nature with hostile suspicion. But as they tamed nature and began to put down roots in many parts of the continent during the latter half of the 19th century, they came to view nature in a different light, no longer hostile but as a reassuring friend. To them, the wilderness indeed was a theater of war in which they had been engaged in mortal struggles for survival. It was part of their history and the source of the frontier spirit that sustained them through the trials of early statehood. It was against this backdrop that Yellowstone National Park was established.

From the very beginning, Yellowstone National Park had two important roles to play. One was to protect its spectacular natural landscape for generations to come from aggressive commercial exploitation, while the other was to make the awe-inspiring beauty of its landscape accessible to the people solely for recreational purposes. Given the recklessness of commercial exploitation of natural resources that threatened to spread all over the country at that time, it is understandable that the Federal Government of the United States should have taken such a protective measure. But in view of the rather modest level of interest the people took in outdoor recreation in those days, due credit should be given for the farsightedness shown in having assigned the latter role to a national park. I believe that the changing outlook of the American people on nature, reflecting the progress they made in land development, may have had a profound influence on the recreational concept of the role of national parks.

As human societies progress with time, the tension of city life intensifies on the one hand, and an increasing number of hours become available for recreation on the other. These factors combine to reinforce the role of national parks in catering for the rising demand for recreation. Recreation has an important bearing on health and spiritual life and, even more importantly, on the culture, economy, and national character of a people.

Of the various benefits derived from national parks, I would like to emphasize their educational possibilities. In response to the growth in the number of visitors to national parks in postwar years, the U.S. Government established various types of park facilities under a program known as "Mission 66." Special emphasis was placed, among other

things, on educational facilities such as visitor centers and nature trails. Moreover, as public concern about environmental pollution became increasingly vocal in the second half of the 1960's, the educational function of national parks has come to claim keen public attention. Public officials have shown growing realization of the importance of national parks as a tool eminently suited for spreading an understanding of environmental problems, and thus national parks have come to take on a new role as places for "live" environmental education.

The national park system of Canada came into existence in 1885 with the establishment of Banff National Park in the Canadian Rocky Mountains. The Canadian system was modeled on that of the United States, with the resultant adoption of the two roles assigned to national parks in the United States. But it must be noted that several subsidiary roles have also been given to their national parks. One is the inducement of a tourist traffic of foreign visitors to increase the earnings of foreign exchange. The other is the development of local communities, which is also closely related to the economic role. Canada has a small population compared with her vast territory and large areas of wilderness still remain to be exploited. Her national park system has no doubt played an important role in stimulating local development. Incidentally, the national parks of Japan have also played similar secondary roles to a significant degree. More often than not, however, their role in economics and promotion of local development clashed head-on against the primary purpose of national parks—the protection of nature—and often led to impairment of the beauty of the natural landscape.

Swiss National Park was established in 1914, and its primary purpose is to preserve the topography, plants, and animals in their original form, and to use them exclusively for the purposes of scientific investigation. It must be said that this represents a system built on a more narrowly defined purpose than the more general role of those which I have already mentioned. However, in the contemporary world where environmental problems are assuming serious proportions, especially in countries where the tentacles of land development are probing after every remaining tract of undeveloped land, the scientific role of national parks may become increasingly important in the future. The various roles of national parks discussed thus far are common, if in varying degrees, to all national parks of the world. Basically, they revolve around the two principal roles given to national parks 100 years ago when the world's first national park was established: the preservation of natural landscape of national importance and its utilization for recreational purposes. Other functions are either outgrowths or metamorphoses of these two principal roles.

Japanese National Park System

Before discussing the roles played by national parks in Japan, I might offer a brief explanation of the Japanese National Park System, for it is drastically different from those of the United States and Canada. Without a proper understanding of the system's peculiarities, it is difficult to grasp correctly the roles national parks play in Japan. The Japanese National Park System was established in 1931 upon promulgation of the National Parks Law, some 60 years after the world's first national park was established

in the United States. Three years later, the first group of eight areas, including the Inland Sea, the Unzen, and Nikko, were designated as national parks. During the ensuing 40 years, a total of 23 areas have been designated as national parks across the country, and now embrace 1.96 million hectares of land and water.

As mentioned earlier, the National Park System of Japan is different from those of the United States and Canada. The principal difference lies in the ownership of the land involved, that is, whether the land located within the area of a national park is owned by the State, the manager of the national park, or by private persons or organizations. In the United States and Canada, the land located within the area of the system is owned by the Federal Government, and the protection of the natural landscape and the development of recreational facilities within national parks are effectively carried out by the State pursuant to the management right of the land. By contrast, in the Japanese National Park System, the land within the area of national parks is not necessarily owned by the State. Instead, the State merely exercises certain control on acts that are carried out on the land within national parks. For instance, when the owner of an area of land located within a national park, or a person having certain rights on the land, wishes to erect a certain structure on his land, cut trees, or quarry gravel or earth from his land or carry out other kinds of activities that may impair the beauty of landscape, he must obtain a permit from, or file a report with, the government. The government investigates the situation with a view to determining whether or not there is any danger of the landscape being impaired by the proposed activities and either issues a permit, in some cases with certain stipulations attached, or disapproves the application.

What are the reasons behind this approach? Japan is small in area, with a long history and a large population. Consequently she has a high density of population; her land is developed literally to the last nook and cranny and her land utilization is intensive and diversified. It is true that there are some areas seemingly idle to casual observers, but in fact many of them serve multiple purposes: as a source of forestry products, as a riverhead, or as an outdoor recreation ground. Furthermore, State land accounts for only a fraction of the total; most of the State lands are managed as forests by the Ministry of Agriculture and Forestry. Given the mode and intensity of land utilization, we can ill afford to restrict the establishment of national parks only to State land, yet hope at the same time to cover all natural landscapes of national significance and provide people with means of outdoor recreation. In fact, the two demands are not compatible, hence the compromise. One can find a parallel approach in the United Kingdom where the situation is similar.

Thus, under the Japanese system, lands located within the area of national parks are divided into three categories on the basis of the quality of landscape and the mode of land utilization: special protection districts, special areas, and ordinary areas. The special protection district is the most important area containing the most spectacular natural landscape deserving rigorous protection, and commercial activities such as those mentioned earlier are not allowed. The special area is next in importance, and commercial activities therein are subject to prior approval of the government. The ordinary area is the one lying in the periphery of a special area, where the land is actively utilized. In this area

also, commercial activities on a scale larger than a certain specified level must be reported to competent authorities prior to their undertaking.

The National Park System does not require the State to acquire all the land necessary for a national park prior to its establishment, and therefore affords greater facility than would otherwise be the case. But its drawback is that the power of the State is weak over matters relating to the protection of natural landscape. Its inadequacy in this respect was brought to light when it was confronted with surging waves of industrialization and land development. The role of national parks in protecting natural monuments of national significance increasingly came under attack from aggressive development activities armed with the ownership of land or the rights to use the land located within national parks. In an effort, therefore, to bolster the faltering system, measures are being taken to nationalize lands which are situated at strategic locations within national parks.

The roles of national parks in Japan

In 1934, when the first national park was established in Japan, people expected national parks to fulfill four roles. Naturally, two were identical to the two basic purposes expected of the first U.S. national park. The remaining two included the attraction of foreign tourists to earn foreign exchange, and the promotion of development of local communities lying within the periphery of national parks. While these two economic roles admittedly were of an ancillary nature, they met with strong support from a segment of the population. Although the number of areas designated as national parks had increased to 12 by 1936, the administration of the areas had to be suspended for the ensuing 10 years. In 1946, the administrative machinery of national parks was reinstituted with a renewed vigor and, in the same year, Iseshima National Park was established. This park embraces the Grand Shrines of Ise, the most celebrated Shinto shrine in Japan, the mountainous area behind it, and the coastal area of Shima (renowned for cultured pearls). At that time, Japan, suffering from the effects of the war, gave top priority to economic rehabilitation. Under such circumstances, the earning of foreign exchange, originally considered as of secondary importance, was given sudden prominence. And from this standpoint, Iseshima, despite its limited scenic value, came to be designated as a national park.

Thereafter, as economic reconstruction got into its stride, the livelihood of the people began to be stabilized and industrialization and urbanization progressed apace. These favorable developments were translated into a growing popular demand for recreational facilities, and the number of visitors to national parks increased by leaps and bounds. Surging social and economic development brought in its wake a tide of land development of unprecedented scale and diversity, necessitating that urgent measures be taken for the protection of the valuable natural environment. As a result, several new national parks were established and the areas of others were enlarged.

At this point, I would like to draw your attention to a social phenomenon: social and economic development, accompanied by an intensification of industrialization and an expansion of urbanized areas, tends to overconcentrate population in a few industrial centers at the expense of depopulating larger areas. It was hoped that the effect of the people's recreational activities might help to cope with the depopulation problem. In

1970, a total of 284 million people visited Japanese national parks and they spent a sum of ¥528 billion (or roughly U.S. \$1.4 billion). A flurry of development activities was stimulated within the area of the national parks; many roads were built and numerous ropeways were installed. Skiing areas and golf courses sprouted within national parks, a phenomenon rarely seen in the United States. Lodging facilities, not just small inns but large and starkly modern hotels, were built. The money these facilities helped to earn brought economic benefits to the outlying areas of national parks, but, at the same time, this secondary role brought with it undesirable side effects. One was the impairment of natural beauty by the addition of large numbers of manmade facilities. A number of roads are now being built reaching deep into the mountains, and the resultant destruction of the environment has created a serious social concern. More problems have been set by the amenities offered by commercial establishments set up in national parks, oblivious of the original aim of communion with nature of the national park. Since the second half of the 1960's, those of us responsible for the management of national parks have been endeavoring to augment educational facilities in national parks. But the fact is that the few facilities we have managed to build are drowned in the multitude and bustle of commercial facilities. It must be admitted that the greatest shortcomings of the national park system of Japan are the institutional weakness mentioned earlier and the excessive proliferation of commercial facilities unintentionally fostered by such a weak system.

As mentioned earlier, the number of national parks now stands at 23, covering 5.3 percent of the nation's land, on all the four islands of Japan: 4 in Hokkaido, 14 in Honshu, 4 in Kyushu, and 1, the Inland Sea, surrounded by Honshu, Kyushu, and Shikoku.

Speaking of the legislative framework relative to national parks, I wish to mention that the National Parks Law was comprehensively amended in 1957 into a Natural Parks Law. Pursuant to this law, two additional categories of parks—the quasi-national park and the prefectural natural park—were established. At present, there are 44 quasi-national parks with a combined area of 990,000 hectares, and 279 prefectural natural parks with a total area of 2 million hectares. These quasi-national parks and prefectural natural parks constitute the natural park system of Japan.

Also since the second half of the 1960's, an entirely new role for national parks was conceived among the people at large. This was born of the growing awareness that these natural parks, which occupy important parts of the nation's natural environment, are playing an important part in the preservation of an agreeable living environment. As time passed, this awareness was reinforced, first by an intuitive suspicion that the air and water pollution which make our lives miserable may not be entirely unrelated to the improvident destruction of natural environment, and secondly by scientific findings made by increasingly sophisticated ecological and geochemical studies. Combined with the pressure of limited availability of land and the proximity of urban centers to natural parks, this awareness led to a reappraisal of the importance of the potentials of natural parks in the preservation of the environment.

Natural parks, including national parks, are of central importance for the preservation of the natural environment system of a country. I shall now attempt to analyze their role from a different angle.

Most cities have parks planted with trees and gardens. What function do they perform for the citizenry? Many visit their city parks; some bask in the sun on a bench or stroll the footpath; others play tennis, visit a greenhouse or a flower show and learn about plants. Let us call these benefits obtained from a city park a "utility effect." But these are not the only functions a city park performs; we are aware of another function. The mere existence of a city park in itself is beneficial to its citizens. Let us call this an "existence effect." The plants growing in a city park perform a number of functions: they help cleanse the air and moderate the elemental force of weather; they absorb noise; they shield the surrounding buildings against spreading fire; and they protect the people from wind. In addition, a city park is an ideal place for citizens to take refuge in case of a natural calamity. Such are the "existence effects" of a city park.

The functions of a natural park removed from cities also can be viewed in terms of these two effects: the utility effect and the existence effect. Preservation of natural landscapes of national significance, which constitutes the basic role of the national park, can be classified as an existence effect, while provision of recreational facilities may be classified as a utility effect. And the role newly assigned to national parks in Japan, that of the preservation of natural environment, constitutes an important part of its existence effect.

Now, I would like to analyze the natural park's role of preserving natural environment. For the sake of convenience, it can be divided into three components. The first is obviously its capacity to preserve the natural environment it contains. In a country such as the United States, blessed with a vast land mass, the combined areas of national parks account for only a small percentage of her land, whereas, in Japan, national parks alone account for 5.3 percent of her land and natural parks as a whole occupy more than 13 percent. Consequently in Japan the role of national parks of preserving the natural environment is very highly appreciated.

The second component concerns the scientific and technological values of the ecosystems contained in natural parks. Scientific discoveries emerging from the study of these ecosystems may go a long way toward the development of techniques of pollution control and the improvement of natural environment protection technologies. The national parks of Japan contain a large number of valuable ecological units including forests, grasslands, marshes, lakes, seashores, and seas.

The third and last component is educational, that is, the educational value of the recreational opportunities which national parks provide. Nowhere can one find a classroom more eminently suited for education on environmental problems than in national or natural parks. Indeed, one might say that these national or natural parks are living museums stocked with material for instruction.

The growing appreciation of the roles played by natural parks in the preservation of natural environments matured into the establishment of an Environment Agency in July 1971. The National Parks Division of the Ministry of Health and Welfare, which had been overseeing the management of natural parks, was transferred to the new Agency to form its Nature Conservation Bureau. Under the initiative of this Bureau, a Natural Environment Protection Bill, designed to expand the coverage of natural environment protection areas to the entire land of the nation, is now being drafted.

Conclusion

National parks have made great strides during the past 100 years, playing various roles in the process. In retrospect, one is reminded of the two basic roles which national parks played throughout their history—that of preserving natural areas of national significance, and of providing the people with a means of recreation. These two basic roles combined to give the people multiple benefits. The health and spiritual benefits given to man by national parks are indeed unfathomable. The unique quality of national parks of different countries has had a profound influence on the formation of different cultures and national characters. At a time when popular concern about deteriorating environmental quality is becoming increasingly organized and vocal, the educational role of national parks has taken on added importance and is meeting with deep appreciation. National parks are more and more useful as a means of encouraging people's understanding of, and communion with, nature, and of fostering the idea of natural protection reinforced by a boundless attachment to nature. Through such use, national parks are making great contributions to the popular concern for the protection of the natural environment. In Japan, which has a large number of natural parks, they perform the new function of preserving the living environment of her people.

Such are the increasing roles of national parks, and with the accelerating social and economic development of each country, they may gather new ones along the way. It is to be hoped that those who are concerned with the planning and management of national parks in their respective countries will heed these aspects and endeavour to work out balanced and varied programs for their management. I, for one, will renew my determination along these lines in concluding my report.

SESSION IV / PAPER 9

POPULATION AND ECONOMIC PRESSURES ON NATIONAL PARKS

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As population and economic pressures increase, the desire for national parks increases also. The more crowded people become, the more desperately they need the natural and open spaces provided by parks. The more wealthy people become and the higher their incomes are, the more they can afford to visit national parks. The richer whole countries grow, the more national budgets can provide for the acquisition and development of

national parks. With advances in the technology of rapid, long-distance transportation and with the lowering of transportation costs, individuals, families, and larger groups are able to travel to national parks more easily.

Population and economic pressures are the underlying causes of the diminution of certain natural areas and the degradation of the quality of many national parks. They constitute also the principal reasons why more and more national parks are being established and why the national park movement has begun to flourish all over the world. As always, problems tend to define opportunities.

The objective must be to increase the number of national parks and their capacity to provide for outdoor recreation, ecological preservation, beautiful scenery, and other benefits and services, and, at the same time, hold in check the mounting pressures of population and economic growth on them. Meeting this objective, even making progress toward it, will not be easy. It will require more far-sighted planning, more professional skilled personnel, much money, and a broad base of public understanding and support. With the continued growth of international travel, population and economic pressures on the national parks of any one country will tend to spread to other countries. A world view and cooperation among the nations is called for.

In this short paper I want to describe and analyze some of the principal population and economic pressures on national parks as these have been felt in the past and may occur in the future. Then I shall consider several lines of approach to lessening these pressures. Some of these approaches deal directly with acquisition, management, and use of the parks. Others are directed to broader population and economic growth factors. Finally, I shall suggest an international approach to the more adequate and systematic handling of the problems created by these pressures.

Population pressures

First, of course, is the increase in the number of people in the world. The story has been told many times recently. The outlook is alarming. World population is now around 3.5 billion and is rising at about 2 percent a year. At this rate there will be nearly 6.5 billion persons on earth in 2,000. Rates of increase vary greatly among countries, generally being greater in the poorer places. In a few countries of Europe the population is not much more than replacing itself. The annual rate of growth in the United States, which has been falling rapidly during the past decade, is now around 1 percent. Recent evidence indicates that if American women had the number of children they say they want, the net reproduction rate in this country would be close to one. This is equivalent to a longer run tendency of the population merely to reproduce itself. Because of the disproportionate number of women approaching the child-bearing ages, it would take a couple of generations for this net reproduction rate to be translated into zero population growth. In the poorer countries, where 70 percent of the people of the world live, no such prospect is in sight. In the vast reaches of Asia, Africa, and Latin America the race between population and food will continue to be a close one.

Within each country, apparently without exception, most of the increase in population is occurring in urban areas. Continuation of recent trends for another few decades will

lead to almost unimaginable results in Calcutta, Djakarta, Rio de Janeiro, Lagos, Dacca, and many other cities. Despite much greater wealth and income, the outlook for New York, Tokyo, Moscow, and many of the European capitals is full of severe social and economic problems. Whether the planners and the politicians will be able to cope with all of this and prevent major breakdowns remains an unanswered question. In the United States and Canada, and in other economically more developed countries, virtually all of the net population increase will locate in suburban rings outside the central cities, taking up large amounts of agricultural and recreational land and leaving a residue of more-or-less intractable problems at the center. The world of the future seems destined to be increasingly an urban and suburban world despite the valiant efforts that may be made to prevent it. A rapidly increasing population by itself places even larger demands on parks and natural areas in general, especially for outdoor recreation. This is even more true when more and more people live in cities and need the kind of change and quiet that national parks can provide. Whether urban dwellers are driven to seek park experiences as an escape or offset to the pace and noise of congested living may be uncertain, but many city people testify that this is the case. Certain parks are advertised for these features. The long sustained, high rate of increase in the use of national parks nearly everywhere in the world has probably been propelled in part by such a psychological force. In many countries, something approaching a cult has arisen, the followers of which, many of them youth, are devotees of the parks and outdoor life. A summer experience in the park, or in some cases winter as well as spring and autumn, has become part of the way of life for millions. Visitor-days in the national parks of the United States has doubled in the past 10 years, maintaining a rate of growth that has been going on for 50 years with few interruptions. It can be predicted with confidence that use of national parks in this country, and no doubt in others also, will continue to rise rapidly, limited only, or at least mainly, by the extent of the park areas and the facilities provided. An end to the "run" on the parks is not in sight.

Economic pressures

Adding to the demographic pressures on national parks are the economic pressures of higher incomes, greater mobility, shorter work weeks, and longer vacations. In the United States, personal income has been rising by 4 percent or so a year on the average for a long time. The portion of this spent on recreation in parks and travel to parks has increased fairly steadily in line with the greater use of the parks. Outdoor recreation, including the parks component, is a growth industry along with electronic computers, health care, plastics, and some others. As the income of less affluent families and individuals rises, the effective demand they can exert on parks will increase. First the nearby and later the more distant parks will come within their economic reach. The market for outdoor recreation in national parks has only begun to deepen in the more economically developed countries, let alone in most of the less developed ones where the national parks movement is still embryonic. Because major national parks are typically located rather far from population centers, transportation routes and vehicles are necessary to make it possible for large numbers of potential visitors actually to go to the parks. In most instances this means

automobiles and buses and, of course, roads. In many countries the number of motor vehicles is doubling or so every decade and highways are being extended into the more remote areas. In addition, the use of airplanes to carry people to or near to national parks has increased very fast. It is now easy and quick, but not inexpensive, for persons from Europe and North America to visit the African game preserves or the historic sites of pre-Columbian culture in the altiplano of South America. Quite a large number of the several million visitors who go to Europe each year from overseas spend some time in the national parks there. Pressures on national parks during the coming years apparently will in no way be reduced for lack of means for traveling to them. In the more developed countries the demand for motor cars remains insistent, while elsewhere the day of the automobile is just dawning.

Economic growth not only means higher incomes, it means more production as well—more food, forest products, minerals, water, and land itself. Parks and nature preserves frequently have to compete with these other uses of land and water areas. At times the competition is sharp as in parts of East Africa or in some of the valleys of the Sierra Nevada in California. To a considerable extent, increases in production can come from higher yields of crops or even minerals per unit of land. This, in fact, has accounted for the remarkable increases in agricultural output in the United States for the past 40 or 50 years. The same number of acres under cultivation has produced enough to feed a larger population on a more varied and nutritious diet. But looking to the future it may well become necessary to turn again to bringing more acres into cultivation, especially if certain pesticides are banned and limits are placed on the use of commercial fertilizers. Additional forest land may be needed also not only for timber but to protect watersheds and provide habitat for wildlife.

Certain other elements of economic growth pose threats to parks. For example, the unplanned extension of highways into more remote areas or the scattered location of summer camps and cottages can effectively deny the use of otherwise favorable land for nature parks. In the United States, many lake and sea shorelines are completely taken up by such buildings with the result that the public lacks access to the water. High property values make Government acquisition for parks prohibitively expensive. The rate at which this kind of development proceeds seems to vary directly with the income level of the people.

Natural areas put aside for protection of ecological systems or to preserve rare species of plants or animals may yield significant economic benefits, but unfortunately they frequently are not certain and are typically long deferred. They usually lose out in competition with other uses that bring a quicker commercial return. The most severe conflicts come when a very poor population needs such a natural area for pasture or cropland.

The two kinds of pressures on national parks—population and economic development—typically go together and reinforce each other. It is hard to say which predominates. In the United States, the long-term 4 percent annual growth in national product and income has been composed of 1 to 1.5 percentage points for population (roughly for labor force also) and the remainder for overall productivity gain. In Japan during recent years, economic growth has resulted primarily from productivity improvements. In many less developed countries population and labor force have been the principal factors.

Reducing the pressures

Population and economic forces are, nearly everywhere, putting pressure on national parks and nature preserves. They will continue to do so; neither set of forces is likely to disappear in the near future. How can these pressures be reduced? How can they be redirected along lines less harmful, less threatening to parks?

I shall deal briefly with these questions first on the demand side and second on the supply side to see how the growth of the first might be checked or channeled differently and how the second might be increased or made more efficient.

On the demand side, there are possible ways of restraining the very rapid growth in use of parks. Higher charges could be placed on admission to parks and on use of the various facilities offered. Entrances could be limited and perhaps rationed in some way, for example by a fixed number of advance registrations. More realistic would be limitations on the time any one party could stay in a park, say one day or two days, or even a few hours in some cases. Overnight lodging and camping could be prohibited in the park or in the most scenic or interesting parts. Congestion might be reduced by preventing vehicles from simply driving through a park or using a park road as a means of getting to the other side of the park.

Many other possibilities come to mind for manipulating the demand characteristics. In the national parks of the United States much of the difficulty is caused by too many automobiles and too much camping right at the places where the principal features are that people want to see. Yosemite Valley is one of many examples. However much one may want to guide demand in certain ways, one probably does not want to deny people the chance to visit national parks. There are limits as to how much can be done to reduce demand.

Approaching the problem of population and economic pressures on the supply side, therefore, offers more promise. Here many possibilities are available. Of course, more parks and larger parks will help increase the supply of recreational and nature experiences. The substitution of smaller parks close to urban settlements can take some of the pressure off most national parks which tend to be located farther from where most people live.

A greater variety of parks generally, and in many locations, would give people a wider choice of parks to visit for particular purposes. For example, a person who wants to fish or to observe flora or fauna can go to a park where this is available but little else. All parks can be subjected to more imaginative landscape planning and design so as to enable more people to enjoy them without detracting from the quality of the experience. The people-carrying capacity of many parks could be doubled in this way; for very large parks it might be increased tenfold or more. To raise carrying capacity, new investment will usually be required in roads, trails, camping sites, sanitary facilities, water supply, shelters, protection, markers, and many other things. Most park visitors, in the United States at least, do not stray far from the roads and trails. This typically leaves most of the land area of the park unused.

Another way of stretching the supply of parks, or adding new ones, is to make a small sacrifice in purity of concept and establish more multiple-use natural areas in which park experiences are combined or placed in sequence with other compatible uses. For

example, in large parks the more scenic or ecologically important parts can be given full and permanent protection, while other parts can be used for other purposes. Frequently a waterway or a lake or ocean shore, plus the land for one half mile back, is about all that park visitors care about seeing. The multiple-use idea need not be anathema to park lovers. In some countries, the two are not in conflict. Skillful landscape design and controlled use frequently can harmonize grazing, forestry, commercial fishing, and summer (or winter) homes with park uses, if not simultaneously then in the time sequence of first one and then the other. National park systems in the future, even more than is now the case, will have to include more areas, more intensive development of existing areas, more multiple or shared-use areas, and a greater variety of areas with many of them located near cities. Otherwise, parks everywhere will be overrun by the demands of more people and higher economic levels. It will be necessary to work in all of these directions if the pressures on national parks are to be contained.

Of course, efforts made directly to check population and economic growth would help ease the pressure on natural parks, but important and far-reaching as their effects would be, these matters lie beyond the scope of this paper.

An international systems approach to national parks

At the First World Conference on National Parks held in Seattle a decade ago my colleague at Resources for the Future, Dr. Marion Clawson, and I presented a paper in which we advanced the idea of a system of parks extending from city parks and playgrounds to great national parks like Yellowstone. In between would be metropolitan and county parks, state parks, and multistate parks. Parks in the total system would be designed and located to meet the needs and desires of people for a wide range of experiences. The parks at the city end of the spectrum would be people oriented; those at the national end would be natural resource, ecology, species, or superbly scenic in orientation. The types of parks would blend into one another as colors in the spectrum. The system would be planned, financed, and developed as a whole. We were thinking of such a park system for a single country.

On this occasion, I would like to expand this idea briefly along lines I set out in a paper given at a western hemisphere parks conference held a few years ago in San Carlos de Bariloche, Argentina, and in an address also several years ago to the International Union for Conservation of Nature and Natural Resources in Lucerne, Switzerland. This is to look upon the park systems now being developed in a number of countries around the world as interrelated, each available for the use, enjoyment, and education of all the people of the world. One place to begin is with the superlative parks and nature preserves which are being advanced through the United Nations Conference on the Human Environment, held in June of this year in Stockholm, and its follow-on activities. The proposal for a World Heritage Trust of such parks has been working its way forward for a number of years; for example, this idea was put forward in the Report of the Committee on Natural Resources Conservation and Development of the National Citizens' Commission, which was prepared for the White House Conference on International Cooperation, in November 1965. Its time has come.

Beyond this the national park administrations in the various countries, perhaps with IUCN leadership, could, to advantage, set up a permanent means for exchange of ideas and coordination of their research and planning. The major objective would be to meet the needs of people everywhere for park values and experiences and to preserve suitable areas for this purpose. Park and nature resources, no less than oil and water or fish and forests, will have to be thought about and managed on an international scale if the powerful demographic and economic pressures now at loose in the world are to be prevented from wrecking them.

A continuing international task force, emerging from this Second World Conference on National Parks, could take the matter in hand and begin the design of an international system of parks and nature preserves. It could survey the trends and outlook for population, economic development, travel and vacation desires, and the ecological and species-survival needs that parks can meet. It could aim toward international standards for parks. It could consider how best to utilize parks for education. It could encourage national and regional park planning. It could do all these and much more to help ensure that unspoiled but used parks will be a permanent part of the world environment.

DISCUSSION

Dr. José Candido de Melo Carvalho (Chairman): Points which may deserve attention and which have not been fully discussed at previous sessions include biological and cultural changes in man himself, the possibility that parks and equivalent reserves will be the only "islands" of nature left in the future, the possibility and problems of rehabilitation or restoration of spoiled areas (of which Tijuca near Rio de Janeiro is a classic example), and the desirability of establishing a *global* network of parks and reserves.

Dr. Stefan Myczkowski (Panel Member): The Polish network of 12 national parks and more than 540 nature reserves was established in 1932, largely through the efforts of Prof. Wladyslaw Szafer. He had visited Yellowstone 4 years earlier and written a book for Polish students explaining the "national park" idea. Two points are suggested by present conditions of the parks in our country, which is being rapidly industrialized. First is the special value of border or "international" parks: there are seven or eight pairs of these parks scattered around the world, three of them on the Czech-Polish border, where two other mixed protected areas (a national park on one side and a nature reserve on the other) are established. Secondly, the value of parks for recreation is always outweighed by their value for research, education, and as biological indicators—a point well brought out in Paper 9.

Zekai Bayer (Panel Member): Due to their geographical location and variety, the natural park resources of Turkey—fauna and flora—are very rich and enhanced by the archeological remains of the civilizations which have inhabited the country through the centuries; but there has also been deterioration, accelerated as elsewhere during the 20th century, which makes intensive natural resource protection vital. For us, this is the main role and function of the national parks, in the establishment, master planning, and management (including tourist development) of which the Turkish Government has accepted all the generally recognized principles.

Anthony Wayne Smith (Panel Member): Under U.S. law priority in the national parks is given to nature conservation, and the status of recreation or enjoyment of the parks is clearly recognized as secondary. For the latter can of course only be provided, if the quality of the parks is maintained. With this in view, there are a number of developments which can be expected in the future, such as curtailing private automobile traffic by the introduction of mass-transportation facilities and the spreading of the visitor load to other types of protected areas. Thus if the national forests were brought into play in the Yellowstone/Grand Teton area, the amount of space available would be multiplied by a factor of four to five.

Phairot Suvanakorn (Panel Member): In Thailand, the 5 existing national parks and 14 additional protected areas proposed are the responsibility of the Royal Forest Service, and the problems for the future are largely concerned with the enforcement of park laws against growing pressure of population, and on the land, the impact of agriculture, illegal felling of trees, dam construction, military use, and mining.

Claude Fatoux (Panel Member): The fact must be faced that in developed countries there is a limit to the indefinite extension of protected areas for the purpose of absorbing increasing numbers of visitors: the land is simply not available. Therefore, the problem will always be to balance the need for recreational opportunities in natural areas with the preservation of the natural resources of these areas. The answer can only lie in systems of zoning, with special emphasis on the immediate periphery of parks and reserves.

Prof. Mohamed Kassas (Arab Republic of Egypt): There seem to be three sets of factors influencing future trends of the parks movement: (1) the stage of development of the country concerned (in the United States it has been possible through economic development and technology to add to the park system in the past 20 years some 10 percent of formerly productive land, or 7½ million acres—equal to the total cultivable land of Egypt—every 5 years); (2) the physical environment; and (3) the population/land-surface ratio. My second point is that the uses of national parks are interrelated and should be integrated: thus research helps toward the rational choice of areas, management, and conservation, and provides material for education. Third, the essential aspect of rational management in large-scale national parks such as the Yellowstone/Grand Teton complex lies in functional zonation, in which recreational use does not, in fact, include more than 5 percent of the total area.

Dr. Alceo Magnanini (Brazil): I would prefer the term multiple function rather than multiple use, since in fact the greater part of these protected areas should not be "used" at all but simply set aside to ensure the survival of flora and fauna.

Kai Curry-Lindahl (Author of Paper 7): I would agree with the last two speakers in that it is very rare for more than 10 percent of the area of a park to be used for visitor access and facilities.

Georges Ramanantsoavina (Malagasy Republic): A point that has to be taken into account is that unless effective control can be exercised over that 10 percent, things can easily get out of hand, because of man's activities rather than the presence of man himself—his

habituation to archaic practices such as shifting cultivation and burning. As a matter of principle, therefore, the recreation or tourism zone should be strictly confined to the area, probably on the periphery, for which material means of control are readily available.

J. Douglas Cuillard (Costa Rica): I would question the argument in Paper 8 that the role of national parks changes and grows in response to changing social and economic requirements. This approach seems to me to be at the root of many insoluble park problems today, which would be avoided if park managers put conservation first and resisted social and economic pressures which threaten it.

Dr. Joseph L. Fisher (Author of Paper 9): I do not agree that conservation is always the priority; in other cases it may be tourism. The point is that it is we who must assign the priorities, using the zoning system in the process.

Anthony Wayne Smith (Panel Member): The maintenance of the ecosystem should still come first. Of course, account must be taken of economic and population pressures, but there is no need to adopt a passive attitude: something can and should be done about both of them.

Thanom Premrasmi (Thailand): The pressures on park or potential park areas in my country and probably many other developing countries all stem from the problems affecting forest land: shifting cultivation, slash and burn, to which the half million people of the hill tribes of the north are particularly addicted; forest fires, especially in the 120,000 square kilometers of deciduous forest (affecting seedlings and regrowth); and illicit cutting due to the ever-increasing price of timber. All of these are interrelated human activities, so that if one can be controlled the others will probably be controlled too.

A. M. Oseni (Nigeria): Ownership of the land, as divided between different government departments, and the desire of local people to increase their protein supplies by hunting are other causes of pressure and conflict.

Kai Curry-Lindahl (Author of Paper 7): The conflict between reserves and people should be resolved by a better understanding of the reasons for protection, which is why education is of paramount importance, and also, as mentioned in my paper, by attention to the question of compensation. Too often the revenues from parks are collective and do not make much impact on individuals. Governments do not usually like the idea of direct cash compensation, so the only answer is to take every opportunity to emphasize the national ownership of parks and the benefits which come from this in the way of schools, medical facilities, etc.

Alberto Bruzual (Venezuela): The Chairman has drawn attention to the problem of indigenous inhabitants of park areas: they are almost bound to develop activities incompatible with park philosophy and this creates conflicts of a political nature which interfere with the development of parks, by degrading the scientific, natural, and touristic values of otherwise suitable areas. The authorities hesitate to interfere with activities such as cultivation, cattle-raising, and mining, which are the only source of income of the people concerned, while conservationists sometimes underestimate the social and economic factors. In principle, a national park in an area of existing occupation should never be declared without a quantitative and qualitative study, and the financial resources and health programs which are needed for successful relocation or resettlement of human

inhabitants. Until these studies are completed and the eventual use of the area can be determined, it would be preferable to place it under a different kind of legal protection and management than that of a normal national park.

Tufuga S. Atoa (Western Samoa): It seems to me doubtful whether the conditional kind of occupation by primitive people suggested in Paper 7 could work effectively, as it implies a division of authority.

Kai Curry-Lindahl (Author of Paper 7): Reference has been made to the health problem in connection with possible resettlement, but with primitive peoples, such as bushmen and pigmies, living as a natural part of an ecosystem, it is doubtful if the health problem can be solved if they are moved, so that as long as they are in balance with their surroundings they are better left where they are.

Richard R. Forster (Canada): While agreeing with the concept of integrated park system planning as described in Paper 9, I do not entirely agree with its approach to multiple use. Parks should, in most cases, only be the subject of a very special kind of resource-based use, i.e., activities in which the experiencing of natural environments is primary and not incidental to user-based, mass recreation, as reflected in summer and winter homes, resort villages, and the like. The latter should be catered for by separate authorities outside the parks, although there is probably a need for overall coordination of the authorities charged with park and open-space responsibilities at all government levels.

Ruhi Çinar (Turkey): Surely it is always a matter of striking a balance between the protection and utilization of park resources and between supply and demand. Guidelines based on experience are what is wanted.

Prof. James G. Nelson (Canada): The conclusion to which all the argument points, is the urgent need for more regional and comprehensive planning. It is implicit in the various solutions which have been proposed. There are numerous unfortunate examples of the establishment of zones in national parks which clash with land use around park boundaries, simply because inadequate study and discussion of the latter took place when the park was planned. This applies especially to the planning of new parks which are aimed at corresponding closely with ecosystems. One method of promoting the regional approach is for park authorities themselves to establish regional advisory committees, although this works less well with new parks, because of such factors as the timelag in generating interest and the effects on land costs.

Jean Balfour (U.K./Scotland): Some other points in Paper 9 on which more information would be desirable are the statement that U.S. national parks could take 10 times more visitors without impairing their scientific or conservation integrity, and the question whether the "park systems," to which prominence is given, should include recreational areas near urban centers to relieve the pressure on national parks. We are not always clear as to our aims and objects and, therefore, how best to implement them.

Mrs. Margaret E. Murie (U.S.A.): I cannot believe that Paper 9 is right in mentioning the possibility of activities such as forestry, grazing, or commercial fishing applying to national parks.

Derek Bryceson (Tanzania): User-pressure on the parks comes largely from the population of industrialized countries, who are under tension and strain because of the nature of industrialized society. The broadest possible approach to the whole problem is there-

fore necessary, including the changing of society to release the tensions, which can otherwise swamp and change the character of the parks through the demands they create.

Dr. Joseph Fisher (Author of Paper 9): Replying to questions and comments, my approach to "park systems" is completely comprehensive and I consider that everything from wilderness areas to heavy tourist-use areas should be included. The emphasis should not necessarily be on protection, but the ingredients for visitor use must be investigated and specified, and carrying capacity (for which my figures are only "guestimates") determined.

Dr. José Candido de Melo Carvalho (Chairman): Our time is up and there are still more than 12 requests for interventions which I have not been able to fit in. I hope that, in the case of those who submit a text of what they wanted to say, the main points can be summarized at the end of this section of the Conference proceedings.

Prof. Valerio Giacomini (Italy): What we have talked about is not a "park system" but a "conservation system" (we are attempting this in Sardinia with the combination of proposed Gennargentu National Park, and four "natural parks" and numerous protected areas). In developing such a system, a risk to national parks proper is involved in insisting too much on such theories as that they should always be financially self-supporting or that they should play a central role in urban development areas.

Andrew Allo Allo (Cameroun): Not much mention has been made, when talking about multiple use, of the direct use of fauna for meat, though it is referred to in Paper 7. The successful culling of large numbers of hippopotamus and elephant in Ugandan national parks is worth remembering, as well as the general importance of wild protein supplies not only in the well-endowed savannas but also in the less favorable dense humid forest regions.

Adalbert Bayigamba (Rwanda): Aid to developing countries, often essential, should be "judicious," that is to say, related to specific needs and should also be in line with the criteria emerging from the U.N. Commerce and Development Conference recently held at Santiago, Chile.

Prof. Antoon de Vos (FAO): The increasing struggle for survival will have a depressing effect on multi- and bi-lateral aid. Both inside and outside a country, wildlife and national park management will be given inadequate priority and reduce requests for technical assistance, unless the trend is offset by growing environmental concern. If aid is made available, therefore, it will tend to be on the basis of economic justification and the earning of foreign exchange through tourism rather than of the scientific importance of the conservation needs. All one can hope is that if areas survive because of tourism, the other values will ultimately become better recognized.

Bengt D. Edholm (Sweden): Growth of tourism and the problems it brings are an inevitable consequence of declaring a national park, since the interest of a protected area is certain to increase. It is not yet a problem in my country, only because facilities lag behind publicity (there is no road at all in the largest Swedish national park which

comprises more than 1,500 square miles). Our main problem is lack of effective legislation; witness the recent opening of one of Sweden's largest powerplants—in a national park. The more strict the legislation, the more will future generations be grateful.

André-Roger Dupuy (Senegal): It has been astonishing to hear the *raison d'être* of national parks, namely the reservation and safeguarding of natural ecosystems, questioned by some participants: it must take precedence over the recreational role, if a process of steady degradation is to be avoided. It would be better if some different name could be given to recreation zone since national parks should under no circumstances get involved in playing the part of "leisure centers."

Jean Servat (France): Tourist development may be regarded as a necessary adaptation to the socioeconomic development of a country rather than something in conflict with national park aims. The problems it raises are concerned with adjustment of priorities and management and, as others have pointed out, the solutions can be found in such ways as visitor education and organization of reception areas and peripheral zones. The preservation of the natural environment remains the primary objective of the national parks and implies careful control of visitors in order to avoid disturbance. Where visitors come first, a quite different formula is needed, as followed in France with the regional parks which are oriented toward the welcome of tourists in zones that are protected as much as possible (state forests, outstanding natural sites, etc.).

Dr. Leslie M. Reid (U.S.A.): It is worth calling attention to the reference to the World Heritage Trust in Paper 9, since some kind of special designation such as that of "World Trust Parks" for areas of undeniably superlative natural features is needed, both because of the public and financial support it would attract and because it would provide a stable framework for the park movement not subordinated to economic pressures.

Efrain Charneco Sala (U.S.A.): The island of Puerto Rico is a good example of the intensification of most of the factors that have been discussed: small size (35 × 100 miles), high population combined with rapid industrialization and urbanization (the 2.7 million people of today are expected to have doubled by 1990 and three-quarters instead of one-half to be living in towns), increasing wealth, and increasing leisure. Although there is still a great variety of natural features not yet ruined by man (tourism is the second industry), the danger to them is obvious, and without extensive financial and technical aid there is little hope of overcoming the problems of land acquisition, development, management, and operation which could make current plans for two national parks into a reality.

Stan B. Brown (Fiji): In the island context, the problem of marine pollution should be mentioned. As long as the oceans are treated as dumping grounds, there is a threat of oil and other destructive pollutants to the coasts, reefs, and marine parks of islands, which do not have the defenses or resources to deal with them. In Fiji, legislative and administrative measures and penalties have effectively checked local inshore pollution; the question is whether similar measures are necessary and possible on an international scale or whether we can only rely on the slow education of users of the sea.

John E. Clarke (Zambia): A side effect of tourism development is the demand for the removal of discomforts: in Zambia, for example, the tsetse and the tall grass or thickets which obscure viewing. I feel that in national parks it is important to uphold the principle

that visitors must see them on the terms dictated by the habitat, and that interference, such as the application of residual insecticides along the roads, is a deplorable sacrifice of park values.

Mrs. Doris F. Leonard (U.S.A.): In the State park system of California, where visitor pressure is intense, electronic monitoring for the control of the number of visitors has been introduced and appears to hold considerable promise as an additional aid in park management.

Lord Wemyss (U.K./Scotland): The extraordinary variety of sites that need to be conserved, whether for purer conservation objectives or for public recreation, and sometimes for the enjoyment of future rather than present generations, suggests that it is impossible to devise a worldwide definition and unprofitable to try and thrust our ideal definitions and names upon each other. A special point also arises from the great variety of forms of ownership and land use in different countries: very often the land is already owned and used by some person or community, under which the landscape is altered, even beautified, by man's intervention but still remains eminently worthy of conservation. There is surely room, in many cases, for allowing present ownership and occupancy to continue, perhaps in a modified way and certainly under agreement with the government aimed at limiting the use and preserving the landscape and other attractions—a formula somewhat similar to that adopted in Japan. Continued ownership and use could be for all time, not just for a lifetime or term of years, and would have the added advantage of saving the costs of total acquisition.

Nalla Kane (Mauritania): Despite the lack of a clear lead on the subject, I still feel that the strict definition of "national parks" is desirable to avoid the uncertainty and irresolution which seems to affect people in the absence of such a definition. I also urge the necessity for the creation of a global national park system under an international organization which would not only interest itself in the study of ecosystems, but also take an active role in establishing parks, especially in developing countries which have too many other preoccupations. Only such an organization could keep the park movement free of dependence on economic motivation (the unfortunate overemphasis on tourist development) and political contingencies.

SESSION V

PARKS AND PEOPLE

Saturday, September 23, 9 a.m. to noon

GUIDANCE FOR PARK MANAGERS AND THE STIMULATION OF NEW AND CREATIVE WAYS TO OBTAIN GREATER PUBLIC BENEFIT FROM PARKS

Chairman: Robert Cahn, U.S.A.
Rapporteur: Theodore S. Burrell, U.K.
Authors: Paper 10: Dr. Marion Clawson, U.S.A.
11: Tetsumaro Senge, Japan
12: Dr. Robert F. Schloeth, Switzerland
Panelists: John J. McCarthy, Ireland
John S. McLaughlin, U.S.A.
John Kimanzi Mutinda, Kenya
Robert G. Stanton, U.S.A. (Virgin Islands)
Mrs. Elsa Salas de White, Venezuela

RAPPORTEUR'S SUMMARY

If in Session IV the amount of use to which a national park should be liable was disputed, Session V made it clear that, like it or not, a large number of people are involved. The ecological value of a park, as the top priority, depends on natural balance. Perhaps the interrelationship with and the impact or potential impact of people on national parks is a matter of balance as well.

Paper 10 outlined the five stages frequently found in the life history of national parks: the "preservation" stage, often in response to the urgings of a few dedicated people; the "early management" stage, which often meant a lack of management and a tendency to run things "on the cheap"; the stage of rising public interest, with maybe an opening-up of the park; then a period in which carrying capacity is nearly reached or exceeded, a stage now found in a significant number of parks; and finally the "crown jewel" stage, with an adequate management approach to the natural park resources, a stage perhaps not yet completely reached anywhere and involving new attitudes, no less important and difficult to realize than those involved in the initiation of national parks.

All the background papers stressed the problem of numbers, Paper 11 describing the situation of overuse and suggesting ways of dealing with it and avoiding repetition, while Paper 12 insisted that economic considerations should never be allowed to alter national park goals: recreation needs must be faced, but outside the parks themselves.

The panel members' comments covered a variety of interrelationships: John McCarthy, that between urbanization and park visitation; John Mutinda, the dependence of proper

park management on the goodwill of people living nearby; Robert Stanton, the need to form links with surrounding communities in the development of a sense of individual responsibility. Parks and people, preservation and use, were not, in John McLaughlin's view, as diametrically opposed as they may seem, provided sensible carrying capacities were established in the master plan and adhered to; Mrs. Elsa Salas de White, however, agreed with Paper 12 that recreation needs should be met largely outside the parks.

People had to be involved in many ways. Concern about national parks was really man's concern for people of tomorrow and this view led discussion to the importance of education. It was noted that in India very ancient cultures had had an appreciation of nature, but more recently overuse of the land had had an adverse effect.

What kind of people were parks for? In Africa, it was suggested, the poorer people usually had other ways of spending their time; by contrast, a Latin American example was quoted from Chile showing a complete change of attitude following on the introduction of cheap transportation to the parks. Transportation indeed appeared to be of key importance. Representatives from Switzerland and Swaziland were concerned about the building of new roads across parks—major highways were in the wrong habitat in a park, as alien as a lion in our conference room. But situations could improve: buses in lieu of cars had proved a great success in Yosemite and the Peak District in England and, despite the 6,000-mile gap, public reaction had been remarkably similar.

How should national parks fit into the wider environment? A Canadian suggested that environmental education started right at your own front door in the middle of a city; the formula adopted in some Scandinavian countries, where it is every man's right to walk and camp in open country, helped to spread the load and ensured that the poor were not at a disadvantage. Ways to combine parks and people depended on local circumstances—and on attitudes. There were cultural differences and there were capacity limits; use should never be at the expense of the park. Altogether, it was not a simple matter and there were many problems, but the obligations and opportunities seem even greater.

SESSION V / PAPER 10

PARK VISITS IN THE COMING DECADES: PROBLEMS AND OPPORTUNITIES

by Dr. MARION CLAWSON
Resources for the Future, Inc., Washington, D.C., U.S.A.

Nearly all national parks in all countries have experienced a rising tide of visitors in the past two decades, with all the problems arising out of the need to provide for, and in a sense to manage, larger and larger crowds of visitors. The next decade promises more of

the same, i.e., continued rising numbers of visitors, often coming from more distant as well as nearby areas, many willing to spend substantial sums to visit the national parks of their choice and to see their wonders, and often more demanding of services than visitors have been in the past. Both the problems and the opportunities that such increased numbers of visitors will bring, however, depend upon the general historical stage of the particular national park and the economic and social development of the country in which it is located.

Although many factors have underlain the steadily rising trend of visits to national parks in the various countries, four seem dominant: population changes, trend in per capita real income, increased leisure, and improved transportation.

More people in a country or in the catchment area of a national park within a country mean, other factors being equal, more visitors to the national park. All the available evidence suggests that the number of visits to national parks per capita (or per thousand or per hundred thousand) of the base population is unaffected by the size of the total population. That is, doubling the national population or the population within the tributary area of a national park will mean, other factors being equal, twice as many visits to the national park. Increases in total population are relatively small from year to year, yet over a period of years or decades amount to a great deal. In addition to changes in total numbers, such population changes as differences in age distribution may also affect national park visits; a country with a large proportion of very young children, as is any country with a high rate of natural increase in population, is likely to show a relatively low rate of visits to national parks; the small children do not go frequently to national parks, and their presence in the family may limit the time and money that their parents would require for such visits.

Since most national parks are located at some distance from most visitors, and often are at relatively long distances, a visit to a national park is likely to require a considerable expenditure of money. For this reason, the visit rate at national parks is quite responsive to changes in average real incomes per capita. In the economically developed countries of the world, where national income statistics are reasonably accurate and more meaningful than in low-income countries, there has been an upward trend in average income over the years; the rate of increase has varied from prosperity to depression, and sometimes has been masked by changes in the general level of prices, yet over a period of several years the gains in real income per capita have been very marked. Many statistics could be cited in support of the foregoing statements, or many illustrations of higher levels of living could be cited, but these seem unnecessary for our present purpose.

As average real incomes rise, the proportion which is spent for the so-called necessities—food, shelter, and clothing—is likely to decline; and conversely, the proportion which is so-called “discretionary income” is likely to rise. We refer to these as “so-called,” because some of the necessities take on luxury character as more expensive foods or more expensive clothing are bought, and some of the so-called luxuries become so deeply imbedded in personal consumption patterns that they become psychological necessities to the persons involved. Nevertheless, persons with higher incomes do have the alternative of choosing what to spend their money for, to a degree that the lower income persons do not; and, increasingly in recent decades, they have been spending more and more of that

discretionary income for outdoor recreation in general, and for visits to national parks.

But a visit to a national park takes some time. In relatively small countries, as England and most western European countries, many people live close enough to a national park to visit it on a 1-day excursion. In the United States, in large countries generally, and in most economically less-developed countries, the proportion of the population living close enough to any national park for a 1-day visit is much smaller. Under such circumstances, most people visit national parks as part of a longer trip, often as part of their annual vacation; even in Britain, many visitors to national parks are on holiday. A century ago, the annual vacation with full pay was virtually unknown in the world; today, for the higher income countries, it is almost universal among the whole labor force. Moreover, the typical length of the paid vacation has increased in many countries, from 1 week or less to 2, 3 or even more weeks. Extensive travel to a national park in the same country, or travel abroad which may include a visit to one or more national parks, thus becomes possible for people of average or higher incomes; such travel is no longer the privilege of a few wealthy people in each country.

Equally important with the foregoing has been the great improvement in transportation of the past generation, particularly the rise of individual car ownership and the development of the fast highway or motorway. As recently as 60 years ago, visitors to Yellowstone National Park nearly all came by railroad, from their homes to the park; once there, they traveled by horse-drawn stages within the park, or walked to nearby sites. Today, visits to national parks in the United States and Canada are almost entirely by personal autos; in other countries, the proportions so arriving have been mounting, and in many countries are about as high as in the United States. With the personal car owned mostly for other reasons, the annual vacation by auto involves relatively low marginal costs; and trips of several hundred miles, often including visits to two or more national parks, are entirely within the economic ability of a substantial proportion of the total population. In recent years, the airplane has become a major factor in visiting distant national parks, especially those in countries other than the ones where visitors live. And the combination of airplane, as part of a commercial airline, and the auto, rented at a major air terminal and driven to a national park, is an especially effective means of transportation for persons who can afford them, in the large countries like the United States and for economically less-developed countries which count on a flow of foreign visitors to supply needed foreign exchange.

More important than any of these factors, however, has been their combination; more people, without higher average incomes would have meant relatively limited increases in park visits; or higher incomes, without more leisure would have severely limited park attendance; and all of these, without better transportation, would have been relatively limited in effect: in the United States, during World War II, when gasoline and tires were rationed and new cars were unobtainable, visits to national parks fell off by more than three-quarters in just 2 years. For the United States, for the past three or four decades, the rate of increase in total population, in average real income per capita, in leisure per person, and in total miles traveled per capita has each been in the general range of 1 1/2 to 2 percent annually, on a compound rate of increase; but atten-

dance at national parks (and at many other types of outdoor recreation areas) has increased in the range of 8 to 10 percent annually.

The outlook for each of these underlying factors is upward, for most countries, for the next decade and probably for many further decades; the rates of increase may not be the same in all countries, nor the same for each factor, and the interplay among factors may differ somewhat by countries. But the upward trends seem highly probable. The nature of both the problems and opportunities for the coming decade varies from country to country, however, depending upon the degree of development of the national park system in each country, and upon its economic and social development. To understand these variable effects, we must now trace the stages in the development cycle of national parks.

Stages in the life history of national parks

A national park, or a system of national parks for a country, seems to go through a more or less definite historical cycle or development pattern. This cycle is not uniform from one country to another, or even from one park to another in a country; in particular, the length of each stage may vary considerably. For instance, the second stage, that of "early management" lasted for at least 40 years for Yellowstone National Park, but lasted no more than a few years or might arguably have been reduced to near zero for some of the more recent U.S. national parks. Nevertheless, with all due allowance for varying patterns, some stages in park history or development seem recognizable; and both problems and opportunities differ according to stage. The stages are:

1. **Reservation** of some natural wonder or unusual natural feature, to avoid its development for other purposes or, in the case where the land and water is already publicly owned, to avoid its disposition to other owners. Reservation of land for a national park at this stage is frequently the response of a government to the urgings of a relatively few dedicated people; there is likely to be very limited general public support for the reservation of this particular area or even for the idea of national parks, if it is the first one in a country; but there is also likely to be minimum opposition to it, for the area is not likely to be in high demand for other purposes. As John Ise¹ says: "The establishment of Yellowstone was, of course, due partly to the efforts of a few of these idealists, several of them men of influence. Reservation was possible because most private interests were not looking so far west at this early date, for there were no railroads within hundreds of miles of Yellowstone." Similar statements could be made for many of the other U.S. national parks, and, to a degree, for other national parks in other countries. In more recent times, the establishment of a national park has usually aroused more interest, including both greater public support and more marked opposition.

2. **Early management** of a newly created national park has often been minimal, sometimes almost totally lacking. One of the early tests of many national parks has been to fight off the threats of commercial exploitation. In the early 1920's, for example, determined efforts by promoters with powerful political support sought to have one

¹ *Our National Park Policy, A Critical History*, Johns Hopkins Press, Baltimore, 1961.

or more dams authorized for Yellowstone National Park, including a dam to control the flow out of Yellowstone Lake. The history of national parks in the United States is replete with similar instances. Recently, proposals to divert much of the water from Murchison Falls, in the national park of the same name, in order to generate electricity, have attracted attention and opposition from many lands. Two other characteristics are common for this early management period: attempts to operate the national parks "on the cheap," and low public usage. Again, to use Yellowstone as an example, the first "superintendent" served 5 years without salary and without any appropriations; for more than 40 years appropriations were tiny; at one stage, after game killing, forest-fire setting, and vandalism at the wonder spots had reached very serious proportions, the U.S. Army provided troops to manage the park; and appropriations were so low that facilities to care for visitors were either nonexistent, or worse than minimal, or were provided by private concessioners. The British national parks have never had more than minimal financial support; the effort has been to make them the responsibility of local planning authorities, in spite of the expressed national interest in them. But usage of many national parks in this early stage has been low; again in Yellowstone, visitors annually were under 20,000 as late as 1910 and in earlier years far below that figure. In part, this had been because transportation facilities to and within the park were poor; but in many cases—as in Yellowstone in the early years—it had been because average incomes in the country were low, so that few people could afford to travel to the new national park.

3. Rising public interest is the third major stage in the history of most national parks. Economic and social conditions within the country may change to make park visits easier—rising real incomes per capita, paid vacations more common, rise in private car ownership and in quality of highways and roads, and others. Improvements to roads and to accommodations for the traveler in the park may make his visits there more pleasant. As visits rise, more and more people hear about the park, primarily by personal contact with those who have visited it, but also through various written materials, radio, and, perhaps, television. As the flow of visitors increases, greater investments in public facilities are needed, and larger appropriations for management staff also. With mounting public knowledge of the park, and thus greater political support for it, the threats of its commercial exploitation recede. While public use of the park mounts during this third phase, total usage is within the park's carrying capacity—although some trouble areas or "sore spots" may emerge. It would appear that a considerable proportion of all national parks in the world are in this general stage today. Obviously, there is not a sharp or clear division between it and either the preceding or following stage; rather, there is a continuum, but it does seem useful to recognize this as a separate stage.

4. Park use approaches, reaches, or exceeds carrying capacity even when the latter has been increased as far as practicable by capital investments of various kinds and by full administrative staffing. Determination of carrying capacity is not easy, as other papers at this Conference have shown; carrying capacity cannot be determined so precisely that one can say this visitor is within it but the very next one is above it; and the problem is made enormously more difficult because greater usage may change the nature of the recreation experience at the park, perhaps only subtly so, perhaps rather obviously so.

Moreover, carrying capacity can be increased, within some limits, by investments of capital and by greater expenditures of labor and management skills. Nevertheless, there comes a point where the physical carrying capacity of a national park has been exceeded, and serious physical deterioration is sure to follow. Still more seriously, a stage of deterioration in the quality of the psychological experience is likely to come earlier.

The problems of excessive use of national parks have not, in my judgment, been faced frankly and soon enough by park administrators. I feel confident that several U.S. national parks had reached a stage of exceeding their carrying capacity before their administrators were willing to acknowledge the fact; while I do not know British national parks as well, I have the strong impression that the situation is the same for some of them; and from what I read, I suspect it exists in some national parks in other countries. The dominant management problem, once public usage has reached or exceeded carrying capacity, is to restrict this usage; this is far from easy. A momentum toward increasing attendance at the park may have been built up, which is not easy to control; the same factors of population, income, leisure, and transportation work at this stage, even when they produce unwanted results. Some of the management problems of this stage are discussed in more detail later; but restriction of use, to conform to carrying capacity, is easier if there is some alternative place where visitors can go when they are turned away from a particular park. It is here that the concept of a system of parks in a country becomes so important. It may be impossible to find any more areas of national park quality—they may all be included in the country's national park system already. But it is possible to find, or to make, excellent general recreation areas, often out of land and water resources not in heavy demand because not especially suitable for other uses. A great many visitors to national parks may be almost, if not fully, as well satisfied to visit an attractive outdoor recreation area (whether called park, forest, or whatnot), especially if it is more conveniently located to their home.

I judge that a significant number of national parks in the world have reached or are closely approaching this fourth stage of overuse. More seriously, it is the probable fate of a substantial proportion of all national parks, unless real foresight is taken to avoid it. There may be countries so thinly populated themselves, or whose people have such low per capita incomes that most of them cannot afford to travel to their country's national parks, whose parks do not attract significant numbers of foreign visitors, and whose national park system is so generously sized, that use may never exceed carrying capacity. But merely to name off these conditions makes it apparent that most national parks, sooner or later will reach the stage of overuse, if trends toward greater and greater use are allowed to continue uninterrupted.

5. National parks become crown jewels in a national system of parks and recreation areas. National parks should be areas of truly outstanding quality, of truly national significance; and, by definition, such areas are limited in number and in extent. They should not be used as ordinary recreation areas, where parks, or forests, or other kinds of outdoor recreation areas of lesser significance and quality might serve as well or almost as well. Popular use of such crown jewels would be strictly limited to carrying capacity, and every effort would be made to make the psychological experience of visiting them as rich and rewarding as possible. This would obviously call for investment

and for staff, which, in turn, cost money. Such national parks would be elitist, but an elitism of taste and interest; great care should be taken to avoid making their use an elitism of wealth and privilege.

Perhaps no country in the world has yet attained this stage of national park development and use, though some may be approaching it. Its ramifications are many; not only will it call for different management approaches, and different public attitudes, but it will also call for adequate provision of the other elements of the national park system. In many countries, as in the United States, where administration of national parks is in one agency and the other units of a truly national system of parks are in various other agencies, federal (national), state (provincial), and local, this will pose many difficult political problems. The initiation of national parks, generally conceded to have begun with the establishment of Yellowstone National Park 100 years ago, and whose anniversary we are here to celebrate, was an event of worldwide significance. I submit that the evolution of the national park, to meet the circumstances of highly developed societies and economies, may be no less important and no less difficult. One hundred years ago, many people found the very idea of a national park strange; very few people accurately saw the directions in which national parks would evolve. Likewise, today, too many of us are looking at the national parks of the world through the spectacles of the past, talking and thinking about their use and their management in terms of the past. As we try to see dimly the direction of economic and social change within each country, let us realize that national park management and use must evolve in new directions as well.

Problems and opportunities for national parks at different stages in their development cycle

Nearly all national parks in the world will experience increased attendance in the decade ahead, unless positive measures are taken to limit attendance to carrying capacity; and increased attendance will bring both problems and opportunities to the managers of such parks and to the countries concerned. But the nature of both problems and opportunities will depend upon the stage in the development cycle to which the particular park has attained.

The four "fueling factors" of park demand—population, income, leisure, and transportation—will continue to operate for almost all national parks, even when these effects are unwanted. The population trend is, regrettably, almost inexorably upward everywhere; the rate of increase varies from country to country, and varies over time within the same country; and a major issue of public policy in many countries is to reduce the rate of population growth. But, for at least a decade, population growth rates generally similar to the recent past are a basic fact of life. While there is some concern in the world with where unrestricted economic growth may ultimately take us, for man as a species and for various countries, there is no significant popular support yet for the idea of a no-economic-growth society; on the contrary, in most countries of the world, rich and poor alike, the concern is to keep the rate of economic growth high. To the extent that each country succeeds in attaining this objective, its citizens will have more money to

spend, especially more discretionary income, and more of this will be spent in visiting national parks. But leisure is almost sure to increase also; the paid vacation will spread to larger proportions of the world's working force, and the average length of the paid vacation will increase; even if there should be no reduction in the typical workweek, there will almost surely be an increase in the kind of leisure that leads to visits to national parks. And one can expect further improvements in the speed, comfort, and economy of transportation. Such increases may be difficult to visualize in the United States, where we already have a highly developed transportation system, and where additions to it often produce as much congestion as they do improved transportation. But in most of the rest of the world, personal-car ownership will almost surely rise—whether one regards this as progress or views it with abhorrence; highways and roads are likely to be improved, especially for higher speed travel, including travel to national parks; and feeder airlines are likely to bring more and more small cities within the air travel orbit.

Without attempting to estimate the exact size of each of these components for each country, one may with considerable confidence conclude that the combined effect will be upward, and rather strongly so, for most countries. To managers and planners of national parks, these economic and social trends must be accepted as part of his environment, in more or less the same way that the climate and topography of his park are environmental "givens." How are such trends likely to affect national parks in various stages of their historical development?

Reservation of additional land and water areas for national park purposes is still an essential process, as other papers at this conference will show. One may assume that the national parks reserved to date represent a combination of the most desirable areas and of the areas most easily reserved within each country; additional areas will either be less desirable, by some standard of park desirability, or can be reserved only with more public opposition, or both. But there are still opportunities to establish additional national parks in the economically developed countries of North America, Europe, and Japan. By and large, the opportunities to reserve additional parks are relatively better in the economically less developed countries, although the apparent demand for additional national parks may be less. Even where present and early prospective demand does not seem to require additional national parks, a good case can be made for reserving such areas, even if their management will be difficult because of the lack of public funds for this purpose. National parks can often be reserved in advance of intensive economic development with less friction and less disruption to the populace than is possible later. The prospect of potential increases in national park attendance should, therefore, spur on efforts to reserve soon prospective national parks.

The problems of *early management* of national parks will still continue to be important in many countries. In particular, two such problems will demand a lot of attention: the threat of disruptive commercial development, and the effort to maintain a national park system on the cheap. Threats of commercial development in or near national parks still continue; in the United States, for instance, there have been numerous threats to Everglades National Park—drainage of essential water for agricultural purposes, or construction of a huge jet airport nearby, and perhaps others. In the developing countries, where tourism is an important earner of foreign exchange and a major economic activity,

there may well be threats of overcommercialization—actions which would kill the goose that laid the golden eggs. It is essential that friends of national parks somehow convince the public at large, including its businessmen and its politicians, that use of natural resources for national park purposes may be as economically sound as use of the same resources for other purposes, such as hydroelectric power production, irrigation, timber harvest, or mining. But there is also a common desire to operate national parks “on the cheap”—to somehow have a system of national parks, available for and used by millions of people, without paying the cost. Nations must realize that they cannot have national parks on the cheap any more than they can have huge dams or steel mills on the cheap; economically valuable resource developments necessitate capital investment and continued annual expenditures, and there is no way to avoid such expenditures. While this problem is sometimes acute in low income countries, it is common in higher income ones, too.

Rising public interest, within carrying capacity, will characterize a large proportion of all national parks in the world during the next decade. Steadily increasing attendance at a national park brings many management problems, with which national park administrators are familiar, and which can be solved without undue difficulty if adequate funds are available. Better transportation facilities within the park, more overnight facilities, at least at the more distant national parks, more eating places, more staff to manage the park's resources and to cope with the increased crowds—all these, and perhaps other measures, will be needed, but the problems of their supply are familiar ones. There will have to be greater capital investment and greater annual expenditures. But the services of national parks in this stage of development need *not* be free to visitors; the average visitor will be well able to pay his share of the costs of park maintenance and operation. In my judgment, national park administrators throughout the world have seriously underestimated the ability and the willingness of users to pay for the services they get at national parks. The same income situation which has produced the hordes of visitors makes it possible for them to pay for what they get; not charging them for such services is a form of income redistribution in favor of park visitors and against all nonvisitors, including, among the latter, those who cannot afford to go to the national parks. Instead of being a means of helping poor people, as it is often alleged, subsidized use of national parks is actually discriminatory against poor people. Considerations of equity, practical political considerations of obtaining adequate appropriations for park management, and management considerations in affecting popular usage of park areas, all argue for imposition of park-use fees or charges which at least meet the costs of administration of the parks.

One aspect of national park management at this stage is essentially negative or cautionary: avoid making investments or taking actions, or building attitudes among park users, which will prove embarrassing when the park reaches the next stage of overuse. We have suggested above that almost all national parks will, in time, come to a point of use in excess of carrying capacity of that park, unless some positive steps are taken to avoid such high usage. The time to do something about excess usage is before it occurs; when crowding becomes extreme and/or the psychological quality of the national park experience has declined significantly is a needlessly late stage to be initiating action. The time

to avoid a collision between one's car and the telephone pole is before it occurs, not afterward. When attendance at a national park has been mounting steadily for some years, as is often the case, the question should immediately be asked: what happens if these trends continue for another decade, or two, or longer? No alert national park manager should be caught by surprise with a volume of visitors greater than he is prepared to cope, or greater than the carrying capacity of his park.

Park use exceeding carrying capacity is the stage to which most if not all national parks will ultimately come, unless measures are taken to limit use to such capacity. Restriction on park usage may be more difficult for park managers and administrators than it is for the public, especially in those countries where every effort has been exerted for many years to encourage national park visits. New attitudes on the part of park management personnel and new management techniques will be required. At the minimum, park visitors should be charged a fee or use charge which at least covers the marginal costs (capital and current outlays) of their visit; and a good case can be made for charging somewhat higher fees as well. As noted above, the public is more willing to pay reasonable charges than many park administrators realize. But there should not be, and probably cannot be, sole reliance on higher charges as a device to limit park attendance to carrying capacity. That capacity itself can be increased in various ways: hotels, motels, or other overnight services for visitors can be moved outside the park; recreation activities, wholly proper and desirable in themselves but not requiring the unique natural resources of the national park (such as golf courses and night clubs), should be removed or banned; the use of private cars within the park must be reduced or eliminated, and replaced with public buses, whose use should be “free” in the sense that no charge to the rider is made directly (although entrance fee or other general charges might well include the costs of bus operation); and other measures might be used. It seems almost certain that many national parks will have to go to a system of advance reservations; entrance without reservation would be possible only if idle capacity existed—as it is now for the opera or theatre or airplane. But a critical aspect of this stage of park development is to pitch the “interpretive” services of the park toward the unique character of the national park; it is not merely a pleasant piece of outdoors for a little fun and recreation, but rather it has special features and qualities which should dominate the thinking and the attitudes of users. Cultivation of this attitude on the part of park visitors will require intelligent and sophisticated actions and procedures by park personnel, but surely it is not impossible. National parks as crown jewels in a truly national system of parks is the ultimate stage in national park evolution, as far as this writer can foresee. The system aspect of parks of all kinds then becomes paramount, irrespective of the agencies under which various parts of the system are managed. In some countries, a single national agency might manage both national parks and all other units in the system; more probably, some of the other units in the system will be managed by other agencies of the national government, some by state or provincial agencies, and some by local governmental agencies. This will create important and difficult problems of intergovernmental cooperation. In any case, the national parks should be stripped of all recreation activity which does not require their unique resources and characteristics; this will leave plenty of activities for the national parks, and those for which they are uniquely equipped. Total visits to each

national park will be kept within its carrying capacity, including the quality of the recreation experience as part of the capacity determination. The entire public, of all ages, income levels, occupations, races, and special interests, will be served in the park recreation system as a whole, but not every individual at all times within the national parks as such.

SESSION V / PAPER 11

PARK FACILITIES FOR THE FUTURE

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One hundred years have passed since Yellowstone National Park was established in America as the world's first national park and many national parks have been established in various countries during that period. The United Nations List of National Parks and Equivalent Reserves enumerates 1,204 parks in 93 countries. This figure represents only the parks which meet the national park criteria, and there are in reality far more "national parks." The national parks and equivalent reserves in the U.N. List vary considerably. Even the national parks proper vary from country to country in size, natural resources to be protected, recreational value, etc. For example, Canada's Wood Buffalo National Park covers a vast 4,428,000 hectares, nearly twice as much as the total area of the 23 national parks of Japan, whereas Platt National Park, the smallest in the United States, extends over only 368 hectares.

Many parks in Africa and Asia are intended primarily to protect wild animal species, while other countries have parks with scenic attractions dependent principally on physical features and vegetation. There are also parks designed to feature mountains, tablelands, coastlines, islands, caverns, glaciers, etc. Some parks are aimed at attracting tourists from abroad in an attempt to improve the balance of payments, and others place primary emphasis on academic or recreational purposes. The differences between national parks also depend very much on the extent of each country's national concern for parks, its economic strength, national character, demand for recreation, etc.

Park use

More use is made of parks in developed countries than in developing countries, particularly for recreational purposes. The main reasons for this are higher incomes, greater leisure, better transportation, and higher mobility. In recent years, various kinds of

pollution, the growing eclipse of natural environments, and the complexities of urban life are accelerating the trend.

In the United States, the population is expected by the year 2000 to be double what it was in 1960, and its outdoor recreation demand to treble. In Japan, which perhaps has the highest park use in the world, the number of visitors soared to 300 million in 1970 from 140 million in 1960, or by roughly 2.1 times in a decade. It is still continuing to rise at an annual rate of 10 percent or so. A more or less similar trend has been noted in many countries.

Developing countries, on the other hand, are still rich in nature, and that is why popular demand for nature is not so strong as in developed countries. But Uganda and Tanzania are encouraging the younger generation to use parks, and this tendency is also likely to be increasingly met with in the future in other developing countries. As a result of wide publicity, parks with interesting wild animals are attracting ever-increasing numbers of foreign visitors. The remarkable development of airways today is serving to internationalize the use of national parks, by drastically shortening travel time and making people less conscious of national boundaries.

Overuse

In summer, the Yosemite Valley is full of people and cars. Crammed with campers and trailers, many campgrounds produce an urban atmosphere and are even called "camping slums." Long queues are formed at the dining room, and cars are incessantly on the move throughout the night. Yosemite is by no means an exceptional case, nor is the United States as a whole. As a matter of fact, this state of affairs is common in developed countries and in Japan is far worse. Of the 23 national parks, only 3 record less than 1 million visitors a year, and the numbers of visitors to such leading national parks as Fuji-Hakone-Izu (72.9 million), Seto Naikai (46.0 million), Jo-Shin-Etsu Kogen (18.8 million), Aso (17.3 million), and Nikko (16.0 million) are just astronomical. This overuse occurs because of the proximity of parks to big cities, the concentration of population in big cities, and the improved transportation system. The number of park visitors reaches its peak in autumn. In 1971, the daily number of visitors to Hakone, fairly close to Tokyo, reached 150,000, and to Nikko, 145,000, choking up these parks.

In the United States, park use concentrates on 5 percent of the total park area, and facilities are centered on that part. But in Japan, hiking and climbing in roadless wilderness areas are also very popular, and the phenomenon of overuse is widespread. In areas accessible only on foot, half a million hikers, 70 percent of them female, swarm every year, and in alpine regions hundreds of tents are put up, and those waiting for their turns to climb rocks form long queues. Perhaps all this is hardly imaginable in other countries.

Park overuse on this scale is resulting in the destruction of the valuable natural environment and the introduction of an urban atmosphere. Alpine plants, often trodden down by visitors, tend to be replaced by species such as plantains which can withstand such treading. Not a few marshes are drying up. Cars are driven into the woods. Wastepaper and empty cans and lunch boxes, as well as any food left over, litter the parks. Not

only is the vegetation destroyed, but notable changes are occurring in wildlife species. Facilities designed to protect the natural environment tend to give rise to a sharp increase in the number of visitors—as seen in the case of wooden gangways built across marshes through which it would hardly be possible to walk. The rise in the number of visitors entails expansion and improvement of facilities, which in turn erode the nature conservation areas and draw more visitors.

Some park visitors go hiking into the back country or mountain areas on foot, others come by car to enjoy beautiful landscapes. Many others just come to parks for outdoor recreation. While national parks are meant for the first two types of visitors, the third group does not necessarily need them for their outdoor recreation. They come just because parks exist nearby. In Canada, there are even said to be some people who visit parks to enjoy urban-type townsites. Such kinds of visitors appear responsible for much of the park overuse.

In many developed countries, overuse of national parks at the height of the season reaches such proportions as to call for drastic measures to prevent it and bring national parks back into desired shape. The year 1972 is the memorable centennial of national parks. There seems to be no better time for a thoroughgoing scrutiny of national parks than the 1970's.

Restrictions on park use

National parks have a dual purpose: (1) to conserve the scenery, wildlife, and natural and historic objects, and (2) to enable these assets to be enjoyed in a manner that would leave them unimpaired for the enjoyment of future generations.

National parks are required to meet popular demand, but such popular demand is not always reasonable. Those advocating rigid protection of nature or loving wilderness reject any type of development. Those enjoying recreation demand the expansion and improvement of roads, campgrounds, skiing grounds, and other recreational facilities. Such expansion of facilities or any type of development should, however, be suited to the desirable use of national parks and the protection of natural environment.

To this end, both qualitative and quantitative restrictions on park use are needed. Qualitative restrictions mean those which cover activities in parks and quantitative restrictions refer to the number of park visitors.

1. Outdoor recreation in parks. Types of outdoor recreation vary from country to country. They are fewer and generally simpler in developing countries, complex and more mechanized in developed countries. In developed countries, sightseeing by car, picnicking, fishing, and water recreation are generally popular, and, in countries with a high rate of motorization, camping based on recreation vehicles, driving, water skiing, boating, and snowmobile driving have been growing in popularity in recent years. There are, on the other hand, countries, like Britain, West Germany, and Japan, where hiking, climbing, and backpack camping are in great vogue. Desirable types of park use must be for close communication with nature, full enjoyment of nature, and inspirational experience hardly obtainable in other places. They include sightseeing, nature study, and nature observation, and for such pursuits it is necessary to build park roads, nature

trails, visitor centers, interpretive facilities, observation facilities, overlooks, or viewpoints—all of them accompanied by an interpretive service. Simple and nonmechanical types of recreation are to be preferred in national parks, such as climbing, hiking, picnicking, swimming, boating, canoeing, fishing, skiing, skating, riding, and primitive camping. Automobile driving should be limited to zones coming within Land Classification I, II, and III, as explained in subsection (2) below. Water-skiing, motorboating, indoor skating, tennis, and some other sports are preferably confined to recreational-type parks or user-oriented areas. It is better to build golf courses and large-scale, urban-type campgrounds with hookups outside national parks altogether.

Types of activity unsuited to national parks are those tending to destroy nature and the natural environment, including various artificial, urban, recreational, or user-oriented activities. Hunting, roller skating, bowling, drive-in theaters, shooting, the use of snowmobiles (at least in wilderness parks, due to the risk of accidents, disturbing wildlife, and noise), and "second homes" or holiday houses, all come under this category.

If one should really desire to make good use of and enjoy a park and learn something from it, one needs to stay at least a few days. In the past, hotels, motels, lodges, and other accommodations were needed within park boundaries, but now that the number of visitors has soared so sharply, they are apt to require large portions of the nature conservation areas for their construction. Beyond a certain limit, therefore, it is desirable to construct such accommodations outside park areas. Exceptions may occur in countries with a low degree of motorization, or where lodgings are not available nearby and it is not feasible to build them outside the park but where they are needed within the park boundaries to make it possible to observe wildlife.

2. Land classification. National parks can be divided broadly into (a) the natural type with primitive features, (b) the recreational type suitable for recreation purposes, and (c) the historical type containing many historic relics. They can be further categorized according to land classification. Many of the Japanese national parks are of the natural type, but there are also a number of recreational-type parks in this country with its limited land space, teeming population, and long history. In many cases, natural-type parks embrace recreational-type areas within their limits.

The Outdoor Recreation Resources Review Commission of the United States recommended the adoption of a land classification system for recreation land in 1962. Such a system is highly effective in protecting and managing natural resources and determining the quality of recreation best suited to the specific characters of parks. In the United States and Canada, it is already adopted in master plans. The land classification uses the following six categories:

- Class I: high density recreation areas
- Class II: general outdoor recreation areas
- Class III: natural environment areas
- Class IV: outstanding natural areas
- Class V: primitive areas
- Class VI: historic and cultural areas.

Recreation activities and facilities in these respective areas will be as follows:

In many national parks, Class I and Class II areas are treated almost equally, and

various types of outdoor recreation activities permissible within national parks are intensively carried out in them. Villages (U.S.A.), townsites or visitor service centers (Canada), and developed areas (Japan), which would become park-use bases, are set up within these areas, with accommodations, campgrounds, restaurants, stores, gas stations, administrative facilities, etc.

Class III areas are offered for many recreation purposes, but are much more primitive in character than Classes I and II. Park facilities, therefore, are lower in accommodation and density. Recreation activities are confined to climbing, hiking, picnicking, camping, sightseeing, swimming, boating, yachting, fishing, skiing, and some other activities close to nature, and facilities are simpler.

Class IV areas are marked off for enjoyment and observation of nature through hiking and climbing (horseback riding in some countries). Trails, nature trails, observation facilities for panoramic and wildlife purposes, primitive campgrounds, etc., are built as integral parts of the natural environment. Except in special cases, there are no park roads, and such roads, if any, are one-way approaches.

Class V areas conserve as much primitiveness as possible and are designed to become places of communication between nature and humans. Installation of any mechanical equipment such as lifts and cableways is not permitted at all, and facilities are limited to trails, shanties, shelters, and primitive campgrounds.

In Class VI areas, which are, in general, relatively small, park facilities are limited to those of an educational character, such as trails, visitor centers, and museums for the display of historic sites and remains. Park roads, parking lots, rest-houses, etc., are built outside the areas.

3. Carrying capacity. Natural areas have carrying capacities governing their conservation and use in a rational way. To make the best use of the carrying capacity consistent with the protection of nature, park use is restricted, and a limit placed on the extent and degree of development. In other words, it is an optimum people-land ratio. So far no theoretically right scale of carrying capacity has been worked out, but it will certainly become an important guideline in determining the proper relationship of nature conservation and development for national parks in the future.

Carrying capacity of parks could be analyzed from various angles, which include the following:

(a) **Physical capacity:** This is the capacity of the land and water surfaces available, to be determined by geographical and geological features, vegetation, water, safety, and the like.

(b) **Psychological capacity:** This covers the number of visitors a park area can accommodate while enabling them to have park experience with satisfaction. Experimental values will be obtained through psychological tests in various types of natural environment. Such numerical values may vary greatly according to individuals.

(c) **Ecological capacity:** This concerns the park capacity to accommodate visitors without impairing the ecological balance. According to a study of the alpine tundra in America's Rocky Mountain National Park, gathering pieces of stone or flowers and depositing of litter adversely affects high-tundra ecosystems. One year's walking over such areas appears to allow recovery, but after 2 years' use there is none. The alpine

marsh of Japan's Nikko National Park is a roadless wilderness area and is visited by 500,000 hikers a year. As visitors frequently tramp through marsh, much of the vegetation has been destroyed, and its reinstatement is expected to take quite a number of years and involve a complex process of plant succession.

Carrying capacity is high for Class I and Class II areas and low for Classes V and VI. After it has been determined, limits will be placed on the number of visitors and park facilities, and, together with the permissible recreation element and land classification, will be incorporated into the master plan. For existing parks, revisions or readjustments will be made. In the case of an overused park or area, a road in active use may have to be closed or abandoned or made into a one-way route; private cars may be replaced by buses or trailers; the length of visits to campgrounds may be restricted; accommodations may be moved outside the park boundary. In Nikko National Park, visitors were requested not to drive cars on weekends in autumn, due to abnormal congestion. To control park overuse in a specific season, it may be necessary to set up an information or control center.

Reduction of park use

Demand for outdoor recreation has been rising year after year, showing no sign of letdown. For the vast number of people seeking recreation, a lot of space is needed. Depending on recreation demand, city parks, suburban parks, forests, lakes, marshes, rivers, seashores, parks laid out by local governments, regions falling under the national park system, national forests, etc., can all be utilized. Unlike America where priority is given to city parks in emergency park improvement measures, in many countries even those who would be satisfied with other areas often tend to use national parks, causing park overuse phenomena. In Japan, where national parks exist close to cities, the pressure on national parks is not likely to diminish even if other types of parks or recreation areas should be improved. But national parks alone cannot meet fast-rising recreation demand and recreation pressure. It is essential to disperse park use as widely as possible. To this end, regional plans centering on large cities must be worked out, and attractive recreation systems designed. In Japan, one such idea for a large-scale recreation area has been mapped out.

National parks can hardly solve visitor-pressure problems by themselves. The suspension of road improvements, restrictions on private cars, or establishment of accommodations or campgrounds outside parks may be conceived, tried as a solution, but in the long term the number of visitors will have to be limited forcibly in accordance with the carrying capacity of respective parks.

Park facilities

Only direct-use facilities will be considered in this section, and not the administrative infrastructure.

1. Park roads. The normal means of approaching and traveling in national parks is by road, and roads have become one of the most essential facilities in this age of motoriza-

tion. But roads are prone to destroy nature, transplant culture and urban environments, metamorphose the quality of recreation, and occasion park overuse as a result of easy access.

In the first place, the advisability of constructing roads in natural areas comes into question. In nature, there are fragile habitats like marshes and primeval forests. Forests, once they have lost balance as a result of deforestation, etc., tend to be continually destroyed, and their restoration is very difficult or impossible. Such areas should be kept clear of roads and any other human works. Destruction of natural environment by the construction of motorways is giving rise to a great deal of criticism in various places. A typical example is the road built on Mount Fuji. When the road was constructed 7 years ago, spruce forests in the subalpine zone, above 2,000 meters in altitude, were greatly damaged. Even today a number of trees are dying or falling every year. Forests on the lower half of the mountain, however, have been quickly restored, showing hardly any trace of destruction now. The road should not have been extended beyond the midslope. This blunder resulted from the absence of ecological, geological, meteorological, and other specialized investigations prior to road construction.

When a road is built, it must be taken into consideration that the zones along the road will undergo transformation and environmental changes as a result of increased recreational use, and the road itself and the rise in the number of road users will bring about a considerable alteration to animal habitats.

There is room for careful study as to whether access to a mountain summit or viewpoint should be a cableway or lift or road. When a cableway is constructed through a forest, the amount of felling could be relatively small, and, accordingly, the forest scar could be minimal. It will still require a parking lot at the starting point, but only a path at the top end. On the other hand, any road construction tends to transform the physical aspects of the landscape over a long distance. Generally the construction of a parking lot at the top is not easy. All such factors should be taken into careful consideration before selecting the means of access. Traffic need not, of course, be limited to roads, but monorails, which are gaining popularity today, are apt to give too urban an atmosphere to a natural environment.

Public highways under the management of the central or local government are to be found in many parks and proving very helpful, allowing commercial traffic. But many vehicles, including large-sized trucks, just passing through parks, spoil the natural environment, and it is not so easy to control such traffic merely on the grounds of being in the interests of the park. It is therefore more desirable that public highways should make a detour to keep away from parks, although detours may often be extremely difficult and time consuming.

Park roads, unlike public highways, should not merely link different spots, but be meaningful, useful, and pleasant throughout their length, maintaining harmony with environment. Distances, speed, and economical aspects are secondary considerations. Along a park road, it is advisable to set up observation platforms, nature trails, visitor centers, etc., to enable park visitors to have as many opportunities as possible to come in contact with nature.

As for park road standards, the United States set these in 1967, and they could well

serve as basic guidelines for other countries, too. Park roads do not need to be the same as highways in terms of width, curve angle, grade, tangent, etc., and high-speed traffic and large-sized recreation vehicles should be controlled.

In Japan, buses are still one of the principal means of public conveyance, but in other developed countries, it can be said, almost all roads are exclusive to private cars. Many of them are five-seaters, but some are one- or two-seaters. Buses carry 40 to 60 persons at a time. The parking space required for a private car is very uneconomical. Large parking lots are necessitated at observation centers, campgrounds, accommodations, restaurants, et al. Furthermore, new cars are continually being designed to be larger and speedier, and can even haul large-sized trailers. The deluge of private cars is undesirable from the standpoint of efficiency and nature conservation. Their exhaust gases have no small influence on vegetation and wildlife. Whenever the layout of park communications is being reorganized, therefore, park roads for mass transportation ought to be built, so that private cars can be replaced by buses or trailers. Yosemite and the Mariposa furnish good examples.

It is always a good plan to make the central part of the park a roadless area, while linking up the peripheral Class I and Class II areas. An actual example is Olympic National Park in the United States. Several separate radial roads fan out into the park from the road which encircles this park, but they end up at points well away from the central zone. Nonetheless, visitors can enjoy grand views of the Olympic Mountains, the rain forest, the Douglas-fir and Sitka spruce forests, and wildlife. Leading on from the end of the roads, a wonderful trail is available for those who want to go backpack camping. This is quite adequate for the purposes of a national park. Many roads in other parks have been overdeveloped and offer too much convenience. It is not all necessary to lay on all the abundant conveniences of urban life for park visitors to get into touch with nature.

2. Trails. Walking tours, including hiking, climbing, nature study, and nature walks, are the most desirable form of recreation in a national park, and should certainly receive more encouragement in future planning. In Japan, the Tokai Nature Trail (covering a distance of 1,376 kilometers between Tokyo and Osaka) is now in the preparatory stage, modeled after long-distance trails in North America and Britain. There are already a considerable number of trail users, and hiking and climbing are growing in popularity. Trails are divided into the following categories:

Long-distance trails connecting natural areas and historic sites belonging to the national park system or/and national forests;

Countryside recreation trails providing easy access from cities and suburbs to areas coming under the national park system;

Park trails intended for hiking, climbing, and nature walks;

Nature trails relatively short in distance, centering around campgrounds or villages, townships and other developed areas within parks, which are useful for the observation and study of physical and geological features, forests, plants, wildlife, and other aspects of the park.

All these trails are to be equipped with signposts, interpretive notice boards, outdoor exhibits, visitor centers, etc.

3. Overnight accommodations. In the past, when the number of park users was not so appalling as today, housing complexes, villages, and townships, with their range of accommodations, were systematically built within parks. In developed countries, however, the marked increase in the number of visitors has come to pose problems for park conservation because of the multiplication of hotels and lodges. As villages and townships grow in scale, so communities of concessioners, employees, and their families are formed, all needing somewhere to live. In some parks, permanent dwelling houses are on the increase. In Japan, this also notably applies to parks in which hot springs are situated and were in use long before the parks were officially designated. Expansion of development areas of this kind is generally undesirable, and the idea of setting up the relevant facilities outside park boundaries is fast gaining ground. But it is virtually impossible to move all accommodation facilities out of large parks, and it is not proper to deny people the experience of lodging within parks altogether. The magnificent views of sunrise and sunset and the observation of wildlife are experiences which cannot be gained elsewhere, and to deprive visitors of them completely is not desirable. The best solution is to control accommodation facilities by setting optimum capacity limits.

In the United States, small clusters of motels, cabins, restaurants, etc., are being formed adjacent to parks and serving as park use bases. Gatlinburg near Great Smoky Mountains National Park, Gardiner and Flag Ranch near Yellowstone, and Jackson below Grand Teton are examples. Gatlinburg is a very strange town filled with a number of hotels, motels, restaurants, and curio shops of strange designs and colors. I stayed there overnight and realized it was not suitable as a place of stay for visitors to Great Smoky Mountains National Park.

Similarly, downstream of the Yosemite Valley, groups of motels and cabins are ubiquitous, but the surrounding environment is so much out of keeping with the park that visitors only stay there when the accommodations inside the park are filled. In such cases, one answer would seem to be first to include the area within the park boundary and then place it under park management, so that good-quality accommodations and environment worthy of a national park can be ensured. When an area is specially designated for such facilities, many concessions should be granted, and park regulations relaxed. If for any reason the special area cannot be included within park boundaries, other regulations to attain the same measure of control should be enacted.

There is a tendency today for luxury accommodations to be provided, but in view of the wide income differences between park visitors, the ideal is to furnish good facilities at low rates. The Japanese Government is now giving more financial assistance for the establishment of national vacation villages and national hostels. These enterprises charge a reasonable \$5 to \$7 for a night's lodging and two meals, and are very popular among family groups. There are also youth hostels throughout the country.

Hotel, motel, and lodge buildings must be in harmony with their surroundings, enveloped by them, and not allowed to be too prominent. Preferably their styles should be in keeping with the character of the country or locality. Rustic cabins are also preferable for campground buildings.

4. Campgrounds. These are one of the desirable facilities because campers using them can be in close touch with nature. People tend to flock to them in summer, and a fairly

high level of use can be expected if the park season is short. Primitive campgrounds consist simply of sites, a water supply, fireplaces, toilets, garbage pits, and shelters, while semiserviced campgrounds are equipped with cabins as well as tentsites, toilets, kitchen shelters, picnic tables, and fireplaces. It is best to have sites at wide intervals (75 to 100 feet in Canada) and keep as many grassy spaces as possible to avoid turning campgrounds into camping slums. A suitable-sized campground is one which provides for 250 units. In the United States and Canada, campgrounds specially designed for big holiday vehicles such as trailers and caravans have become necessary. Their equipment includes water supplies and electricity and sewage hookups. Such campgrounds are essentially urban in character and devoid of natural atmosphere. They amount in effect to making provision for mobile cabins and villas, which are appropriate to recreational parks, villages or townships, but which should always be located either on specially designated sites or outside the parks altogether. In the case of Japan, it will take quite some time before the need for such campgrounds arises. In these urban-type campgrounds, as well as in fully serviced and semiserviced campgrounds, trailers and tents should be separated from each other.

In the sophisticated-type campground just mentioned, visitor centers, campfire sites, amphitheatres, etc., will be set up, and an interpretive program will be implemented. Playgrounds will be made for children and group campgrounds provided, separated from the main campgrounds, but on no account marked off exclusively for specific users. Cabins and tents grouped around lodges are of more general use and desirable than trailer camps. Separate cabins, each with a shower, toilet, and kitchen are preferable to motel-type establishments.

5. Skiing facilities. Skiing is a desirable form of park use in winter. There are two main classes of skiing: ski touring over the natural mountain slopes and meadows and skiing on prepared runs. The former is equivalent to hiking, climbing, or nature walks and is better suited to park purposes. The latter destroys nature in the preparation of runs, while the accessory facilities needed, such as lifts, lodges, restaurants, and parking lots, alter the natural environment and affect wildlife. The demand for skiing facilities, must, therefore, be carefully studied from the standpoint of nature conservation and park use in winter. They are definitely not permissible in Class IV and Class V areas. In the case of Japan, almost half the surface of the country is blessed with snow in winter but almost all areas suitable for skiing are within the boundaries of national parks or quasi-national parks. Hence skiing is an important type of park recreation. The same is true at Banff and Jasper National Parks in Canada. In the development of skiing facilities, their location, scale, and accessory equipment must be worked out in such a way as not to impair park values. Competitive ski runs and ski jumps are to be avoided in national parks. Rescue services have to be provided and always ready. Ski lifts, lodges and ski runs can be profitably utilized for out-of-season purposes.

6. Marine parks. The establishment of marine parks was approved at the First World Conference on the National Parks held in Seattle, U.S.A., in 1962 and recommended to member countries. Countries with a marine park potential have subsequently been conducting studies in this particular field. In Japan, a total of 22 marine park areas have now been designated within national parks with a view to protecting the "underwater-

scape." Glass-bottomed boats are being widely used to view underwater life in its beautiful setting. Recently, several underwater observatory towers have been built to allow three-dimensional underwater viewing. In Virgin Islands National Park of the United States, people are taught to use snorkels and there are well-kept underwater trails. These all constitute a novel type of park facility and it is hoped that further technical developments will enable visitors to enjoy the magnificent submarine landscapes in still safer and easier ways.

7. **Water sports.** Recreational use of water in lakes, seas, rivers, etc., can be expected to continue to increase in the future. It includes sightseeing by large boats, motorboating, yachting, canoeing, boating, water-skiing, swimming, and fishing. In Canada, the prevention of noise produced by motorboats in primitive areas is now having to be considered. As a rule, it would be advisable to limit water-skiing and motorboating to Class I and Class II areas, and the same applies to marinas.

8. **Educational facilities.** Today we are facing two important tasks—the conservation of nature and the protection of the environment. To enable us and our posterity to lead comfortable lives, we must boldly tackle these tasks and solve them in our day. Efforts should begin with the study of nature, of pollution-free environments and of the effects of humans on the environment. This is why countries attach importance to national parks as places of education for nature conservation. Education in nature conservation demands many facilities such as visitor centers, museums, amphitheaters, nature trails, and outdoor exhibits to help in the important task of training naturalists and natural historians. Interpretive services, such as nature talks, campfire talks, bird or wildlife observation trips, and guided tours should be prepared on a basis of careful and thorough investigation and research.

In the United States the National Environmental Education Development Program was planned by the National Park Service in 1968, to help the future progress of national parks in this field. It supplements school education and sets up national environment study areas within national parks. But there are still many countries lacking adequate visitor centers and nature trails as well as naturalists. It is, therefore, important always to remember that environmental education development is the appointed task of national parks.

Conclusions

1. The scope and purpose of national parks must be reexamined with full understanding of nature conservation and a realistic assessment of park use.
2. Qualitative and quantitative restrictions on park use should be studied.
3. Coordinated international study of carrying capacities of national parks and the formulation of park-use control standards based on results are urgently needed.
4. Land classification of parks should be undertaken, and park facilities controlled on the basis of this classification.
5. Developed countries need to redouble their efforts to eliminate the park overuse situation.
6. In resource-oriented parks, it is unnecessary to offer visitors lavish facilities or to make things too easy.

7. Preventive measures against overdevelopment of national parks should be organized.
8. Removal of overnight accommodations and urban-type campgrounds from park areas or establishment of new facilities of this kind in specially designated areas or outside park boundaries must be encouraged and promoted.
9. Public highways passing through park areas should be closed.
10. Park roads should be reexamined.
11. Restrictions should be imposed on the entry of private cars into park areas and mass transportation methods introduced.
12. Educational facilities in parks should be improved and expanded.

This paper has mainly dealt with parks that show a tendency to be overused. Many of these can, in fact, only be described as being in a state of "tourist pollution," and the solution of the environmental problems involved is strongly urged. It is much to be hoped that national parks which are still undeveloped will never be allowed to follow in their wake.

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TRANSPORTATION WITHIN AND OUTSIDE PARKS AS A MAJOR FACTOR IN RESOURCE USE AND PROTECTION¹

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The problem of the transportation of persons in national parks has now assumed major proportions. Even though technical facilities for opening up regions of the most varied kinds are today practically unlimited, the choice of means of transport gives rise in many cases to considerable difficulties from the viewpoint of environmental protection, in general, and of the preservation of natural beauty and of important ecosystems in national parks, in particular. In the majority of national parks, difficulties of this kind arise mainly in connection with the numbers of persons to be transported or, in other words, the extent and capacity of existing or planned transport installations. Regardless of whether transportation is by air, land, water, or snow, problems related either directly or indirectly to the fate of the protected areas will almost always occur, unless there is realistic planning. Naturally, there can be no question of entering into details of the transportation problems facing the varied kinds of park systems. On the basis of the developments now taking place, it must be assumed that sooner or later every park will have to come to terms in one way or another with its own special problem concerning methods of transportation. However, the volume factor is common to both access transportation and traffic within parks. The reasons for this are to be found in the complexities of a situation of growing use, the contributory factors in which are the general growth in population and the upward trend of private-car traffic.

Every national park or nature reserve has a specific capacity regarding visitors, a point which now—more than ever before—calls for the closest attention, even though unfortunately, the criteria for assessing such capacity have not yet been determined in all cases. All relevant transportation facilities must, therefore, be adjusted to the carrying capacity of the area concerned, in order to avoid degradation or, indeed, destruction of irreplaceable natural assets, such as can result when the choice of any particular means of transportation saturates the capacity of the park. Thus there is an urgent need to establish the limits of the carrying capacity of each park.

Means of transportation may be divided into the following main categories: (1) private transportation—on foot, by horse, private car, motorcycle, aircraft, motorboat, ski, snowmobile, etc; and (2) public transportation (or concession)—bus, Land Rover, sightseeing coach, tram, minitrain, cable car, aircraft, helicopter, ship, raft, sleigh, snowmobile, mule, railway, etc.

¹ Original: German.

The choice of the means of transportation is governed by such factors as: geographical situation, climate, size of the park, distance from residential and tourist centers, degree of tourist attraction, and the carrying capacity, ecology, type, and administration of the park.

Economic considerations of a private and even of a national character often also play a determining role in the choice.

Transportation outside the park

The type and capacity of access transportation largely depend on the factors mentioned above. Experience has shown that existing public transportation facilities, such as railways and air services, cannot be greatly influenced by considerations relating to a park. In planning new installations, a point to be taken into account is the visitor volume that can be properly handled in the area concerned. What must be avoided at all costs is that investments made on purely economic grounds may exert such pressure on a park as to oblige it to alter its goals and adapt itself—to its own prejudice—to conditions imposed on it.

Access to remote parks—such as some of those in Africa or Latin America—is often possible only by air. Air traffic should, however, be kept within limits envisaged by park authorities. On the other hand, there are still in Sweden large national parks which can be reached only after days on foot. Air access is available only in exceptional cases. In both cases, the unspoiled nature which it is desired to preserve is entirely dependent on accessibility. The decisive factor in a decision to visit them is not the convenience of transport but the desire for real contact with nature. Another example of interest from the tourist and ecological viewpoints is the Ngorongoro crater floor, which can only be reached by means of Land Rovers operated by concessioners and the park authorities; in this case, the enjoyment of the visit is entirely dependent on the transportation factor. When it comes to dealing with private means of transportation, particularly cars, many parks are in a position to exercise effective control over the numbers of visitors and to direct the flow of cars by an appropriate arrangement of the parking spaces adjoining the park. At sites near national main roads, or international routes, and where, in consequence, traffic cannot be limited by means of checkpoints, limitation is possible only by the well-thought-out location and size of parking space. At many parks it will be necessary in the future to stop private traffic at the entrances and replace it by transportation services, operated by concessioners or by the park authorities, which can at the same time take over the guidance and direction of visitors.

The bulk of the transportation problems arising in connection with access to parks can no longer be solved by the transportation or road-building departments alone; what is needed, rather, is close cooperation on the part of the competent park authorities and conservation representatives, since it is at the park entrances that the volume of visitors can be directed or, where necessary, limited. The planning of access transportation facilities should be guided by whether they will lead to long-term protection and prevent overutilization by tourists. In future, only a very small number of parks will be able to afford to provide generous access transportation—namely those in which the main

attractions, natural or other, are not affected by the presence of large numbers of people or cannot be destroyed thereby in the long term. Famous waterfalls are a good example. However, in this case also, an essential condition is a well-planned internal transportation system in the park.

Transportation problems inside national parks

"People welcome—cars not." This is the slogan of many modern parks which only a few years ago were engaged in carrying out extensive road-building works and in attracting visitors with massive publicity campaigns, having failed to take account of the potential "use explosion." The private car has become a particularly awkward and hard-to-regulate means of transportation not only in our cities but also in some of the best-known national parks in many countries. In the long term, no solution is to be found by providing ever more extensive parking space, more panoramic lookouts and more roads. Any effective solution calls for cooperation by both parties—the park administration and the users. In order to preserve the character and particular charm of national parks, the users will, in future, have to make their contribution by accepting some far-reaching restrictions, in particular in regard to the number of visitors, the nature and manner of the visit, and traffic. Those parks that have not yet been swamped by cars would do well to revise their traffic plans in the light of experiences gained in other parks and to take at this stage the necessary steps for a careful balance between conservation and use.

In many cases there will be no other choice than to stop private-car traffic at the entrances to a park or allow limited access to a few central parking lots, replacing it elsewhere by other obligatory means of transportation. As regards such other means, two possibilities are at present favored: (1) walking—the health aspects of which need not be enlarged on here; (2) such modern facilities as monorails (for long distances) and minitrains (for short trips). For many visitors, the doubtful joys of bumper-to-bumper traffic will thus be replaced by a new experience in communion with nature when they find themselves having to go on foot to particularly interesting spots in the park. In many places, visitors will have to accept delays of several hours—or even perhaps, 1 or 2 days—when visiting outstanding sites, if the demand at peak times is particularly great and the park administration has to impose a quota system. Restrictions on road traffic must, in fact, be dovetailed into measures of a purely technical and administrative nature, aimed at a balanced flow of visitors. These include planning and advance notification of visits; advance booking; ticket systems; publication of regulations for visitors and of waiting times; a flexible quota system; and training of personnel. It is helpful to work out a system of planned visits (as is now done, for instance, in Mesa Verde National Park, Colorado, U.S.A.) and publish it in good time, so that people may quickly become accustomed to it and appreciate the advantages it offers in regard to preserving the park.

Modern transportation technology in the form of monorails can provide transportation to remote points of special interest in parks, wherever such systems can be installed without excessive interference with the natural beauty of the scenery. Developments of this kind, however, entail an element of overreliance on technology and must be approached with prudence and reserve. Consideration should preferably be given to their

use in cases where they can replace roads for the purpose of traversing extensive areas of particular ecological interest, which need to be preserved from excessive human influence. It would have the effect of reducing to a minimum undesirable pressure by large numbers of people, without completely preventing visitors from seeing the areas concerned. The disadvantage of questionable mechanization would be outweighed in this case by the advantage of protecting important areas of the park.

Where there is a danger of overloading and traffic jams on existing roads, preference should be given to sightseeing coaches, electric minitrains, and electric buses, let out under concession and operating either from the park entrances or from central parking areas. With such a system of transportation, it would also be possible to operate a form of quota. Visitors, moreover, would have a leisurely opportunity to observe the natural life of the park, undisturbed by uncontrolled car traffic. In some cases it would be necessary to make the use of such transportation systems obligatory. These and similar facilities should also be envisaged from the outset, when—even in the absence of a direct threat from car traffic—measures aimed at protecting a park are being planned. Even those countries in which parks represent an important source of income for the State will have to give consideration to replacing the private car by a controlled system of transportation, operating under concession, if they wish to prevent the negative effects of traffic difficulties, overuse, and degradation from frightening away future visitors.

In many places, there is a lively controversy concerning whether or not cable cars, trams, etc., should be included in the transportation systems of national parks. In our view, they are mainly a convenience (e.g. when differences of height are involved) and not much suited to easing the traffic situation. If, under the pressure of conditions and of developments in the parks, it should become necessary to make concessions to mechanization, it should be done only in cases where benefits in the form of a reduction in the degree of use may be expected. It is precisely in the matter of opening up mountain peaks and canyons by means of technical installations that a national park should remain clearly distinct from an ordinary tourist or recreation area. The possibilities available in this respect elsewhere than in national parks are so numerous that such a distinction of principle is readily acceptable from the economic viewpoint. The same also applies in regard to helicopter landing sites, the use of snowmobiles for private purposes, and the provision of ski lifts in national parks. The vast majority of the public—and of taxpayers—will be the more receptive to this argument to the extent that those responsible for the future of our parks give clear expression to their intention of protecting the parks better than ever before and preventing them from becoming amusement centers. The latter are also entitled to exist and should, indeed, play a greater part in relieving the strain on national parks. It will be for the specialists in international nomenclature to ensure that the proper distinctions of principle are clearly drawn.

Conclusions

There can be no doubt that today, 100 years after the founding of the first national park, the period of experimentation has finally terminated. Thanks to the experience acquired and the possibility of establishing more accurate projections of traffic and tourist trends,

it should now be possible to guard against damage much more effectively than in the past and to avoid the surprises experienced in many of the older parks in the past 10 years.

We are at an important turning point. The era of almost unlimited access to national parks is irrevocably coming to an end. The various forms of park use and the mechanical and human influences at work must be closely analyzed, with advantages being carefully weighed against disadvantages. In the case of passenger transportation, the lesser evil must—as always—be preferred to the greater.

The greatest danger to national parks in future will be the public *en masse*. The choice of a transportation system for access and internal transportation best suited to the protection of the park provides the authorities with an important and effective means of action. Even some degree of mechanization in the transportation system operated by the park itself or under concession will have to be accepted as an alternative to uncontrolled private transportation, whenever the fate of the park is at stake.

National parks are becoming ever more important symbols of our time. One of their most important tasks—that of bringing man into close harmony with his environment—can, however, be accomplished only if the quality of the visit to a park can continue to be maintained at a high level. An ever greater and more varied range of possibilities must therefore be made available to those persons seeking recreation, the full range from national park to purely recreational area being developed to the greatest possible extent.

A clearer distinction must in all cases be made between the nature protection function and the recreation function.

Freedom to use any desired private means of transportation must be preserved in full, and for as long as possible, in other areas specially designated for the purpose, as an alternative and an attraction. Examples of such facilities are: scenic roads, one-way motor nature trails, scenic parkways, low-speed nature roads, and long-distance scenic highways. By means of appropriate and well-conceived publicity, car traffic can be directed toward the areas intended for it, and thus to an increasing extent away from the national parks.

An example of problems created by increasing use—Swiss National Park

General description, access, and the build up in visitor numbers. Swiss National Park was founded in 1914, and now comprises an area of some 17,000 hectares (67 square miles) in the Engadine, leased on the basis of long-term contracts from four of the adjoining communes. The only private property is the sole hotel in the park (Il Fuorn, 10 hectares). The goal sought by the founders, which remains fully valid today, is: "The Swiss National Park is an alpine sanctuary protected from all human interference and influences not serving its purpose and where the entire flora and fauna are allowed to develop freely." In addition to other protective measures, park regulations provide that the whole area can be visited only by means of a precisely designated network of official footpaths. All the other parts are fully protected. At present the length of this network is 80 kilometers; there are 10 entrances to the park but only 2 of them can be used by

cars, namely those on the international road traversing the Ofen Pass (linking Switzerland with the Italian South Tyrol), which cuts through the middle of Swiss National Park over a distance of 12 kilometers. All the other entrances are accessible only by foot.

Like all remote areas, in the early 1920's (and even the 1930's) the isolated valleys of Swiss National Park were visited only infrequently. Up to 1929, in fact, in the Canton of Grisons (where the park is located), no kind of automobile traffic was permitted! A growth of interest was recorded only after the Second World War. But even at that stage no one would have dared to forecast the extraordinary development of tourism in the 1960's and even more recently, or the enormous interest that there would be in national parks and nature reserves.

The founders of Swiss National Park had absolutely no thought of creating an area completely closed to visits by naturelovers. Rather, it was the wish from the very beginning that the park should serve as a center for creating a genuine feeling for nature protection, in which the quality of the experience of nature would be allied with an example of effective protection of nature.

In 1971, the number of visitors was approximately 270,000. (In 1969, there were about 190,000.) The major part of the great increase in recent years is attributable to the increase in car traffic on the Ofen Pass road. Along this road limited parking accommodation was provided near the starting points of the official footpaths. Parking beside the road is not permitted elsewhere but only at these parking places, and possible parking sites in the forest, in small meadows, etc., have been blocked off by stone boundary walls. ("No-parking" signs are not very effective in national parks!) To enable interested visitors to orient themselves, large directional maps were provided at all parking places. These maps also give in pictorial form the main rules of behavior and prohibitions. This pictorial form has proved particularly successful, since experience has shown that today any sort of lengthy text is simply ignored. The guidance provided is supplemented by an information office based on the same concept (Zernez park house), comprising a display and projection of slides.

Despite the great increase in the number of visitors, the standardization of planning and guidance has led to a reduction in the number of transgressions of the regulations (fines are imposed in such cases). On the other hand, the demands on the staff have become much heavier. One of the reasons why Swiss National Park has become a genuine attraction is that in summer many wild animals are to be found, which can be observed under relatively good conditions at a certain distance from several viewpoints. Ibex, red deer, chamois, and marmots are at times visible in fairly large numbers and thus constitute a special attraction. Watching, photographing, and filming animals has now become one of the favorite pastimes of what we are pleased to describe as our leisure society.

Experience of traffic problems in the park. What conclusions of a general application can be deduced from the experiences of Swiss National Park—a small mountain reserve located in the midst of a high-density tourist area? (St. Moritz is only 40 kilometers away.)

The growth in car traffic on the short, 12-kilometer stretch of road concerned has resulted

in what is for us an extraordinary concentration of private cars and touring coaches, so much so that we are now faced with a shortage of parking space. Since, however, the park authorities have no official power to control traffic, establish park entry gates, or hold up cars in any way, they find themselves obliged to tolerate unrestricted traffic in the area of the park. Naturally, mention should be made of the happy discovery that about 80 percent of all visitors are quite ready to walk for a few hours. Since, however, the most frequented paths start from the road and between 80 and 90 percent of the visitors use private transportation to reach the park, the parking places inside the park are those most in demand. This situation could be, perhaps, compared with the position in some parks of the United States, where visitors inspect the park from lookouts. There is, however, the difference that in our case each individual visit lasts much longer, because people spend more time on foot in the park and the parking areas are occupied for a correspondingly longer period.

The financial resources of our park, to which no entry charge is made, do not permit any large-scale extension of the parking areas; and, on the other hand, a heavy increase in the flow of visitors following a doubling of parking facilities could not but have an adverse effect on central areas of the park in which they were situated. For these reasons, it seems more appropriate in future to refrain from regularly increasing spaces for parking to meet requirements or continually extending them, at the expense of the landscape, until adjoining parking areas coalesce. Instead, the aim should be to provide any additional parking facilities at points outside the park, so sited as to relieve pressure on the most popular areas and achieve a better distribution of visitors in relation to footpaths.

It is still not certain that the means available to us will suffice for effective future relief of the pressures and for adequate control of park visits. We feel a responsibility toward the public not only to provide a rewarding experience of nature at the present time but also—in accordance with the aims of the founders—to hand the preserved area over in a proper state to the next generation. Unfortunately, however, a sober and realistic assessment of the prospects for further development imposes the practical conclusion that a nature reserve bearing the attractive name of "national park" must face the prospect of an ever-more-dangerous conflict of interests. The great influence of the prestige associated with the name, increasing use, even purely in terms of numbers of visitors, and—last but not least—the economic interests in the park, which are already deep-rooted in the surrounding area, leave little hope of achieving any really significant degree of relief. It is significant that many beautiful mountains and good trails located not far outside the national park are visited by only very few people in summer.

The Engadine, an Alpine valley about 100 kilometers long, with magnificent scenery, many well-known winter resorts, and a very large number of mountain railways, cable cars, and ski lifts, offers a considerable contrast with a nature reserve. Its mechanical transportation facilities are practically unparalleled and everything is done to make nature more accessible to the tourist "consumer." Purely from the scenic viewpoint, the Engadine is one of the most beautiful areas in the Alps and could, on the whole, be regarded as a national park. It might, perhaps, be better described as a "pre-park," because our Swiss National Park is located in the center of it, an island to be preserved

from technological innovations in transportation—even if it is an island crossed by a road.

Future prospects. Our experience shows that there are national parks which will soon reach the limits of their carrying capacity, and which have little prospect of overcoming the transportation problems connected with limiting the number of visitors. Those parks, however, which are in a position to do so, both financially and otherwise, should make every possible effort to take appropriate measures to adapt their transportation, from both the technical and the tourist viewpoint, to the difficult situations that will arise in the future. In all cases, top priority must be given to measures aimed at protecting parks against pollution by noise and against atmospheric and water pollution, maintaining an ecological balance, and preserving a high-quality experience of nature. If this necessarily entails drawbacks and restrictions from the visitor's viewpoint, the future will nevertheless prove that the sacrifice was worthwhile. And, wherever possible, let there be no more roads built in national parks!

Where the "use explosion" has not yet occurred, it will definitely take place soon in some form or other. The authorities of even the largest parks in the world would do well to reflect seriously about this even at the present stage. The approach taken to problems of visitor transportation will be decisive not only in regard to adopting a realistic position but also in regard to the very future of national parks.

DISCUSSION

Robert Cahn (Chairman): In the background of the debate, it should always be remembered that in the original concept it was never intended that national parks should in any way be "elitist." Here, at least, in the region where it all started, a glance at the variety of people using the parks shows that this principle has been observed.

Dr. Marion Clawson (Author of Paper 10): To leave maximum time for discussion, I do not propose to say more in presenting my paper than to emphasize what it says about the five stages in the normal history of national parks and their relationship to the human impacts on parks.

Tetsumaro Senge (Author of Paper 11): Following Dr. Clawson's lead and before giving a brief summary of the contents of my paper, I should just mention that, although I am fairly familiar with the national parks of North America and have drawn on them for some examples, my paper concentrates on the situation in Japan, which is an extreme one in terms of visitor pressure. However, I believe the general, long-term trend is in a similar direction, so I hope our experience will help others to avoid getting into the same difficulties.

Dr. Robert F. Schloeth (Author of Paper 12): The emphasis in my paper is on the key role of transportation in park management. It is illustrated by the development, particularly in very recent years, of the Swiss National Park, which is perhaps a rather special case in being bisected by a public highway; this makes really effective control almost impossible, especially for a park of this size. However, in most national parks it should be possible, with proper planning, to control and direct private motor vehicles which make up the majority of the traffic.

John J. McCarthy (Panel Member): National park planning for the future must take account both the number of people and what they really want; the rate of park visits is likely to be in direct relationship to the proximity and extent of urbanization. Other points to be remembered are that the interpretive services may be regarded as a recreational facility in themselves; and secondly that, in addition to making sure that the parks are open to the poorer sections of the community, the needs of the aged and physically handicapped should receive attention.

John S. McLaughlin (Panel Member): All the papers concur in believing that without resource management and control of visitor use, the national parks are certain to deteriorate. For this control, the application of a classification as described in Paper 11 is particularly helpful and commendable. Estimation of carrying capacity must be based on precise standards of use and preservation. The setting of these standards requires a mixture of research and management experience. It is obvious that more sociological advice is needed by the park planner and manager.

John Kimanzi Mutinda (Panel Member): Not even the biggest park—Tsavo in Kenya, for example, with its 8,000 square miles—is ecologically self-contained. The good will of people living close to the boundaries is therefore essential. Animals wander seasonally across the boundaries and, in our case, the local people, such as the Masai, do so, too, although recently they have begun to settle down, which in fact makes them less tolerant of the animals. The kinds of question that have to be answered, therefore, are: Should there be buffer zones between parks and people? Should people be allowed to fence off game migration routes and shoot animals that cause damage? Should park authorities be called on to pay compensation, to cover, for example, the movement of animals into favorable habitats outside the parks? Unless satisfactory answers can be found, adverse consequences to the parks, including overpopulation followed by massive die-offs of animals, are inevitable. In Kenya we are working on programs designed to make local farmers benefit directly from fees charged for activities in the parks, but it is still very experimental.

Robert G. Stanton (Panel Member): Not enough account is taken of the great differences between people, their desires and attitudes, which complicates the task of those responsible for providing facilities for recreation and enjoyment whether inside or outside the parks.

Mrs. Elsa Salas de White (Panel Member): A novel scheme, about 60 percent privately financed, which is being tried in Venezuela, to help solve the problems of parks and people and in particular to provide for the poorer sections of the community and the great surplus of young people (60 percent of the population is aged under 15), is the establishment over the 2-year period 1972-73 of very large numbers, as many as a thousand, of "pocket parks" in densely populated areas. This does not mean that efforts will not continue to help large numbers of people (for example, arrangements for 30,000 schoolchildren are planned) to visit the national parks, but it will be strictly in order to benefit from the values those parks can alone provide and not for recreational purposes.

Conrad L. Wirth (U.S.A.): All parks are established by and for people. Grizzlies do not set up their own parks. The fact is, however, that for the past 100 years we have been careless, and it is only recently that we have begun clearly to recognize that man is part of nature and to appreciate and do something about such factors as pollution.

José Rafael García (Venezuela): The kind of pressure of people on parks which occurs in Japan and is described in Paper 11 is still almost inconceivable in Latin America, where we are still at Dr. Clawson's Stage III. Parks and reserves in Venezuela are multi-purpose, often aimed more at controlling soil erosion than at providing recreational opportunities.

K. O'Donovan (Canada): The problem we are discussing are tied up with the metaphysical question of man's objective, which I believe to be the establishment of universal peace and harmony. For this reason it is essential that our attitude to those whose views differ from ours must be one of tolerance and understanding. Thus the proper solution of a situation in which we would like to see a country establishing or maintaining a national park, although its people are hungry for land on which to grow more food, lies in more technical aid to enable that food to be grown on other, perhaps less favorable land. This is more important than putting money into costly development of parks, when what is really necessary is the participation of the people themselves in that development. Money should be spent, not on major works, but on many small works that involve people in volunteer action near to where they live: this may be more troublesome in regard to supervision, but is far more rewarding in terms of infusing people with the spiritual values of nature.

Lynn H. Thompson (U.S.A.): The transportation problem and its solution discussed in Paper 12 is well exemplified in Yosemite National Park, long known for its traffic congestion. The provision of free public transportation in buses and tramcar-trailer vehicles, combined with the closing of a third of the valley to private automobiles and complicated rules for those who use them elsewhere, has been successful, achieved without any adverse effect on public relations except for objections on principle from the automobilists! Moreover walking has been encouraged.

Theodore S. Burrell (Rapporteur): A similar situation and solution are to be found in Peak District National Park in the United Kingdom, which is ringed by cities—17 million people living within 50 miles. It is interesting that reactions have been the same as those at Yosemite. People have discovered their feet, bicycles have suddenly reappeared, the air is clean, the view better, and environmental damage less. Once some initial problems were ironed out, the scheme even won the support of the major motoring organization.

Albert L. D. Mongi (Tanzania): The attitudes of people today may differ widely—we here are interested in the Serengeti's ecosystems; the people who live round its borders believe that the gazelles are only something good to eat. But the important thing to remember is that the parks are for the people of tomorrow, who maybe will be less blind to their true values.

Zonke Khumalo (Swaziland): The suggestion in Paper 10 that increased visits to parks are partly due to increasing individual incomes suggests that parks are still to some extent for the privileged. But resistance to the setting aside of land for parks will only be overcome if the support of the underprivileged masses can be won. This is the main reason for developing cheap bus transportation to the parks along a few highways rather than increasing the number of roads and tracks to suit private motorists.

Horacio Gallegos Gamiochipi (Mexico): The policy in Mexico is definitely aimed at ensuring that the national park system with its beaches, parks, and pre-Columbian monuments provides *all* the people with an opportunity for recreation, to enjoy nature, and to recall the glorious past.

Dr. Kenton R. Miller (FAO): In Chile, the Government now includes outdoor recreation as one of the major national objectives. With the provision of transportation services by the Park Service and labor unions, the pattern of park use is changing: the emphasis shifts from foreign tourists to the participation of the local underprivileged. As a result, all the axioms and guidelines for park planning need to be restudied: FAO is paying particular attention to the redesign of interpretive programs. With regard to the impact of these changes, we have found that most park areas include land already cleared and modified, so that the policy is to locate development in these areas until the knowledge gained from ecological research supports the careful opening up of undisturbed natural areas.

Mrs. Elsa Salas de White (Panel Member): Even if transportation facilities to more distant parks can be provided, it remains very important to provide parks near to population centers so that children can have recreational opportunities near home, so as to be better able to enjoy and benefit from their eventual visit to a distant national park.

Russell E. Dickenson (U.S.A.): The program which has been developed around Washington, D.C., which is closely linked with the school system, is relevant. We have about 50,000 acres in all and the summer section of the program last year catered for a million children, for whom the National Park Service provided transportation.

Rocco Knobel (South Africa): Although in South Africa the national parks are proclaimed by act of Parliament and the land is State-owned, their administration is entrusted to Statutory Boards representing the Province concerned, conservation societies, industry, commerce, etc. We can, therefore, operate our own facilities and use the income from them to cater for the aged and infirm as well as children. We have been able to influence the school authorities so that visits to the parks are regarded as part of regular studies of ecology. On any given day there are at least 200 schoolchildren in the parks, as part of their ecology curriculum during school hours. They, in turn, bring their parents to the parks in holiday time and help to educate them in understanding the value of the parks.

Ponsiana Ssemwezi (Uganda): In a country like Uganda, an essential feature of the educational process is to make sure that hostels are provided as well as more expensive lodge accommodations.

Dr. Pekka Borg (Finland): The formula adopted in some Scandinavian countries is to uphold everyman's right to walk, stay, and fish in all forests, by lake shores, and in other areas which are not cultivated or built up. This multiple use relieves the pressure on the national parks and at the same time makes nature available for everybody, rich and poor, schoolchildren and other groups, even in the immediate surroundings of the cities.

J. R. Wright (Canada): We should be careful not to be guilty of imposing our values and aspirations on the so-called "poor," whether urban or rural, on the very possibly fallacious assumption that they are anxious to visit national parks rather than benefit from quite different kinds of recreational or educational opportunities. In fact, many people are ill-at-ease in "wilderness" and their environmental education must begin at home within their personal terms of reference. Thus, we must look to the return of nature to the urban

framework, a recognition of the intrinsic role of urban open space as a repository of natural and spiritual values. From an identification with such spaces, the urban dweller may perhaps develop an interest in the higher order represented by national parks.

Perez M. Olindo (Kenya): No one in this discussion has mentioned the growing influence of the press, radio, and television, in the light of which the rather negative philosophy of the last speaker is probably becoming less justified. Many more people would in fact like to visit national parks: the opportunity for them to do so should be facilitated and supported by a governmental effort to provide not only entertainment but also all the other services which will help to evolve an informed citizenry.

Théodore Hounto-Hotègbé (Dahomey): In Africa, education of the people is indeed the vital element.

K. S. Sankhala (India): There has, unfortunately, been a rather different and backward trend in India. National parks had a very definite place in the ancient philosophy of the country, so that support for the concept was enshrined in the hearts and understanding of the common people. But this has undergone a change due to the degrading of ancient park areas by overuse.

Yong Ju Hwang (Republic of Korea): The problem is how to teach people, especially in a highly populated country (Korea has 330 people to the square mile), to enjoy and benefit from the parks without using them in a destructive way. I would certainly support the view that all mass recreational facilities should be located outside the parks.

Hunter Han-Ting Eu (Republic of China): Paper 11 advocates a "coordinated international study of carrying capacity," which is presumably to be defined as a predetermined relationship between park resources and the number of visitors, established by park managers and planners. It is necessary to remember that such a study would be very complicated, since not only physical and ecological factors would need to be taken into account but also the cultural background. Then there are such questions as whether every zoning class within a given park would need to be considered and whether the study would have to extend to the areas surrounding the park.

Prof. Ronald G. Seale (Canada): Paper 12 referred to restrictions on the use of private cars in parks, but during the Yellowstone sessions several politicians argued that restriction would penalize the elderly and infirm. That fallacy needs to be firmly rebutted: the elderly and infirm are in fact the smallest users of cars, the most likely to benefit from public transportation, and the most frequent participants on package tours. The arguments against restrictions on private cars are based on nothing more than vested interest or other selfish motives.

Nathan V. E. Woodruff (U.S.A.): The fact must be faced that private automobiles have four advantages (low cost of travel, getting one exactly where and when one wants to go, convenience for carrying luggage, and comfort). If public transportation is to be substituted, thought needs to be given to how these four needs can be equally well met, otherwise public support will be lacking.

Robert Cahn (Chairman): Once again we are at the end of our time with about a score of requests for intervention unfulfilled. The main points that those who requested were hoping to make will be very briefly summarized in the record if they are submitted in writing.

Dr. Wolfgang Erz (Federal Republic of Germany): The stages in park development described in Paper 10 are of historical importance but do not apply in a modern and reasonably well-informed country. Thus, in my country, the first true national park, established as recently as 1970, started at the "crown jewel" stage: support and funding for it, both private and governmental, were raised specifically on that condition. With the new concern for the environment, the whole background and basis for park development has changed in "developed" societies.

P. H. C. Lucas (New Zealand): A park administrator in my country once suggested putting up notices at park entrances reading, "If you can do it anywhere else, don't do it here." There is plenty of room still for "people manipulation" to control the level of use; a deliberate decision not to build a road, or to leave a road, campground, or other facility in a primitive state is a useful management tool. The development of alternative attractions to draw off potential national park visitors offers great hope, if a way can be found to offset park "glamour."

John Cripps (U.K.): In England and Wales, direct limitation of park visitors would be difficult, so we look to solving the problem of overuse by providing a wide range of alternative opportunities or facilities—a network of locally owned but nationally subsidized "country parks," for instance. Most park visitors with us are day visitors; most want space to exercise themselves after the confinement of the city and as an objective for their excursion from the city. These needs can be met by country parks and regional parks such as Lea Valley near London. More research is necessary, however, into people's needs, followed by provision for as many different ways as possible of meeting them; in the United Kingdom this is assisted by organizations such as the National Trust and the Countryside Commission. Finally as to transportation, there is one point to add: if it is provided free by a park authority, as perhaps it should be, it can be a costly item in the budget.

Ramiro Hernandez (Venezuela): Integrated and continuous planning of popular recreational activities is the solution to visitor pressure on national parks: it would, for example, cover the "staggering" of holiday periods and leisure hours and the establishment of other kinds of recreation areas rather than trying to establish more national parks, in which their well-known and fundamental values are not properly taken into account.

Prof. Michel Maldague (Canada): The need for more research has been mentioned, and the studies which have been going on in the Laurentides Provincial Park of Quebec are worth mention: they are aimed at finding ways of increasing the satisfaction of visitors and, at the same time, reducing ecological degradation to a minimum. The fullest analysis of park visitors, their views and ideas are carried out using student guides, questionnaires, photographic studies and many other techniques. Immediate corrective measures are carried out on degraded areas. The general conclusion is that proper visitor reception and management will reduce park deterioration and greatly increase visitor satisfaction.

Herbert Sydney Curtis (Australia): High-standard walking trails with a grade limit of 1 to 12 and a hard surface, unobtrusively integrated with the landscape, are a management feature not yet mentioned. Their advantages include ease of access, and the fact that because it is so easy to walk on the trail few people leave it, thus leaving most of the park completely undisturbed; they are also conducive to the improvement of the "park

experience." The disadvantages are largely restricted to high initial construction cost, but the expenditure is usually well worthwhile.

The Lord O'Neill (U.K./Ulster): A narrow-gauge railway in a nature reserve in Northern Ireland has proved less intrusive than large numbers of cars as well as facilitating management; being steam operated, it is also an attraction in itself. There is another Ulster project, involving a "Peatlands Park," more than 700 acres of hitherto commercially worked peat bog, which was already served by a light railway. It is proposed to continue to use the latter for internal park transportation, which will be much cheaper and less of a disturbance than building a road.

George Bagnall (Ireland): The three elements fundamental to parks are noninterference, nonexploitation, and public access. A big factor in determining what the public wants is the type of promotion given by the tourist boards, which usually tend to oversell the natural resources concerned but do not stress the importance of physical planning and research. In Ireland, we have sought to correct this by legally involving the Irish Tourist Board in planning and development, in association with departments at all levels responsible for parks, monuments, and resources. The other main concern in Ireland is to disperse the focal points of tourist attraction that have been inherited from the past; we look to the parks to provide guidelines to national management of the countryside rather than themselves trying to meet all current and future recreation, education, and conservation needs.

William M. Hammerman (U.S.A.): The emphasis of Perez Olindo, Théodore Hounto-Hotègbé, and others on education as the means of bringing about better understanding and use of national parks by the "poor", "disadvantaged," or "underprivileged" is justified. It applies just as much in the United States, where still only 2 or 3 percent of schoolchildren have the experience of visiting outdoor areas as supplementary learning laboratories. No doubt this vital aspect will be further discussed in Session XII.

SESSION VI

PLANNING AND MANAGEMENT

Saturday, September 23, 2 to 5 p.m.

THE BROAD ASPECT OF PLANNING AND MANAGEMENT FOR THE FUTURE, WITH EMPHASIS ON PHYSICAL AND LIVING RESOURCES

Chairman: P. H. C. Lucas, New Zealand
Rapporteur: Dr. Wolfgang Erz, Federal Republic of Germany
Authors: Paper 13: George B. Hartzog, Jr., U.S.A.
14: Miss Sylvia Crowe, U.K.
Panelists: Emmanuel O. A. Asibey, Ghana
Willard W. Brown, U.S.A.
René G. Fontaine, FAO
Reginald J. S. Hookway, U.K.
Raymond M. Housley, Jr., U.S.A.
James William Keenan, Canada
Prof. Gerhard Olschowy, Federal Republic of Germany
Bernardo Zentilli K., Chile

RAPPORTEUR'S SUMMARY

Three main topics covered by the background papers attracted the greater part of the discussion both from the Panel and from the floor.

1. Park planning in the perspective of total environment. Planning, which will provide the necessary basis for future development and management of national parks, has to fit into the overall land-use planning and planning system adopted by the country concerned. Panel Member Hookway emphasized that in Europe this is now compulsory for state agencies and private interests in most countries. The "plan," or written statement of policy and objectives, for any specific area, such as a region, city, or a national park, must be (a) directly related to the plans for the land around it; (b) as simple as possible; (c) cognizant of the relevant environmental, social, and economic issues; (d) in conformity with the resources, powers, and techniques available for its implementation; (e) frequently brought up to date; and (f) continuously followed up.

Miss Crowe, author of Paper 14, insisted that the whole land has to be planned on conservation lines, so that national parks should not be regarded as mere oases reserved for animals and plants, but as areas where man coexists with other species. This applies especially to highly developed countries where, as Professor Olschowy pointed out, no natural areas are left and the parks often include cultivated areas, the Lüneburger Heide of Lower Saxony being an excellent example. This park, classified as a "nature park" or "natural countryside park," is part of the overall land-use planning in the triangle formed by the three great cities of Hamburg, Hannover, and Bremen, and provides for

the recreation of 3.5 million people a year as well as the preservation of natural landscape and its ecosystems. This dichotomy between preservation and the encouragement of recreational use was in his view the foundation for all planning. It was a view which roused some strong opposition: many considered that the primary criterion in the selection of park areas must be the setting aside of adequate samples of natural communities—the preservation of representative ecosystems—without any particular regard for their attractiveness for tourism or scenic beauty, although these elements might very well enter into many of the areas selected.

2. Park planning techniques. The emphasis in this section of the discussion was on the creation of a "master plan," followed by detailed management plans, for each established or prospective national park. Panel Member Keenan defined the aim of the master plan as (a) outlining the main areas and their principal functions within the overall park objectives; and (b) laying down the degree of development (if any) and of management. The plan would not normally include subsequent site and management planning but both are controlled by it. Its first task, therefore, is to assemble and analyze comprehensive background information as a lead into the second task of determining the specific and detailed park objectives. A point which was generally regarded as very important was that park interpretive programs should be firmly based in the master plan; indeed, interpretation starts by involving the public directly in the planning. In this way people's needs can be learned; often more is known about the flora and fauna than about the people who use the parks. Carrying capacity, which inevitably enters into planning, has an important role in establishing the people-ecosystem relationships. Once again there was a clear consensus that nature conservation must have priority in all planning, a priority established at the national and regional level of planning as well as in all development plans.

3. Implementation of planning. Zoning is the key tool for implementing the plan, and development should be a subdivision of management. One of the most important aspects, which was stressed, is that there should always be alternative plans for achieving the objectives at which management aims. In some cases, especially in developing countries, where ecological information and other data are scarce, periodic plans will be appropriate and allow improvements to be made as more knowledge is acquired.

A variety of disciplines is needed in the agency which manages the park and which is responsible for implementing planning concepts. The ideal park manager was thought to be an ecologist with a strong social science capability. It was argued that the authority in charge of national parks should be an autonomous body and so able to establish its own priorities in management and funding, negotiate and make its own agreements with other official and private agencies, and, in general, maintain the necessary flexibility. There was a suggestion that management has two distinct sides to it, planning/decision and practical fieldwork, and that the former should be in the hands of people with a well-founded scientific knowledge of ecology and a good background in sociology and education. Practical fieldwork, on the other hand, could be entrusted to foresters, road engineers, and other technicians. The main point, however, was that both kinds of professional personnel are essential for the permanent staffing of each park.

MANAGEMENT CONSIDERATIONS FOR OPTIMUM DEVELOPMENT AND PROTECTION OF NATIONAL PARK RESOURCES

by GEORGE B. HARTZOG, Jr.
Director of National Park Service, U.S.A.

At the First World Conference on National Parks, one general session, "Administration of National Parks and Equivalent Reserves," concerned itself with "the practical values, operations, and lessons, as contrasted with the universal love of nature." Summarizing the theme of the discussion, the rapporteur concluded that it had "caught the yearning of the majority of the delegates . . . [recognizing] their desperate need for the concrete rather than the abstract . . ."

It is my assignment to discuss the management considerations for optimum development and protection of national park resources. And, in so doing I shall try to respond—with an important caveat—to the recommendation of the delegates at Seattle who were in agreement that "The factual and the realistic, rather than the theory, are the important points to stress on the highly important subject of national parks."

The caveat, regrettably, is my lack of firsthand knowledge of your systems, your achievements, your challenges, and the conditions influencing your management. I have not had the opportunity to visit with you in your parks as I would wish to do. Thus, for the most part, my experiences are related to parks in the United States of America. I shall welcome, therefore, your contributions in giving this subject worldwide relevance.

Within the parks, one of the most difficult decisions facing any administrator is the type and extent of developments. As a part of this program, a distinguished planner will discuss this issue in depth. Suffice it, then, to share with you only a few management considerations on the general subject of developments.

In the development of parks we can learn much from the present plight of our cities, with most of their ills traceable to unplanned growth. Planning is essential to the intelligent operation—indeed the survival—of national parks. And it is highly important that parks should not be treated as isolated reserves, but as integral parts of the complex economic, social, and ecological relationships of the region in which they exist. Joint planning, then, with all levels of government and the private sector, is essential.

A great many failures in park management can be traced directly to a lack of proper planning. There should be no development in a national park in advance of planning. The location, kind, and extent of developments must be guided by an overall park plan, and every park organization should assign some of its most talented staff people to the planning function.

The determination of how much land is to be reserved and managed as wilderness and how much will be reserved and developed for visitor and administrative facilities is a

decision that should be made only with the advice of a master-plan team. To the extent possible, such teams should represent a broad spectrum of professional disciplines, including ecologists, sociologists, landscape architects, resource planners, engineers, and archeologists. In determining the location of a campground, for example, the advice of an ecologist is as important as the contribution of the construction engineer, particularly if, as in Yellowstone National Park, one must avoid placing campgrounds on the travel routes of grizzly bears. Moreover, the expertise of the sociologist is helpful in determining campground capacity and even whether a campground is needed in the program.

Over the years, there is one rule of development that has proved irrefutable—that every increase in capacity, whether of roads, trails, or campgrounds, is followed by an increase in use.

We have learned, often to our sorrow, that this is particularly true of park roads. Once constructed, they constitute all too permanent access into park areas that can be damaged by constant accessibility and use.

Always challenge the "bigger, faster road" philosophy. A well-designed park road is one that lies lightly on the land. It need not—should not—compete with commercial highways. It should be a road that is different in kind, not degree—a slower speed park road used not for rapid passage from one point to another but for the opportunity to see and be a part of the natural world.

Additionally, management considerations for development, in brief, should weigh the desirability of (1) building facilities in parks only when they cannot function well outside the parks; (2) building on perimeter lands—as contrasted with heartlands—when facilities must be placed in parks; (3) building day-use facilities, rather than overnight facilities, when feasible; (4) building facilities that minimize environmental damage (i.e., tramways rather than roads); (5) using extreme caution and control in permitting concession developments, but treat them as valued partners where they are needed; and (6) developing with simplicity, utility, quality, and appropriateness in mind. Lastly, when in doubt, don't construct!

The survival of national parks depends not only upon the plans developed by park administrators but also, importantly, upon the recognition by the public that it is in the national interest to provide necessary support to national park operations.

It is, therefore, the function of park administrators to open lines of communication—and to keep them open continually—with all segments of government and the public, to insure that programs are relevant and responsive. It is the public's business we are about, and without public support we shall not succeed.

Parks are supported and maintained not only for the sake of preserving nature, but also for the purpose of bringing enjoyment and benefits to people. I do not see how any public organization concerned with human values can develop its programs without an awareness of, and empathy for, the social problems of the nation and the critical needs of its citizenry. In a great many countries, including the United States of America, poverty, inequities in education, lack of equality for all people, and the disintegration of life in large cities are major social problems.

In the past, these critical issues have not generally been concerns of the conservation movement. As managers in the conservation field, we need to reexamine our obligations.

If the purpose of conservation is to develop and maintain a healthy environment, it should be equally healthy for citizens and wildlife alike. Not only nature for nature's sake, but also nature for people's sake.

It has been said, with some justification, that in this country national parks are primarily an experience for the relatively affluent. In some countries, they are primarily for the wealthy tourist from abroad. We must develop programs which will make parks more accessible to all people, but especially to the disadvantaged, who because of economic reasons are now cut off from the parks. If not, wilderness preservation—from the vantage point of the poor and jobless—might be concluded to be among those governments' programs which are not relevant and which should receive low priority in the competition for the funds needed to solve critical social problems.

Notwithstanding the inherent values of parks, whether natural or cultural, people arrive at an understanding of parks largely through a process of education. We who have spent our lives working in and for the parks should not expect other people to possess an instinctive knowledge of park values.

Aldo Leopold spoke for the objectives of national parks when he said that "the principal function of administration of recreational areas is to improve the quality of public use."

A sensitive enjoyment and understanding of national parks does not come naturally to most persons. The majority require assistance, educational and interpretive programs, and the opportunity for frequent visits.

Considering the distances most people have to travel to reach Yellowstone, considering the size of the park and the variety of experiences available, a park administrator finds it difficult to understand why a substantial number of Yellowstone visitors seem content to spend only an average of 31 hours in this great preserve.

The fault may well lie with our own failure to communicate park values more successfully. Our objective as managers, certainly, is not simply to lengthen the stay of every visitor, but rather to make the visit as meaningful as possible, and to acquaint visitors with the diverse experiences available to them when they come to a national park.

If parks are to be experienced on something other than the most superficial level of driving along a park road observing scenery through a windshield, an educational program is needed to inform and prepare visitors before they reach the park.

New master plans for Yellowstone and Grand Teton National Parks recommend that "gateway centers" be established in towns outside the parks, where visitors can learn what activities are available within the parks before they actually enter. Ultimately, such centers become the point at which visitors are separated from their automobiles, thereby giving park administrators better control over the numbers of park visitors and their patterns of use.

If one of the major objectives of park administrators is to improve the quality of park use, the effectiveness of park interpretation must be a major concern of all administrators, not just those involved actively in the effort. I believe interpretation to be one of the most important responsibilities of the National Park Service.

For, if we are to bridge the chasm of knowledge—and often it is a vast chasm—between the "professional" scientist or park administrator and the general public, we must concentrate as much upon effective methods of interpretation as we do upon effective

techniques of resource protection, to the end that visitors are given the opportunity to appreciate the beauty, the significance, and the inspiration that lie behind what they observe in passing.

Our National Park Service is—as are your organizations—a public agency. Policy and program making—and, equally significant, their implementation—in public agencies is, in actuality, a function of all its members. Policies and programs, to be creative in their making and constructive in their implementation, must be validated by the members of the organization. Thus, while employees of the National Park Service are, on the one hand, members of the management body, they are also, on the other hand, a very special and important public.

As a former park superintendent and the administrator of a national park system, it is my firm belief that the complexities of park management require that in personnel selection we must hire from a variety of disciplines. We must avoid perpetuation of the “forester syndrome” which monopolized much of national park management worldwide for many years. It is high time that we recognize that sociologists are as important as natural scientists. Moreover, park managers should avoid the all-too-common tendency to attract predominately introverted employees. Hire people who like people as well as parks! More than 25 years of public service—most of it in management positions—have confirmed these beliefs about National Park Service employees: (1) people do not work for money alone; (2) efficiency is a byproduct of personal interest and achievement; and (3) people do wish to achieve and to grow.

It is, therefore, a function of management to create an environment in which people may grow and achieve to the limit of their potential. An essential part of this environment is a comprehensive training program involving skills, attitudes, and park philosophies.

One of the long-range objectives established by the Secretary of the Interior to guide our management is “to increase the effectiveness of the National Park Service as a ‘people-serving’ organization dedicated to park conservation, historical preservation, and outdoor recreation.” This objective recognizes that our management in its essence is of humans and not of theories and charts. We shall achieve this objective only as the employees of the National Park Service grow in their capabilities and in their commitment to the agency and its programs.

To assist us in meeting this challenge, we have established objectives for personnel management, as follows: (1) encourage highly motivated people of talent and high potential to seek employment with the National Park Service; (2) provide equal opportunities to all employees for individual growth; (3) encourage an attitude of constructive inquiry, a receptivity to change, and a determination to find better ways of doing our job; (4) encourage, recognize, and reward individual initiative; (5) require consistent and demonstrated productivity and achievement as the essential requirement for advancement; and (6) provide opportunities for transfers, details, and other assignments of employees that contribute to the good of the Service and the career development of the employee. Foster the development of a climate that recognizes and accepts the benefits of such interchanges.

The National Park Service, a few years ago, had 56 volumes of administrative manuals and handbooks. A few of these were absolutely essential. They contained the accounting,

procurement, and personnel requirements and procedures required by law. But, the vast majority of these handbooks and administrative manuals merely provided explicit instruction on “how to do the job.”

I appointed a committee to evaluate our handbooks and manuals. The committee concluded, in part, that these volumes should be maintained in order “to insure uniformity in management.” My experience in Government leads me to believe that, generally, “uniformity” is a synonym for “mediocrity.”

Uniformity is not what I seek in management! Rather, I seek creativity and personal growth. Therefore, I abolished all handbooks and administrative manuals, except those essential to guide our field personnel in adhering to legal requirements of personnel, property, and money. In lieu of administrative manuals, we have provided different management tools.

First, we have established administrative policies to guide day-to-day management in the field. Each of these policies is accompanied by an explanation of “why this is the policy.” These policies do not provide answers to specific problems. They do, however, establish boundaries within which a decision can be made consistent with the policy of the organization and in the light of existing circumstances.

These administrative policies recognize the three different categories of areas making up the National Park System, i.e., natural, historical, and recreational. Each category of area was established by the Congress to serve a different purpose and these different purposes are reflected in the administrative policies.

Second, we have established activity standards for the execution of each major field function—administrative management, maintenance, protection and visitor services, resources management, and interpretation. These standards define satisfactory program performance consistent with public use, season of the year, and similar demands of local operations. For example, the maintenance standards recognize that all facilities do not require the same degree of maintenance care. Thus, a backcountry administrative road does not have to be maintained at the same level as does a major park road having high density visitor use. Importantly, therefore, the standard of maintenance established for each facility is designed to achieve the best balance between meeting public needs and preserving public investment at reasonable cost.

Third, we have initiated personal performance standards for each employee of the National Park Service that describe the conditions which will be obtained when the job has been done satisfactorily.

These performance standards establish a channel of communication between the employee and his supervisor for objective dialogue concerning job performance. They represent an agreement in advance between the employee and his supervisor as to the job to be done and the results expected. In my mind, at least, their greatest value is to enable the employee to know in his own mind that he is, indeed, doing an adequate job, or to realize that he is not, even before his supervisor knows it.

Those of us who are concerned with the administration of national parks and similar reserves must deal with many matters which cannot be reduced to “factual” and “realistic” elements. For the ultimate benefits of national parks involve the mystical as well as the practical.

These intangibles, assuredly, are at the heart of park management. Moreover—most, if not all—park administrators are motivated by a belief that it is unworthy to compare the higher values of natural and cultural preserves—that of administering to the human mind and spirit—with alternative values of commercial exploitation. Thus, the complications of programing and budgeting, the need to structure the organization in keeping with its functional activities, the importance of justifying priorities—these phases of park administration are seldom emphasized. Yet they, too, are essential for the survival of the parks.

Inevitably—like it or not—the decision of whether to establish a national park is measured against other economic alternatives. And, regrettably, in this country, national parks have often been established as residuals after provisions have been made for other more quickly gained economic values.

Moreover, the funds required to maintain national parks adequately must compete with the legitimate needs of all other Government programs. And parks cannot be operated without funds, no matter how brilliant the plans and the programs which we develop. So, let's face the economic issue squarely. National parks are good economic investments. Moreover, the so-called dilemma between recreation and park preservation is more apparent than real, if it is understood that the preservation is for the recreation of people in the natural values being preserved. With this understanding, then, there is no dichotomy, I suggest, between preservation and pleasuring since the administrator has it clearly in mind that the preservation function is the focus of management. With this simple, yet fundamental understanding, national parks can be enjoyed fully, can provide an economic value to society, and can compete successfully for their establishment among resource allocations, including adequate funding for all facets of their management—land acquisition, research, planning, development, and administration.

According to Lloyd Brandt, manager of the Legislative Department of the Minneapolis, Minnesota, Chamber of Commerce, "the tourist dollar is the biggest dollar" that comes into that State's economy. Continuing, he said, on November 28th, 1967: "The payroll dollar, while vital, is only a partial gain. Out of the payroll dollar must come the cost of providing public services—schools, libraries, police, fire, waste disposal, and others. The tourist keeps these problems back home. The tourist even pays his share of highways he uses and helps with our local roads, too. The out-state tourist dollar has an economic impact on Minnesota at least 15% greater than a payroll dollar, an extra 15% of value to Minnesota residents."

As long ago as 1957, the U.S. Department of Commerce reported that if a "community can attract a couple of dozen tourists a day throughout the year, it would be economically comparable to acquiring a new manufacturing industry with an annual payroll of \$100,000."

In 1970, travel expenditures of \$7.8 billion by visitors on their way to, and in the vicinity of, areas of the National Park System, amounted to more than 10 percent of the total expenditure of the \$60 billion travel industry of the United States of America.

Significantly, this gross expenditure of park visitors resulted in personal income of \$5.9 billion to employees and businesses providing tourist services along the way, in the vicinity of, and in the parks.

Of this personal income, an estimated \$1.2 billion was returned to the Federal Treasury in taxes, to say nothing of uncounted taxes at the State and local levels of Government.

To bring the economic contribution of the National Park System into sharper focus, let me share with you one example. In Montezuma County, Colorado, in which Mesa Verde National Park is located, personal income from June to August 1970 amounted to \$8.7 million. This was at the height of park visits to Mesa Verde, approximating 130,000 visits per month. Contrast this with the personal income in Montezuma County for January to March 1970 of \$253,000 when the park had monthly visits of less than 4,000 visits. Regardless of your monetary unit, such economic benefits surely are useful tools for all park managers. Keep them on tap—not on top! To sacrifice basic park values for short-term tourist gains will surely "kill the goose that lays the golden eggs."

Moreover, there is a greater and a higher purpose in a national park system, namely, its contributions to the quality of life of all people now and for future generations.

In the fullness of its meaning, a national park is a link between the generations of men in their continuing search to be "at home" in their world.

In the words of J. Horace McFarland, testifying before the House Committee on Public Lands of the U.S. Congress, in 1916: "The park now serves the people; the park decreases the demand on the forces for keeping order; the park is the direct competitor, in the United States, of the Courts, of the jail, of the cemetery, and a very efficient competitor with all of them."

Beyond our need for personal identification is the urgent need to understand our place in the world environment and to join hands in helping to rescue it from impending ecological disaster. Through program innovation in response to the changing needs of society and by sensitive management, the National Park System in the United States of America and—I respectfully suggest—other park systems around the world can contribute enormously to enhancing the life of every citizen and supporting the effort to articulate an environmental ethic for individual and corporate conduct.

This larger objective should be the constant guide and the daily challenge of every park manager.

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THE MASTER PLAN FOR NATIONAL PARKS AND THEIR REGIONAL SETTING

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The need for national parks has arisen because the human species has outbred and abused its habitat. At the 11th hour men have realized that they must defend nature from themselves. Yet the same pressures which have awakened men to the need for this action have

generated a desire to see and experience those very landscapes which have remained uncontaminated by man.

Unfortunately the tourist is almost as disruptive to the wilderness as the mining engineer. He is far more disruptive than the old type of farmer, or hunter, or forester, who lived within the context of the landscape and was himself a part of the ecosystem. A shepherd and his dog or a herd of alpine cows are as welcome in the landscape as a flock of birds or herd of deer. But one tourist with a car or coca-cola bottle can smash the dream of uncontaminated nature.

Here we have the built-in paradox of national parks. Their first objective is to save certain landscapes and ecosystems from the human race. Their second objective is to provide a source of inspiration and enjoyment to the very species from which they are being protected. No wonder we are in difficulties. No wonder that we need clear, deep thought and urgent action if we are to reconcile these almost unreconcilable goals.

There are three reasons for the fatal impact of man on nature: sheer weight of numbers, lack of understanding and cooperation with the rest of creation, and finally the emergence of a new species, *Homo mechanicus*, with a power of destruction far exceeding that of *Homo sapiens*. The landscapes we are trying to save are threatened by all three forces, working in unison.

Mechanized transport, itself destructive, brings ever-increasing numbers of people into contact with ecosystems of which they are not a part, and which they do not understand. Is it more important to expose the maximum number of people to the influence of nature, in the hope that they will thereby gain understanding, or to protect nature at all costs? I believe both processes are essential and should be pursued concurrently, but that the protective role should have absolute priority within national parks. If protection fails, the future has been forfeited, both for our species and all others.

This priority for protection should govern both the regional master plans which determine the areas to be designated as national parks, and the master plans for the parks themselves. But to achieve success, this protective planning must be positive and creative. The ring-fence attitude will defeat itself.

Place of national parks within overall land planning

The overcrowded, polluted state of the earth's surface makes prudent planning of our remaining resources essential for survival. With the increasing movement of people, ideas, and influences across the globe, plans for any one country have to be seen in a worldwide context. This applies to the designation of national parks, and already neighboring countries are planning their parks as contiguous areas across the frontier. But even where this opportunity does not arise, the choice of a national Park should still be seen in relation to world resources, special attention being paid to habitats and landscape types which may be unique on a world, as well as on a national, scale.

Nations can also make use of world resources, through the various international agencies, such as UNESCO, in obtaining advice, professional help, and technical aid. It is particularly necessary to tap all the available expertise in a field where the body of knowledge and experience is only now being accumulated.

The process of land planning is a series of plans, progressively becoming more detailed and more localized, but each fitting into the wide, overall concept of a master plan. In this hierarchy, the planning of national parks should be seen as an ingredient of total, worldwide conservation of resources localized, in the first place, into a broad master plan for a whole country or region. A master plan lays down the broad principles within which local, detailed plans can be fitted.

The first step in planning national parks is to delineate the areas to be designated.

The selection of national park areas. Since the prime object of a national park is to conserve some special landscape, ecosystem, or geological formation, the existence of an area having outstanding natural beauty and interest must be the first criterion. The degree of threat is relevant, although the swiftly moving human inroads of today put every area in jeopardy. Nevertheless, it is obviously impossible to schedule all areas worthy of conservation all over the world, and therefore it is necessary first to protect those under existing or foreseeable threat, provided that the threat can be averted. It is useless to designate an area where mining, for instance, is inevitable.

The criterion of intrinsic value, and of freedom from human impact, must vary from one country to another. Comparatively sparsely populated countries, rich in fine landscape and wildlife, can select the very best. If they do not have a long history of human settlement, they will also be able to select sites largely free from human dominance.

At this stage of the world's history, complete absence of the human species is rare. There are likely to be traces of either farmers, pastoralists, or hunters, or ancient civilizations even in the most remote places. The criterion should rather be whether this human element fits into the ecosystem, or whether it disrupts or dominates it. Many ecosystems are, in fact, dependent on human action; for example, periodic grass burning in the Serengeti is found to be an essential element in its management. Primitive man is as natural as any other species.

The United States is in the happy position of having a wide choice of landscapes almost untouched by man. Other lands, such as Greece and Turkey, may have a rich selection of landscapes, but these are likely to include a heritage of ancient civilization. Troy National Park is an example.

Densely populated, industrial countries may need to designate almost any area which has landscape beauty and ecological interest and which is still free from complete human domination. There can be not uniformity in the reasons for choice, and, indeed, the greater the range of landscape types which are protected, the greater the enrichment of the earth as man's heritage.

The size of national parks must vary as much as their character. The minimum size is that necessary for the functioning of the ecosystem which is being protected, or for the visual appreciation of the landscape which is the *raison d'être* of the park. The territorial needs of any species which is essential to the park's character must be a governing factor. Yet, even this is not absolute, for the designated park may be only the heartland of greater areas through which the species can roam. The Serengeti is an interesting example of this. Despite its vast size of 12,950 square kilometers, it is not a self-contained ecological unit and depends for viability on adjoining controlled areas.

The same principle is applied to Germany's new national park, the Bayerischer Wald.

Here the park of 12,141 hectares is set within 101,175 hectares of forest and mountain. This zoning of land adjacent to national parks is even more important in densely populated countries, where the parks themselves may have to be relatively small and need both buffer zones and extensions of habitat.

An example of failure to control a sufficient area related to a national park is the Everglades in Florida. The survival of this priceless heritage depends on the watershed which has not been included within the park, nor has it been adequately protected by planning powers. As a result, development has taken place which is jeopardizing both the quantity and purity of the Everglades' water.

Similar destruction from outside sources could result from atmospheric pollution by industry, water eutrophication due to overfertilized agriculture, disturbance of the water regime by barrages, and many other possible causes.

The type of control exercised in the British national parks is relevant to this point. These parks do not qualify for international recognition because most of the land is in private ownership, and is used for agriculture (mainly hill farming) and forestry. Nevertheless considerable control is exercised through planning legislation (although not nearly enough to give complete protection). They could be considered as a prototype for lands surrounding true national park areas. They provide great beauty, strong control over development, and extensive public foot access, within a countryside which fulfills a function in agriculture and forestry at a low population density. Such areas, under strong planning control related to national parks, nature reserves, and state forests, would create a valuable complex of natural and seminatural landscape.

State forests are of great value as buffer zones. While timber production is practiced within them, high priority is given to wildlife conservation and to scenic beauty. Excellent campsites can be provided in the forest glades.

In the past, national park boundaries have usually been drawn to delineate a fairly compact area of simple shape. There could be a greater elasticity in the areas chosen for designation. In some cases a more organic form might relate better to the character of the landscape, its use, and topography. For instance, river valleys or mountain ridges could provide a continuity of landscape-type, and of experience, greater than that within a more conventionally shaped area. This concept would be particularly valuable in regions where the valleys have human settlements and agriculture which would disqualify them for national park status, but where the hill ridges are largely in a state of nature. The Appalachian Way and the Pennine Way are examples of ridge reservations which can give a high degree of wilderness experience without severe restrictions on other land use.

Economic factors are bound to play their part in deciding the extent of national parks. In highly developed, densely populated regions, the question will be how much land can be spared from habitation, industry, and agriculture. An area large enough to be a really effective national park may be unavailable, yet the need is acute. The result is often a compromise. An interesting example is the Lüneburger Heide. It serves two invaluable purposes. It conserves extremely interesting ecosystems, including remarkable groves of juniper, and it provides peace, quiet, and contact with nature to the millions of industrial workers in the Hamburg region. But it is not wilderness, and it is not natural. The sheer weight of the numbers of visitors necessitates tripwires along the paths leading to the

junipers. A similar case is Dunes National Park on the coast near Amsterdam. Here the dune vegetation is conserved, and the people of Amsterdam are given the experience of tranquillity and the sight of a very beautiful type of landscape. But this landscape can only be preserved by highly artificial means.

Less developed countries are also faced with constraints, but of a very different kind. First, how large an area can be adequately protected and warded off? Second, what will be the human and economic problems of limiting agricultural and hunting activities over a large area?

Fortunately both the overindustrialized and the less developed countries in many cases have found it possible to overcome their difficulties and designate national parks, but it is evident that this can only be done within the context of the region and its particular problems. The answers to the problems must depend on the individual circumstances and the type and size of a park must therefore be subject to great variation.

The selection of areas desirable as national parks should be based on a survey and assessment of landscape quality, judged both visually and scientifically. A planning team carrying out such a survey should include biologists, geologists, and landscape planners, the latter being trained to see the landscape as a whole and to evaluate visual qualities.

The survey and analysis should comprise a concise and lucid written report, supported by plans clearly showing the various areas and factors referred to in the report.

The subjects covered should include: geology and topography; the chief ecosystems; the particular biotypes to be conserved; the existing land use; any settlements or nomadic people using the area; the interaction of the area with its surroundings; any threat to its existing state; the hydrological regime and whether it is dependent on waters originating in, or passing through, other areas; and the scenic quality of the landscape. The essential boundary of the area must be assessed, both for biotic health and visual integrity. Any necessary controls on adjoining land must be stated.

Regional planning related to the national park. When the physical facts of the regional landscape have been recorded and evaluated, and the desirable areas for national parks delineated, the planning team should state the particular values of proposed areas and the constraints which are necessary for their protection.

At this point their findings should be correlated with all other aspects of planning. The political and economic implications, and the proposals related to the general planning policy of the region, must be explored.

There will be interaction between the park and all other land uses. Transportation, industry, urban development, agriculture, and power and water supply, all are implicated. The exclusion of these uses from the park will mean that they must be sited elsewhere. The park is also likely to generate demands for visitor accommodations, and other tourist facilities in the region. The repercussions of this must be considered and plans made. This demand may be highly desirable, bringing prosperity and a fuller life to a region. This factor, for instance, is of great economic importance to Kenya, whose wild-game parks attract many visitors. In the more industrialized countries, the increase of visitors may prove a problem by endangering the quality of landscape and life in the adjacent countryside.

The prime purpose of national park conservation is the same in all countries, but the

secondary benefits and problems are quite different in industrialized and overpopulated countries from those of less-developed countries. The former need their parks to counter-balance the stress of overurbanization. The latter need them as an aid to their economy. In both cases, the conservation and enjoyment of national parks can only be achieved within the context of sound regional planning. This planning must not only insure that land uses adjacent to the park are compatible with its conservation, but must regulate the pressure of visitors on the park. The latter can be influenced partly by control of transportation and access, and partly by the quality of landscape planning throughout the region in which the park is situated. Transportation must play a positive role in relation to remote parks in regions where communications are not highly developed. In African parks, for example, easy access by plane is essential if sufficient visitors are to be attracted to make the parks economically viable projects.

Where access to the park is to be provided by road, the greatest care is needed to prevent damage to the surrounding landscape. In countries whose road systems are deficient, the need for a road to serve the park should be used to the full to benefit the country as a whole. In more crowded countries, and those with a highly mobile population, deliberate restriction or localization of traffic may be necessary. If overcrowding is to be avoided, fast traffic routes may have to stop well short of, or pass well outside, the fully protected area of the park. This may be termed negative planning, and where negative planning is necessary, it must always be accompanied by positive planning.

The positive planning needed in this case is the provision of alternative opportunities for enjoying open-air recreation, beautiful scenery, and the contemplation of nature and wildlife. These simple but deep pleasures are every man's birthright. They should be planned into the fabric of town and country, available as the everyday diet of all who want them. The first step in the conservation of national parks may well be to make city life enjoyable, to bring the townsman back into contact with nature and with beauty as he goes about his daily life, and to provide city parks, county and state parks, forest parks and water parks—places where every outdoor activity can find its place in the right setting.

These various categories of parks should have infinite diversity. They should not seek only to make use of existing areas of beauty, but should create new beauty and enjoyment out of unlovely places and derelict land. The possibilities of turning industrial dereliction into recreational areas is immense. Old excavations can be turned into lakes for boating and fishing—some quiet, some given over to water-skiing and speedboats. The hills of old slag heaps can become ski slopes or a wooded "mountain" region. Instead of trampling out virgin beauties, we must learn to re-create beauty, and make our bad lands into playgrounds.

Linking this complex of diverse parks, there could be a network of long-distance walks, of rides, and of waterways threading through a land of pleasant towns and healthy countryside. This network of ecological corridors would serve all species, not only men. Conservation is indivisible; isolated islands of health within a sea of pollution cannot survive.

Many of the canals of Britain and other European countries, are taking on a new life as recreational waterways. Gliding along them by boat, through unspoiled country and

past old villages, can provide a degree of peace unattainable on the roads. They make no new demands on landscape, and biologically they are some of the richest habitats. Long-distance walks and bridle paths serve much the same purpose. They may pass through woodlands, skirt agriculture, follow shelter belts and waterways, and open onto heaths and hilltops. They serve not only as a network for quiet recreation but also as ecological corridors linking the habitats of nature reserves and national parks.

Planning must also cater to the millions of people who want to drive through beautiful scenery, or congregate in crowds in the open air, or indulge in noisy sports such as water-skiing. All these are legitimate pursuits, but their followers should not demand space in national parks for lack of anywhere else to go. If they are forced to do this, it shows a failure in the region's master plan or a failure to implement the planning.

The unique need which the national park can fill is to return us to the days when men were in awe of nature and knew themselves to be just one species among all the others. In the national parks we want to get away from all-powerful, industrial man, of whom we are now rather tired and very much afraid.

If the future holds the threats of environmental destruction, which most of us believe it does, the national parks are bastions for survival, which no pressures should be allowed to erode. Only by planning the whole of our environment to absorb these pressures can we hope to conserve the special values enshrined in the national parks.

The influence is two-way. A well-planned environment will support the special values of the national parks, which in their turn will act as powerhouses to energize both the human mind and the ecological health of the whole land.

National park master plan

When the area for designation of a national park has been decided, a master plan for the park itself should be prepared and should be developed concurrently with plans for the surrounding region. This close correlation is vital as there must be interaction between what happens within the park and in its surroundings. If unplanned, this interaction can destroy both, but good planning can result in mutual benefit.

The master plan of the park area will locate: (1) zones of use, including areas of absolute protection; (2) access points, visitor buildings, etc.; (3) roads; (4) trails; (5) viewpoints and areas of special interest to visitors; and (6) campsites. It will not detail the design of any of these elements, but will lay down the principles on which they should be developed.

Accepting the principle that the prime purpose of a national park is conservation, the first need is to define what is being conserved. It may be chiefly scenic values, or special ecosystems, or wild species, or a geological formation, or even an ancient historic site. In most cases there will be a combination of values, almost always including scenic quality, for lacking this, the area would more likely be a nature reserve. The conditions necessary for conservation must then be ascertained by a landscape and ecological survey.

To carry out this work, a planning team should be appointed for the national park, to work in close liaison with the regional planners (or in some cases the same planning

team may undertake both projects). The expertise needed will include the skills already deployed in advising on the designation of the park. In addition, the team will need to have knowledge of recreational needs and social behavior.

To whichever discipline the leader of the team may belong, he must have wide vision, be capable of appreciating the relevance of all the factors involved, and, above all, be dedicated to protecting the integrity of the park as an ecological and landscape entity. The planning process will again start with a survey and analysis. This will record (1) the essential territory for each species; (2) the areas (for breeding, etc.) which must be undisturbed; (3) fragile geological formations and plant cover which must not be trodden upon; (4) areas which will best withstand wear; (5) the best viewpoints and most attractive walks; and (6) areas where camps, parking areas, etc., could be sited without impinging on either the scenic quality or fragile habitats.

After this survey and analysis has been prepared, the positive provisions for the master plan can be blocked in. Subsequently, within this plan, the detailed plans for access points, camps, and trails can be worked out. All master plans should be periodically reviewed, to check that their provisions are working as intended, and to note and deal with any new factors which may arise.

The constraints revealed by the survey and analysis should be accepted as absolutes, not to be compromised in the face of external pressures. The master plan must, instead, adjust the pressures to the need of the site. If national parks are to achieve a special protective status, this is one of the ways in which their planning is likely to differ from that of other areas to which people may go for open-air enjoyment. In many of these other areas, the natural conditions may well be adapted to accept greater pressures. There will be compromise. In national parks let us eschew compromise.

Having ascertained the character of the site and its vulnerabilities, we must assess human reaction to it. What pressures are likely to be put upon it? What are the special experiences which it can offer to visitors?

While recognizing the overriding importance of the conservation role, we must not neglect the secondary, but vital role, of the park's contribution to the quality of human life. At this point, let us try to get a clear picture of what a national park offers, which cannot be found elsewhere.

In the majority of cases, the unique value is to be able to contemplate a landscape, or animals of exceptional beauty and interest, free from the dominance of man. There are two levels at which these landscapes and animals can be enjoyed. The first is simply by looking at them. This gives great satisfaction and some enlightenment to many people. This is fortunate, for it is the easiest form of enjoyment to cater for. The second is a far deeper experience; a sense of participating in the landscape, the feeling that one is part of it—a member of the ecosystem.

The onlooker can be satisfied with lookouts, and views through car windows, safely insulated from contact. Participation, on the other hand, introduces the very species from which we are trying to protect the landscape. Yet its value in human terms is so great that it must be made available to those who can appreciate it, and are prepared to accept the wild (or be accepted by it) on its own terms.

Those terms dictate that the numbers of the human species shall be small enough to have

no impact; that they shall discard the trappings of mechanized man and walk on their own two legs; that they shall behave as guests of the indigenous species, undemanding and understanding, respecting the privacy of habitats, and walking only where they can do no harm.

The planning of national parks is largely concerned with allocating space between the lookers-on and the participators, and the sanctuaries kept free from every human contact. This has developed a system of zoning. The proportions and relationship of the zones depends on the park's size, its character, and the nature of its surroundings.

In some parks, one of the zones may be omitted. For instance, in Troy National Park the human presence is acceptable everywhere, because the experience is that of an ancient civilization set in a more or less humanized, agricultural landscape. But mechanized man (out of tune with Homer's landscape) is strictly limited within a zone well-removed and screened from the main scene. Serengeti National Park, at the other extreme, is planned first for the survival of its unequalled wildlife, and secondly for mechanized man, in the role solely of spectator. For the sake of both the fauna and visitors, lions are best viewed from lookouts or through the windows of motor vehicles. Closer participation is scarcely possible, and the experience of viewing alone is sufficiently rewarding.

A far closer feeling of participation is, however, experienced in, for instance, Jaldapara Sanctuary in West Bengal, where visitors, on the back of elephants, may feel the forest air and hear its sounds and partake of their mounts' reactions when a tiger or rhinoceros is encountered. Closer still is the participation when deer and birds can be watched by walking silently through the forest, or reindeer seen by patient lying behind a rock.

Still another type of park is represented by the Grand Canyon. Its *raison d'être* is the grand spectacle of one of the world's greatest geological marvels. Here the southern rim provides every facility to look and wonder. It also offers the strenuous alternative of penetration by mule. But does it give an opportunity for quiet contemplation to the casual visitor? Is there perhaps a zone missing? I believe a vital type of zone is that planned to be included in the new Bayerischer Wald and expressively called the "Peace and Wandering Zone."

In the United States, six classes of zones have been recommended:

- Class I high density recreation areas
- Class II general outdoor recreation areas
- Class III natural environment areas
- Class IV outstanding natural areas
- Class V primitive areas
- Class VI historic and cultural areas

This gives a useful basis for planning, but I would question whether Class II should be within a park area at all. Class I is a necessary evil. Whether it should be inside or outside depends on the size of the park, and on the nature of its surroundings. Where the boundary is lavishly drawn, the access area can be just within it. But in smaller parks, it may be better just outside. The danger of the latter course is that the surrounding country may suffer, particularly if it is not subject to the same strict control as the park itself. It is therefore probably best to include a suitable access area within the park when it is designated.

In either case, the access area should be sited well away from the most vulnerable parts of the park, yet having good views. Geologically and ecologically, the terrain should be capable of withstanding wear. The wooded South Rim of the Grand Canyon is a prototype of the ideal site. The woods provide a screen and setting for the buildings and cars, and the canyon edge is its own protection, giving superlative views, but no easy access. In the Bayerischer Wald the accommodation buildings are sited just outside the park. In the Serengeti, the lodge and camps are well within the park. This is obviously desirable within an area of 12,950 square kilometers, particularly as one of the attractions of the lodge is seeing the wild animals from it.

There is a Class II zone (General Outdoor Recreation area) sited within the Bayerischer Wald, but it is very small in relation to the size of the whole park. With its stockaded wild animals, cycle tracks, horse-drawn vehicles, museum, and information center, it is completely man-dominated, but it is an introduction to the genuinely natural landscape of the rest of the park. This zone of a park should be introductory in every sense. As the access point, it introduces visitors to the park; by its interpretive center it introduces the meaning of what visitors are to see. It explains the geology, the landscape history, the flora, and the fauna. By providing viewpoints it shows visitors the outer semblance of the landscape.

Many people may never go beyond this introduction. For them, it is television come to life. Others may venture no farther on their first visit, but will have their appetite whetted. Next time they may go farther, and experience as well as see. Once they decide to do this they must be prepared to shed some of their urban values and take nature on her own terms. This will mean leaving their car behind, exposing themselves to weather, and exerting their own muscles. They will graduate to the next zone which corresponds to the U.S.A. Class III, Natural Environment areas. This is the area for "Peace and Wandering" threaded with easy paths. Beyond this again is the Reserve zone, the wildest region, penetrated only by a few rough tracks, from which visitors may not stray. Together, this constitutes the basis of logical and effective zoning. The necessary reduction of numbers in the wilder parts is ensured by difficulties of access, rather than by prohibition. Those really desiring the wilderness experience will find it. Those requiring only a sight of the wild will be content with the small recreation zone. The largest zone of all, for "Peace and Wandering," will enable all who want direct contact with nature to find it, even if they are not physically able to penetrate to the farthest wilderness.

Physical ease of access is perhaps the greatest point of contention in national park planning, and one which needs firm handling. The "access at all cost" lobby is loud and powerful and has done untold harm in the past. Among those who understand the true values of national parks, it will be generally agreed that reasonable vehicular access, whether by train, car, or plane, should be available to the access point. It will also be agreed that no such access can be allowed to the heart of the wilderness or to vulnerable wild habitats. But between these points, there has long been a battle between those who wish to be carborne to all the choicest places, and those who seek to keep these places in a peaceful and natural state. The opposing views are largely governed by the weight given respectively to the experience of seeing, and the experience of feeling.

Yosemite provides a useful case study of these opposing views. The geological formation

of its fantastically beautiful valley was its own undoing. The flat valley floor makes access far too easy, and provides a tempting level site for camps and cafeterias. I went there many years ago, and found it one of the most beautiful landscapes I had ever seen. Seen, but not felt. For how can one fully experience such beauty in the smog of 20,000 campfires, or walking in a queue to see a waterfall? Access came far too close to the waterfalls. Camps and buildings intruded into the equivalent of the cathedral's aisle and destroyed its unity. Would not a landscape survey have revealed that the valley floor was an essential part of the landscape's unity, not to be disrupted? One hopes that the revised plan will remedy this. It makes a useful contribution in curtailing the use of cars, by substituting public transportation on certain routes in the valley.

Where some transportation is considered essential, this policy of leaving all private cars at the access point and providing public transportation is sound, particularly if the vehicles can be noiseless and fume-free. Best of all, horse-drawn vehicles should be provided. This is done at the Lüneburger Heide, and also around the Lakes of Killarney, although the latter is not a national park. The sole purpose of mechanical transportation should be to enable visitors to reach a spot where they can decant from the machine, and penetrae within the natural landscape. Scenic drives cannot be considered a proper ingredient of the heart of a national park; they are of necessity pollutants and can only introduce the urban influence from which the park is intended to be free. They also divide the territory, both from visitors and wildlife. If, however, a road can be sited so that it has views over the park, it will serve the dual purpose of satisfying many who only want the views, and increasing the interest in national parks, without which the national park policy is not likely to succeed.

Camping

Increasingly popular, and linked in everyone's mind with "wilderness" experience, camping must be planned for extensively in relation to national parks. Its provision, however, poses many problems. Large, sophisticated camps can have almost as urban an influence on their surroundings as a small town, and yet lack the beauty which a town or village may have.

As with other national park activities, the different types of camping should be zoned. "Wild" camping—the man with a bivouac tent carried on his back—can be compatible in all but the most strictly reserved zones, provided the number of such campers is small in relation to the area. In too great numbers, they can be damaging. Mountain huts, staged along the trails can also be acceptable in wilderness areas, if they are well-sited, not too frequent, and have only minimum facilities. Small camps for tents or caravans, carefully sited and with no facilities other than an ablution block, could find a place in Zone II, or even in Zone III where this is large enough. Campers here would accept the true simple life, free from cafeterias and tinned music. Large camps with facilities for indoor amusements, laundries, and cafes should either be confined to Zone I or be sited just outside the national park.

Which is the better solution will depend on how generously the boundary of the park has been drawn, and on the nature of the surrounding land. Where this acts as a buffer zone,

it will usually be best to site the camps here. It is particularly suitable in forest land adjoining the park. Whether the camps are inside or outside the boundary, their siting, screening, and absorption into the landscape must be very carefully planned.

It must also be realized that a large camp will exert strong pressure on the adjoining land, both from the campers walking out from it, and from the necessity for road access. The problems of water supply, drainage, possibilities of flooding, and the natural wearing capacity of the ground and vegetation must all be considered. The camps should always be sited within easy walking distance of some place of special attraction such as a view or waterside. The campers must feel they are in the place they have come to visit.

Interaction of national parks and the surrounding land

The viable size and the planning of a national park is dependent on surrounding land uses. While a park, such as the Lüneburger Heide, near to centers of industrial population, is of immense social value, it can only serve its conservation purpose by rigorous and highly artificial management. The Bayerischer Wald, on the other hand, gains in value and ease of planning, by being adjacent to great forests. Under these circumstances a relatively small park area would still be effective, although obviously the 12,141 hectares designated is welcome.

The land uses surrounding the Serengeti are of special interest in the influence they have on the park. The position is favorable in that controlled or conservation areas surround the park, and, to the north, over the Kenya border is Masai Mara Game Reserve. Nonetheless, there is considerable depredation by poachers, although its amount varies with the occupations and the extent of the traditional hunting proclivities of the people concerned. On the other hand, all types of farming communities seek to defend their lands from elephants and lions, so that these animals increasingly take refuge in the park. The increase in the elephant population is causing concern. This is an extreme example of the interaction which must always occur between a national park or nature reserve and its surroundings, and it emphasizes the point that a park can never be considered in isolation. It can only succeed fully as part of a comprehensively planned region.

DISCUSSION

P. H. C. Lucas (Chairman): For this session, it has been agreed that after the two authors have outlined the main thrust of their papers, two of the panel members will launch the discussion on the first of the proposed themes, "park planning in perspective," the others leading in due course the discussions on the other two themes, "park planning techniques" and "implementation of planning (or management)." By grouping interventions under these three themes we hope to achieve the maximum meaningful discussion in the time available.

On my way here, the Immigration Officer at Honolulu, noticing the "Jackson, Wyoming" label on my bag, remarked "That's about the most beautiful country in the world, if people don't spoil it with their damn machines." He added "You know, people ought to pass a test to show they can appreciate and respect wilderness before they can use

it, just so they don't go around dropping their litter everywhere and letting their kids loose with tomahawks." Here was a concept of planning and management of a national park going beyond what most park administrators might consider publicly acceptable. But it does show that there are informed and concerned people around who are watching what we are doing, and it underlines the need for us to have the same degree of courage and vision in planning for the next hundred years of national parks as the pioneers had in establishing them during the first hundred years. This Conference will, I believe, go into history as outward looking, seeing the national parks not as entities in themselves but as key parts of the total environment, to be managed not in isolation but with a national and world perspective.

George B. Hartzog, Jr. (Author of Paper 13): The two points in my paper I would emphasize, in line with the Chairman's remarks, are first that parks should never be treated as isolated units: every increase in their capacity is followed by an increase in use; the golden rule is "when in doubt don't construct." And secondly, since the aim of park administrators is to improve the quality of public use, the really essential factor is interpretation.

Miss Sylvia Crowe (Author of Paper 14): We have already heard much at previous sessions of the dichotomy in national park aims between the preservation of the natural landscape and encouraging the tourist, that most unnatural, destructive animal, to come to them. My paper is based on the view that planning is the solution to the dichotomy, but planning which embraces the whole country on conservation lines, so that parks can never become oases of nature in a polluted anthropocentric desert. In the planning of the parks themselves, the aim must be to make them the culminating experience in a world where natural beauty, contact with nature, and open-air recreation are part of daily life and lead on to that experience. The whole land must be treated as one complex and not as an unrelated collection of ring-fenced land uses.

Park planning in perspective

Reginald J. S. Hookway (Panel Member): In Europe, with its dense populations and wealthy industrial societies living in a relatively small area, planning systems have been forced on us and, in general, all organizations and interests, State or private, are obliged to comply with approved plans. These plans are essentially written statements of objectives and policies, and have six key principles: each plan for a park, a city, or a region must (1) relate directly to the plans for the land around it; (2) be as simple as possible; (3) take into account the environmental, social, and economic issues; (4) conform with the resources, powers, and techniques available to implement it; (5) be frequently brought up to date; and (6) be continuously monitored. Within these principles, planning can be a very sophisticated exercise—involving professional training, data banks, computers, and other complicated techniques—or a simple one in which a few people prepared to think about tomorrow rather than today can wield a great influence. There is no need to have doubts about one's capacity for planning: "great oaks from little acorns grow."

Prof. Gerhard Olschowy (Panel Member): With few natural areas left, except the tidal

zones of the North Sea and the high mountain ranges of the Alps, the whole of the Federal Republic of Germany is subject to comprehensive and legally enforced planning and land-use zoning. The functions of natural, cultural, and recreation areas, referred to in Paper 13, are fulfilled in our protected areas based on the Nature Conservation Act. Nature reserves are generally small and strictly guarded against alterations. The "nature parks" or "natural countryside parks" constitute our main recreation areas and include large-scale cultivated landscapes; they enjoy partial protection, although certain cultural features are strictly protected as natural or architectural monuments. Paper 14 refers especially to one of these "nature parks," the Lüneburger Heide, which is really quite small, only 50,000 acres or a fortieth of the size of Yellowstone, yet visited annually by half as many people again, 3.5 million of them, largely concentrated in summer. Administrative measures to deal with this include locating most facilities on the periphery, prohibiting car traffic in the central area, and enforcing the use of marked trails. But the important point to note is that the *Calluna vulgaris* heathland of the area, the largest in Western Europe, is not a natural landscape, but is a secondary anthropogenic landscape. Now that it is no longer used by farmers for grazing stock, the maintenance of the landscape involves detailed planning, to prevent the natural growth of birch and pine; flocks of sheep have to be kept for the purpose, and mechanical and chemical controls extensively used. In other words, some cultural landscape of considerable value, including its contribution to ecological diversity, can only exist through highly manipulative measures.

Dr. Subhi A. Qasem (Jordan): The emphasis so far has been on industrialized areas, but in Jordan, where we are establishing a park system of eight very different types of areas including 1,500-square-mile Azraq National Park, the planning problems have to do with the restoration of a region exploited by man for many centuries. What we need is for FAO or IUCN to provide an annotated bibliography of all the literature relevant to this kind of situation.

Richard S. R. Fitter (U.K.): The type of information which would be particularly relevant to that situation would include guidance on the reintroduction of large animal species, not omitting predator species.

Dr. Luc Hoffman (WWF): This is a field of special interest to the World Wildlife Fund and in which we have every hope of assisting, but in fact the Jordan initiative merits the fullest encouragement and help from all agencies, since the desert areas east of the Mediterranean and west of the high plateaus of Asia constitute one of the most important gaps in the world system of national parks.

Dr. Leonard H. Smith (Australia): The Land Conservation Council in the State of Victoria, established in 1970 and composed of a full-time chairman, supported by scientific and administrative personnel, representing both the public and private sectors, is worth quoting as an example of a planning authority. It is charged with carrying out a detailed examination of each of the nine areas into which the State has been divided, making specific recommendations, in the light of public inspection and comment, on appropriate land use, which may be for agriculture, forestry, wildlife reserves, national parks, etc. At present the total of the areas reserved amounts to 1.4 percent of the total area of the State, but the policy is to increase this to at least 5 percent.

Maitland S. Sharpe (U.S.A.): I felt there was too much emphasis in Paper 14 on the exceptional or unique areas, whereas it is just as important to plan for the inclusion of representative samples of every kind of area, plant communities as well as great mountains, cultural as well as natural landscapes.

Miss Sylvia Crowe (Author of Paper 14): I agree. The aim should be to find and keep "the best of its kind," which implies the maintenance of maximum diversity.

Prof. James G. Nelson (Canada): Two comments on Panel Member Hookway's "six principles": all of them need to include procedures for public participation—for example, public feedback is an essential part of effective monitoring; second, I would suggest adding a seventh principle, the maintenance of flexibility by keeping to a minimum the closing off of land-use and management options.

William T. Perks (Canada): There is a danger in the overcomprehensive approach to planning in Paper 14 and Panel Member Hookway's remarks. Planning systems tend to spread their tentacles beyond the practical goals, which in this case, should concern the real objectives of national parks and coordination between them.

George Burton Priddle (Canada): Another danger is that too many behavioral assumptions are made and that these need further investigation. It could be, for instance, that a whole new environmental perception might be achieved by viewing nature at high speed, and that this could explain abstract landscape art and reflect a viewpoint of youth with which we are out of touch.

Reginald J. S. Hookway (Panel Member): Replying to the point made by James Nelson, public participation is a technique and should therefore be considered under the next head of the discussion, but basically, of course, the planners are operating as representatives and in the service of the public.

Prof. Donald J. Kuenen (Netherlands): The idea that the planning of national parks should be within the general plan for a country as a whole is only possible if there are sufficient options available. But in many overpopulated countries, we cannot choose according to a list of priorities and have to be content to get what we can. This really undermines the master-plan concept, although the management principles still remain entirely applicable.

Jacques Florent (France): We are constantly brought back to the question of the real objectives or definition of national parks, which there seems to be no time to discuss properly. But I believe it could be summarized in the phrase "reuniting modern man with nature," which means, in effect, helping industrial and urban man to understand the biological mechanisms which he tends to ignore.

José Rafael Garcia (Venezuela): I would prefer to go back to the principle that the park system of a country should cover a representative sample of that country and aim, above all, at the conservation of nature.

Théodore Hounto-Hotègbé (Dahomey): For the countries which I know, Dahomey, Upper Volta, and Niger, the objectives of planning are quite clear—to establish the aims and principles of the parks and anticipate the problems which will affect them. The only trouble is that such planning is almost nonexistent due to the shortage of the necessary technical specialists in our countries. We obviously need to put our planning on a coordinated basis and take full account of the social, economic, geographical, and

juridical exigencies, and, I may add, use a certain flexibility of approach as advocated in Paper 14.

Emmanuel O. A. Asibey (Panel Member): I would agree with the previous speaker but add the point that even in the most backward country it is essential that the plans and the reasons for national parks should be put across to the people.

P. H. C. Lucas (Chairman): Summing up the discussion on perspectives, I would say that it shows how important it is for planning to have the highest ideals, otherwise nothing worthwhile is likely to be achieved.

Park planning techniques

James William Keenan (Panel Member): The master plan of a park will aim at establishing the policies which will, in turn, dictate the kind and degree of development and the management of the area. As suggested in Paper 14, master planning is ideally carried out by a team with a broad range of expertise, but an important member of it not mentioned in that paper is the interpretive planner. The public must also be part of the planning process, and the politicians, who ultimately vote the money, must be involved. The task of the master plan is to assemble comprehensive background information, the relationship of the area to its surroundings and to other areas, the ecosystems and resources, and the potential market; this information must then be analyzed to determine unique and representative features, the fragile environments, the possible development areas, access points or corridors, and potential conflicts, including nonconforming uses of the resources. Only then can the park objectives and policy be defined. They must include alternative concepts, evaluated in ecological, economic, and social terms, which will normally involve zoning and further public and political consultation. The planning next progresses to more detailed determination of boundaries, zones, external land-use controls, including the kind and location of visitor facilities, the management of flora and fauna, and the framework of the interpretive program. Once these are approved—again with public input—the site and management planning may be further developed, and incidentally reviewed and revised at regular intervals. Finally, I should refer to two areas in which there is usually a deficiency of data, which affects the master planner: first, the behavioral characteristics and needs of man himself and, second, the carrying capacity of the area, which includes the “psychological” carrying capacity. We also need better tools for quantifying the benefits of alternative park plans.

W. J. Eggeling (U.K./Scotland): A very real shortcoming of most park management in the past was the inadequacy of locally pinpointed ecological research. Now that the attitude to sustaining park values has changed from strict protection to conservation, or wise use through management, fact-based system-management (often of only a part of an ecosystem) essentially calls for continuous ecological monitoring; this must be incorporated in the park planning from the earliest stages, preferably before the park is established. Understanding of past happenings and present processes in each park or reserve is an important element in management, not least because, throughout his history, man has affected individual localities of his occupancy in very different but often radical ways. We tend perhaps to forget that man, as an animal, has been a part of nature

and its various chains, and that an ecosystem operating utterly without his presence is not infrequently a very unnatural one. Man's past activities may, therefore, sometimes have to be simulated.

René G. Fontaine (Panel Member): It is worth recalling that almost all that has been said so far about ecosystem functioning and manipulation underlies the philosophy and objectives of the “Man and the Biosphere” (MAB) research program; a recommendation in support of the latter could be helpful.

Ricardo Gondelles (Venezuela): The current master planning of Canaima National Park in Venezuela, which will cover more than a million hectares, involves the reconciliation of many different uses ranging from livestock pasturing to mineral exploitation. The key factor is establishing effective communication with the local inhabitants.

Willard W. Brown (Panel Member): That is why the inclusion of interpretive services in the scope of the planning is so important; they have to take the place of the marketplace and village square of bygone days.

Prof. Valerio Giacomini (Italy): Compromise and adaptation are necessary to save what still can be saved and to get the conservation dialogue underway, especially in densely populated countries where one comes into conflict with a very complex network of interests. I am nervous, therefore, about too rigid a definition of national parks, because it could inhibit their establishment, which needs to be undertaken very carefully and gradually.

This “gradualness” is in keeping with the concept of national parks as places of permanent experimentation with the man/nature relationship. It implies a variety of approaches to ecological and human situations and a need for encouraging local initiatives and originality.

At the global level, we have a great common aim, but we also have very diverse requirements at the regional level, which may mean equally diverse and perhaps longer roads to the achievement of a universal system, a system which is itself founded on diversity.

René G. Fontaine (Panel Member): Professor Giacomini's formula of gradualness and regional originality in the approach to the creation of national park systems is particularly valid, as indicated in Paper 14, where a group of sites in a given area could be identified and protected, so as together to constitute a national park; a good example is Circeo National Park in Italy.

Nathan V. E. Woodruff (U.S.A.): There seems to be a contradiction in Paper 13, where Director Hartzog expresses surprise that visits to Yellowstone average as little as 31 hours but also advocates keeping overnight facilities to the edge of the parks and also the importance of “frequent opportunities” for visits. Both these recommendations would surely tend to reduce the average length of visits even more.

George B. Hartzog, Jr. (Author of Paper 13): Experience in Great Smoky Mountains National Park indicates that the effect may be the opposite, namely that when people come more often they come to stay.

P. H. C. Lucas (Chairman): It seems from the discussion of planning techniques that a lot must depend on the makeup of the planning team and that there is much to be said for including a number of nonspecialists.

Implementation of planning

Emmanuel O. A. Asibey (Panel Member): The factors affecting the implementation of a park program in developing countries are the inevitable shortage of funds, the fact that the manager or director of a park or park system has to be a jack-of-all-trades, the problem of assessing human behavior, and the normal political reaction that parks can wait, that we must first have schools and hospitals. Certainly most of the necessary research for national parks will have to be supported from outside for a long time to come.

Thanom Premrasmi (Thailand): It is not much more than 10 years since the National Park Act established the basis for the establishment and management of parks in Thailand. In that time, the most serious problems have been the continuation of poaching, shifting cultivation, and encroachment, not only by agriculture, but more especially by other government agencies seeking to use park areas for mining, hydroelectric projects, military purposes, and so on. In developing countries with a low percentage of literacy, it may still take years to persuade the people of the value of a national park system.

Bernardo Zentilli K. (Panel Member): In these circumstances, as was said by Dr. Carvalho at an earlier session, the only answer is to concentrate on identifying and then persuading the decision makers.

Dr. Kenton R. Miller (FAO): In the developing countries of Latin America, the obstacles to implementation are scarcity of ecological information, the high consequent risk of failure in development, the fact that nothing is known of future forms and intensities of recreation by local people, the strong existing National Planning Boards and the system of annual budgeting rather than project budgeting. In these circumstances, we do not pretend to forecast the future, but base management decisions on periodically revised assessments of the state of our knowledge.

W. P. Tamukedde (Uganda): The system adopted in East Africa is to entrust management to an unpaid Board of Trustees, who do not change with every change of government and can maintain the continuity of planning policy.

Dr. Pekka Borg (Finland): Control of management of national parks by foresters and technicians is not always satisfactory. They should, in fact, be concentrating on practical fieldwork, while the planning and decisions should be in the hands of those who, as a group, have the broadest possible ecological, environmental, sociological, and local knowledge.

Raymond M. Housley, Jr. (Panel Member): Paper 13 made a good point about maintaining a variety of disciplines in the agencies which manage parks. But in the park manager himself the essential is the complete understanding of the park's resources and their interrelationships. Perhaps he should be an ecologist with strong social science capabilities. Some criticisms have been leveled in the discussions at foresters, but it should be remembered that many of the world's national parks and reserves survive today only because of management by forest departments, which have still much to contribute.

Paper 13 also referred to the discarding of manuals and handbooks as a way of encouraging initiative, but it must be used with caution, otherwise anarchy could result. The answer, as George Hartzog indicated, is communication; if excellence is achieved in one place, every one else needs to be told how it was done. Modification of the management of

parks being used beyond their capacity can do much to preserve the quality of the resource, and it is most effective if keyed to the regional approach so rightly stressed in Paper 14. It is useless planning for the management of any land unit in a vacuum, but conversely I would emphasize that it is not practicable or desirable for the park planner to dictate through his planning decisions the use of related lands. The needs of all will be met if the planners of all the agencies involved will recognize each other's mutual problems and solutions. Thus, for example, the saving of wilderness for the user whose experience depends upon its unique and fragile values, while spreading the impact of outdoor recreational use to other kinds of areas, can best be achieved through a regional approach and collaboration.

Richard R. Forster (Canada): I would support the previous speaker's remark about handbooks and manuals; it was a pity that they were discarded here, since they did in fact contain most of the answers to the questions we have been discussing.

George B. Hartzog, Jr. (Author of Paper 13): The trouble is that overreliance on handbooks leads to mediocrity and to decisions not properly related to the local context. What I referred to as the "forestry syndrome," of which some criticism was also made by Panel Member Housley, really depends on the fact that national parks are something more than just a collection of natural resources.

P. H. C. Lucas (Chairman): Despite all our efforts, time has caught up on us and once again we have been unable to hear some of those who wanted to make interventions, so will have to rely on the summaries in the written record.

Perez M. Olindo (Kenya): Reference was made in an earlier session to the need for park authorities to be autonomous. This has indeed a considerable importance for management. In particular, an independent status gives a legal right to retain income and establish priorities.

John S. Owen (U.K.): The discussion has shown that the policy statement on management drawn up by a subcommittee of the First World Conference on National Parks (pp. 364-365 of its Proceedings) has not stood the test of 10 years and needs to be redrafted.

Hunter Han-Ting Eu (Republic of China): Paper 14 suggested that the solution to urban recreation needs was the establishment of a national park system. But, in fact, in countries where there has been a rapid shift from an agricultural to an industrialized economy, the decision makers and planners do often give top priority to city parks and similar recreational facilities, while the more remote natural landscapes are starved of funds and denied a proper infrastructure.

Richard D. Piesse (Australia): In Australia, the chief threat to the implementation of an effective park system plan is mineral prospecting and exploitation. Paper 14 rightly said it was useless to designate an area as a national park where mining activity is "inevitable," but in Australia, where a given mineral may be very widely distributed, it is not necessarily inevitable. Yet the development of Crown or government-held land as a park is held up almost indefinitely just because of the possibility that a mineralized zone might ultimately

be prospected. The only answer would seem to lie in the immediate assessment by government geologists of the mineral potential of all prospective park areas.

Ponsiana Ssemwezi (Uganda): A factor to which previous reference was made in another context, is that research workers too often neglect or seem unconvinced of the necessity of giving, to the management section of the national parks, clear recommendations on the steps which should be taken to implement or apply the results of the research. Hence the establishment of national research councils designed to ensure that research will be properly applied.

SESSION VII

SPECIAL PARK ENVIRONMENTS, PART 1

Saturday, September 23, 2 to 5 p.m.

SPECIAL AND UNUSUAL SOCIAL, SCIENTIFIC, AND ENVIRONMENTAL PROBLEMS OF NATIONAL PARKS IN WET TROPICAL, ARID, AND MOUNTAIN REGIONS

Chairman: Prof. John Stewart Turner, Australia

Rapporteur: Dr. Anne LaBastille, U.S.A.

Authors: Paper 15: Mario Andrés Boza, Costa Rica

16: J. R. Desai, India

17: Prof. Mohamed Kassas, Arab Republic of Egypt

18: Prof. Kh. P. Mirimanian, U.S.S.R.

(presented in author's absence by the Chairman)

19: Dr. Frank H. Wadsworth, U.S.A. (Puerto Rico)

20: Prof. Paul W. Richards, U.K. (Wales)

Panelists: Michel Louis Anna, Chad

Koffi Attobra, Ivory Coast

Dr. Vittorio Agnelli, Italy

José Arreola Tinoco, Mexico

RAPPORTEUR'S SUMMARY

It may help to clarify the discussion if some of the broader considerations put forward are summarized and then, of the three special environments, the arid zone is dealt with first, followed by mountain regions, and ending with the humid tropics. The six papers on which discussions were based have been rearranged and renumbered accordingly.

In general, it was recognized that the development of national parks in all three types of areas is often difficult, because existing park services may lack the funds, materials, personnel, and public support to establish well-managed park systems. Strategies to ensure better progress were summed up in Paper 15. They included the inventory of park potentials, as far as possible carried out by local experts; the establishment initially of only a few "model" parks, based on outstanding historic, scenic, and ecological phenomena; close liaison, during development, with the press and other communications media, in order to educate and attract the public; and making appropriate use of personnel and materials drawn from outside sources, whether small expert groups or large international organizations. It may be desirable, at first, to focus on providing access and

facilities for a broad segment of the public, particularly the less wealthy, so as to build up the national significance and popular sentiment in favor of the parks.

In arid regions, comprising about one-third of the world's land area, much of it undergoing ecological degradation, or "desert creep," due to increasing human pressures, the problems in the way of effective establishment of parks are many: several of these were reviewed in Papers 16 and 17, including the conflict between wildlife and domestic cattle as exemplified in the Gir Forest of India, last stronghold of the Asiatic lion, with its side effects of forest destruction and compaction of soils: and, in the Arab countries, the breakdown of the traditional "hema" or watershed-management system, with similar ill effects from uncontrolled grazing. It was noted that in Australia, despite signs of deterioration under exploitative use of the dry interior, especially the more usable semi-arid sectors, some progress has been made with establishing "desert" national parks; some 7 million acres have been set aside in South Australia and perhaps between 10 and 20 million acres in the country as a whole. Discussion then turned to the problems posed by nomadism in arid zones. Although usually denied by modern social and political theorists, nomadic practices could, according to some experts, be a desirable form of land use, provided that population pressures and competition are low. In any case, where these have been long established, as in parts of the Middle East, they may have to be tolerated. The mechanized equivalent in some highly developed countries may also be useful, as long as it does not extend into high mountain grazing lands.

The last-mentioned consideration led into the topics introduced for discussion by the papers 8 and 19. Both stressed the fragility of mountain ecosystems and also the ecological and economic impact at lower elevations of the processes taking place in the mountains. The special function of national parks in montane regions was to control the watersheds and the hydrology of the foothills, but, in addition, they serve all the scientific, educational, and economic purposes of parks anywhere. A peculiar feature, to which attention was called in the discussion, was that mountain areas classified as grazing lands may be more productive if they support a mixture of wild and domestic stock, as in Peru. Here, the combination of vicuña and cattle (rather than sheep and cattle) had been estimated to be 150 percent more productive and also meant that a rare and endangered species would be properly protected and propagated.

In the wet tropical zone, according to Paper 20, some 47 national parks or equivalent reserves are recognized in the U.N. list, which indicates a serious underrepresentation in comparison with savanna and grasslands. As a consequence, thousands of rain-forest species are now or will be threatened, mainly as a result of forest destruction from shifting cultivation and the ambition to establish more and more pastures and grassland for domestic animals. The Amazonian rain forest was particularly singled out for discussion, and the consensus was that, despite its tremendous extent (3 million square kilometers), it is under severe threat from the pressures of human population and material needs. In Dr. Budowski's view, the problems are mainly political, although decisions must be made with proper regard for ecological principles and integrated land-use planning. Many governments are in a difficult position if it comes to a question of refusing to sell timber exploitation rights, since this may seem to impose hardship on local people. The same applies to land in private ownership where the owners are often quite unaware of

possible future environmental impacts. Emphasis was placed on the need for the conservation of natural areas to be recognized as a justifiable and economic form of land use. The highest level of decisionmaking was called for, since otherwise the future of a humid tropical area like the Amazon rain forest could well be tragic.

SESSION VII / PAPER 15

**COSTA RICA:
A CASE STUDY OF STRATEGY IN THE SETTING
UP OF NATIONAL PARKS IN A DEVELOPING COUNTRY¹**

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In less than 2 years, Costa Rica has successfully developed a national park system which includes areas representative of the great ecological diversity of the country, and, in doing so, has managed to obtain considerable public support. Up to the present, the system comprises two parks which have been fully inaugurated and are in an advanced stage of development, and three more which can count on permanent supervision. Moreover, a large number of new parks, including natural, historical, and recreational areas, are under consideration by the Legislative Assembly.

This program has been developed despite a persistent shortage of funds and of qualified personnel, and in the face of the belief, which most people in the country originally shared, that nature conservation is a superfluous activity. In order to achieve it, every possible advantage was taken of the relevant institutions, associations, and specialists in Costa Rica, as well as of opportune situations or events and of technical and economic aid from international organizations and scientists.

In this connection, there is a notable lack of information on the ways in which developing countries actually set about solving the problems involved in the administration and development of their national parks. This is in marked contrast with the abundance of published articles and information recommending, for the solution of conservation problems, such measures as the creation of new institutions, approval of special laws and budgets, and immediate establishment of large numbers of new parks. Insofar as these recommendations take no account of the actual social and economic situation of

¹ Original: Spanish.

the country concerned, a gap is left between them and any practical method of implementation.

It is for this reason that in this paper we will aim to show how some of the most common problems have been at least partly resolved in Costa Rica, in the hope that this may be of use to other developing countries now in the process of putting into operation their national park programs.

General situation when a program is initiated

The situation which confronts the official who proposes to launch a national park program will inevitably be full of problems. In the first place, it is very likely that he himself will have been appointed as a forester, and he will have to begin by convincing his superiors of the need for establishing parks in the country. If his efforts are successful, he will then be given one or two biologists or agronomists destined to become the future park superintendents, a small force of guards or rangers, a vehicle, and funds for materials and equipment. However, he is bound to meet with a great deal of opposition, both on the part of the government and that of the public in general. The fact is that governments and their institutions tend to take an active interest in conservation only when irrational use and pollution are showing obvious signs of bringing about ecological disaster. Even then they always favor *ad hoc* solutions.

Among the general public, the park planner is likely to find widespread apathy, resulting from the absence of conservation education programs or of model areas where non-consumptive or sustained-yield use of natural resources has been demonstrated. On the other hand, there will certainly be a number of influential farmers, ranchers, industrialists, and timber merchants monopolizing or destroying the ecosystems that are threatened with extinction; governmental agencies with plans for large-scale colonization of the wet tropical zones; opportunists invading public lands all over the country; illegal hunters exterminating species with a commercial value; conflicting or inept conservation legislation; and many other adverse factors of this kind. All the problems referred to could, of course, be still worse in countries with military regimes, top-heavy bureaucracies, or dense concentrations of population.

Choosing the parks to be established.

The first problem to be solved is to decide on the areas that ought to be urgently declared national parks or equivalent reserves, and on how many it is possible to develop with the resources and personnel available.

The ideal would be to cover a representative sample of all the life zones and ecosystems of the country. However, the most sensible plan is to make a start with any unique or very uncommon ecosystems, with those that give protection to migratory species and with those of special national significance or with particularly spectacular features. In Costa Rica, we chose as the first park to be established and developed, the area of perhaps the greatest historical importance in the whole country, which is also one of the few still supporting the flora and fauna of dry tropical woodland and of such communities or

habitat types as savanna, mangrove, and gallery forest. The area referred to is Santa Rosa National Park, situated in the north of the country on the Pacific slope and the scene in 1856 of a battle in which national sovereignty was at stake. This great historical interest of the site turned out to be an important advantage. Nobody questioned the necessity for protecting the historic patrimony of the country and we later succeeded, by means of an adequate interpretative program, in "selling" the public the idea of the natural values of the site from the starting point of the historical.

The choice for the second park to be developed was Poás Volcano, one of the few active volcanoes of the continent accessible all year round by road. This area of cloud forest and extremely spectacular scenery is only 60 kilometers from the capital and offers the additional attraction that, from a point on its summit, it is possible to see both oceans and that one may also come across the quetzal, one of the most beautiful birds in the world.

The common feature of these two parks is that they are attractive both to the people of the country and to visitors from abroad, are of easy access, and have great national significance, conditions which made their establishment possible without opposition from anyone.

The three other parks referred to in the introduction are: Tortuguero, which protects a sample of tropical rain forest, as well as the most important beaches of the Caribbean Sea for the nesting of marine turtles; Cahuita, which includes the best coral reef of the country, in addition to first-quality beaches; and Cabo Blanco, a natural reserve which, like Santa Rosa, serves to protect a dry woodland area and also some seabird populations. The remaining parks, still under consideration, comprise caverns, paramo grassland, archaeological sites, volcanoes, and lakes frequented by migratory birds.

In seeking the protection of the numerous areas which are in danger, the temptation to establish too many parks should be avoided. Initially, it is better to protect a few areas and to create a solid program which really succeeds in salvaging what remains, rather than to dilute available resources and never attain any definite goals. It is always, however, well worthwhile consulting national or international specialists on the subject. For instance, it was Dr. Kenton Miller, of FAO, and Dr. Gerardo Budowski, the present Director General of IUCN, who recommended the choice of Santa Rosa and Poás, respectively, and the former also elaborated a master plan for the development and protection of Santa Rosa.

If the funds and staff available are largely invested in, and allocated to, only one or two parks, there is a good chance of having well-managed areas which will serve as excellent models. The worst mistake that can be made is to try to develop several different parks at the same time, since it can result, after a year or two of effort, in having nothing to show for it, either to your superiors or the public. On the other hand, good model areas can set up a most useful chain reaction, since, to the extent that their basic facilities for visitors are properly developed, the latter will soon begin to show their satisfaction by comments and articles in the press. This will be followed by a desire on the part of private or official interests, even of politicians, to create similar areas in their own provinces or cantons, so that the overall prestige and budget of the proposed parks program rapidly grows.

Methods of recruiting a staff

One of the chief obstacles we have had to overcome has been the recruitment of professional personnel, guards, and a labor force, because the park program was a new one and it is government policy for economic reasons to resist the creation of new posts.

There are several possible outside sources for obtaining a professional staff, including the U.S. Peace Corps, the British Voluntary Service Organization, and various international organizations. Before asking for assistance from one of these, it is desirable to check up on the organizations specializing in different fields, and it is also necessary to have available adequate funds to meet subsistence and transportation costs.

The Peace Corps is one of the more important sources, because the country asking for its help is not obliged to offer counterpart funds. The Peace Corps pays for all salaries, medical services, international transportation, and tuition in the local language, and also buys certain equipment. The only disadvantages are that the volunteers cannot stay more than 2 or 3 years in the country and one may sometimes have to wait as much as a year to obtain them.

The British volunteers have the advantage that there is no limit to their length of stay in the country, but, on the other hand, it is necessary to pay a small salary, which for administrative reasons is sometimes impossible to arrange. Whichever of the two aid programs is used, it is normally possible to recruit personnel in all the necessary fields.

As for international organizations, one may mention, among others, FAO, UNESCO, AID, and OEA. Although personnel obtainable through them will be highly qualified, problems will arise from the fact that counterpart funds have to be provided, a requirement which it is sometimes impossible to satisfy; also, because of all the bureaucratic processes that have to be gone through, it usually takes a great deal of time to get the expert required. Another problem that is liable to arise is that the expert may no longer be young, may not know the local language, and may not accept the inconveniences of a park under development. When this happens, assistance is merely transformed into yet more problems for the Director of national parks! IUCN and the WWF are the only organizations in this category active in Costa Rica which do not ask for counterpart contributions and are not subject to bureaucratic requirements.

A very convenient type of aid program has just been launched by FAO in Chile, Colombia, and Costa Rica, thanks to support by the Rockefeller Brothers Fund. For 2 years, a specialist in park planning and another specialist in interpretative services will collaborate with the Director of national parks, acting as two more highly qualified employees specially appointed to assist him. In this case, no counterpart contribution has been requested and the experts will have their own funds to cover subsistence and even to finance pilot projects or models of what they recommend.

It is also possible through international agencies to recruit wardens or guards, although such men tend to want to stay only 1 or 2 years. The Caribbean Conservation Corporation, for instance, is at present paying for the two wardens who are guarding the marine turtle nesting beaches in Tortuguero National Park. Using local resources, it is possible to get men seconded from the Guardia Civil or Guardia Rural and similar police forces, as long as they can be provided with appropriate quarters. The best way to arrange this is to

convince the officers in charge that the guards, in addition to looking after the park, will be fulfilling their proper functions by keeping a lookout for smuggling on the beaches or the clandestine manufacture of liquor in other areas.

The labor force requirements of national parks can often be met or supplemented by recruitment from youth organizations. Thus the State-supported National Youth Movement in Costa Rica has had several work camps in our parks during vacations. These volunteers, who are all students, including some from vocational colleges, carry out all kinds of manual work, even going so far as to build houses under the supervision of an engineer or master builder lent by another institution. The Movement supplies food and transportation and we the tools and building materials. Weekend excursions to different places in the region and novel cultural activities make the young people extremely enthusiastic; indeed they become true champions of national parks. Up to the present, the Movement has saved us about 8,000 U.S. dollars worth of labor. Other local groups which can collaborate in this or other fields are country-dancing clubs, community development associations, the Boy Scouts, and organizations such as Rotary or the Lions Club.

A criticism that might be leveled at the methods of recruitment outlined above is that the staff recruited is essentially "fluid" so that a crisis could cause the collapse of the program. This is obviously a risk that has to be taken although experience has also shown us that once we can get a program into full operation, the need for a larger established staff or additional funds becomes more obvious. The fact is that we have only been successful in obtaining such staff and funds by adopting the approach described.

Methods of obtaining specific funds, materials, and equipment

We have found that the easiest way of raising money for the purchase of land is by the issue of bonds and saving stamps. This has required a lot of very hard work to persuade people to invest, on the basis of the considerable prestige and economic and social development which the proposed park will bring to the province and the country in general. The task becomes easier as soon as the park is actually conferring public benefits.

Certain international organizations also give funds for the purchase of land, including, for example, the World Wildlife Fund (WWF) and, in the United States, the Nature Conservancy, Philadelphia Conservationists, and the League Against Vivisection and for the Protection of Animals. It was due to the support of the two last mentioned that the Strict Nature Reserve of Cabo Blanco was established in Costa Rica. WWF also makes grants for building houses, fences, wells, dams, and so on, as does the Fauna Preservation Society and the Sierra Club. Survey teams and surveillance can also be arranged through these organizations. Secondhand equipment can be obtained through the Compañeros de las Americas, the U.S. Agency for International Development (AID), or individual governments such as those of Canada, Japan, Germany, and Belgium. The Peace Corps, as already mentioned, will provide equipment of all kinds for use by its volunteers.

Building materials and tools, loans of machinery, labor, and other help can be obtained

with relative ease from municipalities and certain ministries. Hitherto, in Costa Rica, municipal authorities have been particularly helpful to us, on the basis of the argument that parks represent an economic development which promotes tourism and the prestige of the canton or of the municipality itself. One tendency of municipalities, is to try to establish installations which are contrary to the philosophy of national parks and of wanting to make management decisions, on the grounds that it is they who have made the major financial contribution.

Various government ministries and other national institutions can also be of enormous help. The Ministry of Public Works is the best source for surveyors, civil engineers, and road machinery. The Ministry of Public Health can arrange short courses for park wardens on first-aid and rescue work, as well as providing medical supplies. The Ministry of Public Education, with the universities, can cooperate in the establishment of short courses on conservation for teachers and lecturers. In our case, the Ministry which has given us most help is that of Culture, Youth, and Sport, for its general objectives largely coincide with those of our own program. This ministry has restored historic buildings in the parks, has donated large quantities of materials, and, above all, has given enormous support to the program.

Methods of obtaining general support for national parks

Official institutions, private groups, and individuals can all help to support and defend park resources threatened by the interests of other groups. They can also help to collect funds, organize press campaigns, obtain international assistance, propose the establishment and financing of new parks, or carry out propaganda work in favor of conservation. As already mentioned, municipal authorities can often provide the most effective support, by declaring themselves to the Deputies of their canton or province as in favor of the establishment of a proposed park, or by calling for the enactment of specific laws once a park has been established. They are also in the position to oppose unsuitable projects which may be launched in the canton and which due to some lack of communication may not have come to the notice of the park department. A good example of the kind of support that can be given is the action of the Municipality of Turrialba in expressing itself in favor and offering funds for the establishment of Guayabo National Monument, which is to be sited at the only place in the country where ruins of an indigenous city have been found. To obtain support for this project, we are in the first place trying to get as "patron" Dr. Carlos Aguilar, an archeologist with the University of Costa Rica, who has just published a study of the ancient city. In his company, we had a series of discussions with National Deputies and Municipal Councillors, which culminated in the introduction of a draft law, now on the way to being enacted.

Most countries have various private groups such as associations or colleges of biologists or agronomists, academies of geography and history, garden clubs, speleological and mountaineering clubs, national political societies, and youth groups. Because of their private status, these organizations are in a position to take action against any public functionary who promotes the interests of companies whose activities are likely to damage the resources of the parks, or directly against the companies themselves. For

example, a year ago the College of Biologists of Costa Rica provoked a public outcry against the presence of cattle in one of the national parks, a classical problem with its political implications, about which we had been unable to do anything. As a result, the cattle were removed within a week. Another example is the Audubon Society of Costa Rica, which collaborates in the sale of publications in the parks. It is trying to obtain the assistance of the National Audubon Society of the United States to establish a refuge for migratory birds, and is committed to a campaign against the export of live animals. The best method of obtaining the support of these groups is by showing them how the parks contribute to their interests and the attainment of their own objectives, and, also, of course, by arranging visits by their members to national parks and special symposia. Associations of "friends" can also contribute in various ways. Thus the Association of the Friends of Santa Rosa, created by the superintendent of this park, is formed of persons living in cities near the park, and includes among its members a school headmaster and various other masters, three very influential country property owners, and a well-known local political leader. It has been a great success from the start, not only because of the constant support it gives, but also because of the revenue it obtains for the park through the sale of modern ceramics made with very ancient patterns, for which there is a great demand from visitors. Many individuals, whether they be scientists, politicians, or ordinary citizens, can give worthwhile help, whether by means of publications, professional support, or political influence. A most important aspect of this is to take the fullest advantage of visits by international scientists, bearing in mind that in our country a rather particular amount of notice is taken of the views and opinions of foreigners. Thus Dr. Archie Carr, head of the Marine Turtle Group of the Survival Service Commission of the IUCN, is one of the scientists who has made several visits to Costa Rica in connection with Tortuguero National Park. Dr. Carr presented very solid arguments in favor of this park which those who were in opposition to the project, particularly the exploiters of turtle calipee, were unable to refute.

Others who have been invited to visit our parks include Dr. Budowski and Dr. Miller, as previously mentioned, and Dr. Myron Sutton, the distinguished writer of the U.S. National Park Service. Meetings with ministers, talks to interested groups, and interviews by the press and on television were some of the public activities carried out. These all helped to promote a beneficial chain reaction, including acquisition of international status for our program; full acceptance of it in the scientific circles of our own country; and better support for it on the part of our heads of department, in the knowledge that the distinguished organizations represented by the visiting specialists would give technical assistance to our program.

The best collaborator or "godmother" that a park program can have is the First Lady of the Republic. Costa Rica's First Lady, Sra. Karen de Figueres, has not only given her full support to the theme of conserving the natural and historical patrimony of the country, but has gone much further by proposing a large-scale program—now before the Legislative Assembly—for establishing and funding a system of natural, historic, and recreational areas, which would comprise no less than 16 new parks. What was of particular importance for us is that our First Lady is in the position to give practical help in everything. Through the President, she can get proposals for new legislation

submitted to the Assembly, she can ensure the support of Ministers and Deputies belonging to her party, seek certain kinds of international aid which can only be obtained by an approach at presidential level, etc. In short, it was only after Dona Karen began to help us directly that our park program began to make rapid progress. The best way in obtain such support from a First Lady is to arrange a series of interviews to discuss the matter and establish a good working relationship between the park program and those concerned with the culture, health, recreation, and general welfare of the people. But apart from all the help that can be obtained from groups or individuals, the best defense of national parks is that which relies on the economic, social, and cultural justifications for them, and the demonstration of the fact that they present an alternative which is the best use for the natural resources of a particular area. For this, it is necessary that biologists and other professional men available to the program should assemble all the technical information necessary to prove what benefits can be expected from the establishment of the park; this is much the best defense against conflicting plans of other governmental agencies or the prejudicial activities of agriculturists, industrialists, timber merchants, and others. Examples of this approach are the studies at present being undertaken by two Peace Corps volunteers, one of them directed to the impact of Santa Rosa National Park on the economy of Guanacasta Province through recreation and tourism, and the other to the water output of Volcán Poás National Park. Studies of land-use potential can also be used to good effect in justifying the establishment of national parks.

Some additional factors

Inauguration of parks. An inauguration is an event of which advantage should be taken for major publicity purposes. Thus, it is desirable to send invitations to all sorts of organizations and associations, important individuals, international agencies, and especially, the press. If a visit can be arranged to allow journalists to have a preview of the preparations for the event, it can often result in valuable free publicity. Invitations to representatives of the churches should not be overlooked in countries where religion is an important factor. The tradition we have established in Costa Rica whereby the First Lady performs the inaugural ceremony has become of special significance.

Making use of national and political sentiment. Several authors have drawn attention to the beneficial effects on conservation of making proper use of nationalist sentiment and other political opportunities. Themes in this category, of which advantage can be taken, include plundering of marine resources by "pirate" vessels, exporting of wild animals, and monopolization of beaches by foreigners. The Santa Rosa park itself is a good example of this. Its purchase was approved and implemented rather quickly because it belonged to a foreign family associated with a dictatorship in one of the Latin countries. "How can it be that the very place where our ancestors fought for liberty should now belong to family X, which has suppressed. . . ?" was the kind of slogan successfully used to obtain, within a few months, the requisite grants from the Legislative Assembly for the purchase of the land.

It is of equally great importance to promote the theme of conservation of natural resources,

with emphasis on national parks, as a political platform. Thus we have urged upon the different political parties in the country the inclusion of this theme in the governmental programs to be advocated in the next political campaign due to be launched in 1974. Obviously this will not be the sole motivation of publicity, since people have a taste for reading about politics, but it should ensure that future ministers or deputies will be familiar with the conservation theme, and one may also hope that the future president will carry out any assurances on the subject that he has given in the course of his campaign.

Propaganda and publications. The best way to keep public opinion firmly in favor of a national park program is through presenting the facts and through constant publicity. One of our Peace Corps volunteers has been devoting himself exclusively to writing a series of articles on parks and similar subjects for the agricultural and cultural supplements of the newspapers. Other volunteers are similarly concentrating on the production of publications, which include short general information brochures, "a series on national parks and biological conservation" (comprising reprinted articles or original studies by our biologists) and field guides to common plants and animals, for sale to all those who are interested. Yet another volunteer has taken upon himself to give talks in secondary schools and to organize a short course on conservation at the University of Costa Rica.

A type of propaganda which is very effective and free of charge is that put out by commercial firms, using various national themes, products, or buildings as their starting point. For instance, a firm of cigarette manufacturers marketed certain brands, using slogans like "cigarette X is as national as our coffee." Following various discussions, they have begun to use the national parks theme as the basis of their propaganda. What is important is that although it is quite clear that parks have no connection with the product advertised, the advertisement is promoting the idea that they are essentially symbolic of Costa Rica.

Application of the experience gained in developed countries. Advantage may often be taken of the experience of certain developed countries, which have programs of well-established national parks, insofar as it is applicable. For instance, we are planning next year a "Mission 73," somewhat similar to the "Mission 66" developed by the U.S. National Park Service, and having as its purpose the enactment of specific regulations by the Legislative Assembly to provide for the public use of the parks.

We are also expediting the publication of "Park Projects," which will be attractively presented and will include the text of the proposed legislation and relevant budget. The aim is to attract and receive the support of Deputies who would like their names associated with a particular park. There are excellent precedents for such projects published by the Park Services of the United States and Canada.

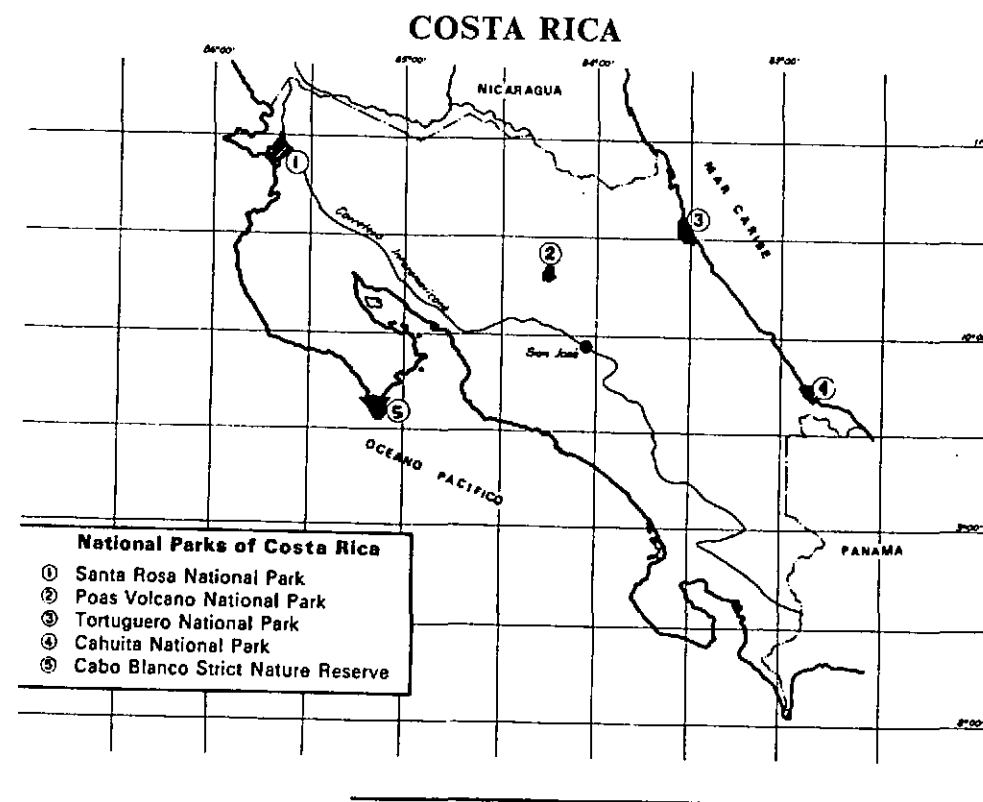
Certain systems of financial backing used by European countries can also serve as a model. These include the presentation at a government level of requests to international banks to lend funds for tourist development programs, covering costly infrastructures, such as main roads and visitor centers.

Finally many examples of installations at present in use in parks of the United States, Canada, and New Zealand can be adapted to our circumstances. Visitor centers, for

instance, have had a tremendous success in our parks; likewise the campsites in Santa Rosa, which are the best in the country, and our system of nature trails, with their interpretative notices, which several private country clubs are already imitating.

Conclusion

No claim is made that the points made in this paper provide solutions for all the problems that arise when one launches a program to protect the natural heritage of a developing country. What should be clear, however, is that the director of national parks and his colleagues will have to create their own program, making use of all that their country can immediately offer and also taking advantage of the experience of other countries with similar conditions. It is with respect to this last point, that we are grateful to IUCN for giving us an opportunity of explaining our own experiences, while at the same time urging IUCN to encourage the presentation of additional reviews of work related to the themes we have been discussing, whenever suitable opportunities may arise.



THE GIR FOREST RESERVE: ITS HABITATS, FAUNAL AND SOCIAL PROBLEMS

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Lions now exist only in Africa and in one reserve in Asia. Long ago, lions were abundant in almost all parts of India, excluding the region south of Narmada. However, since 1884 Asiatic lions have been confined to the Gir Forest reserve in Gujarat State, where they were protected by the Nawabs of Junagadh. After India became independent, the need to protect this rare animal was increased sharply, and in 1965 the Gir Forest reserve was constituted as a wildlife sanctuary. As the home of the Asiatic lion, the forest has attracted considerable scientific attention and is visited by increasing numbers of tourists.

Ecological research in the Gir Forest, under the "Gir Project," has produced significant data. This was started by the Bombay Natural History Society in 1969 with the financial assistance and collaboration of the Smithsonian Institution and Yale University, both of the United States.

Gir Forest was selected for this project because of the lions, and also because this habitat was found to be shrinking, and an immediate need was felt to preserve it and to provide guidelines for its scientific management.

Physical factors

The Gir Forest extends over 1,265 square kilometers. It is 40 miles long (64.37 km) and 50 miles wide (80.40 km). The elevations range between 741 and 2,128 feet (225.8 and 648.6 m). Five perennial rivers flow from the hills, supplying the surrounding agricultural land. Parent rock is basalt, trap, and limestone. Soils on the hills are generally red or yellow, but on some there is virtually no soil cover, while fertile black soils are found on gently sloping parts of the forest.

There are three main seasons: cool-dry season from October to February with minimum temperature as low as 35°F. (1.7°C), dry-hot season between February and June with maximum temperature of 110°F. (43.3°C), and monsoon from late June to early October. The average annual rainfall varies from 19 inches (48 cm) in the extreme east to 35 inches (88 cm) around Sasan in the west. The area is classed as a semiarid region and on an average, each third year is a drought with less than 20 inches (50 cm) of rainfall.

The forest types fall largely within the tropical dry mixed deciduous classification of Champion. The following six subtypes are met:

(1) **Open teak forest.** This is confined to the red soils in hilly areas. The trees are about 10 metres high and the canopy consists of 70–90 percent of aged moderate and crooked teak trees and their other associates.

(2) **Open mixed deciduous forest.** This type is confined to red yellow soil on gentle or steep hillsides where the rainfall is less than 25 inches. Teak is not present.

(3) **Closed teak forest.** This is found on gentle slopes with black soil. The trees reach a height of about 15 meters and teak forms 60 percent of the crop.

(4) **Thorny forest.** The canopy consists of 70 percent *Acacia arabica* of 4 to 8 meters in height.

(5) **Dry tropical riverain forest.** This type is restricted to perennial and the semiperennial streams. The canopy is dominated by evergreen species like jamun *Syzygium cumini* and karanj *Pongamia glabra* which rise to a height of 25 meters.

(6) **Hilltops.** The hilltops are open and dominated by grasses such as *Schima nervosum* and *Heteropogon contortus*.

The open teak occupies the northwestern region of the forest while the thorn forest is found in the west and southwestern region. The closed teak occupies the central and southern portion of the forest while the open and mixed deciduous forest is found in the eastern region of Gir.

Forest management

The Gir Forest is managed under the Revised Working Plan for Gir Forests by Shri Acharya. The area is divided into three working circles namely (1) Superior Teak Working Circle, (2) Inferior Teak Working Circle, and (3) Improvement Working Circle. In addition to this, the grass is also exploited according to the prescriptions under Fodder Working Circle.

Wildlife in the Gir

Besides the lion, a large variety of wild mammals (25 species) is found, chief among which are panther, chital, nilgai (blue-bull), sambar, wild boar, chinkara, and four-horned antelope. Fourteen reptile and 49 more important species of birds have been recorded. S. M. Berwick estimated a total of 6,242 ungulates in the sanctuary. Sambar are most abundant in the west, chinkara in the east, and four-horned antelope in the middle region. Chital and nilgai, the two most numerous species, are more uniformly distributed. Nilgai exist equally well in the most dense and in the most open vegetation. The low figure for wild boar is attributed to the increasing efforts of the farmers to eradicate them from cultivated fields and the possibility of their suffering from a severe epidemic. The disappearance of black buck some 15 to 25 years ago has been related to incursions of agriculture across the boundaries of the sanctuary.

In 1889, the lion population was down to about a dozen. At the request of Lord Curzon, the Nawab of Junagadh imposed a complete ban on lion shooting. Protection by the Nawabs over a long period brought good results, and by 1936 the lions were estimated at 287.

Lion censuses based on pugmarks were carried out in 1936, 1950, 1955, and 1963. In the 1968 census a system of visual counts of the lions was introduced.

The Indian lion does not differ much from its African counterpart. Lions are sociable creatures with strong family ties. They are noisy and vocal. Lions usually live and hunt in family parties, known as "prides," which are comprised of about a dozen individuals, large and small. They prey mainly on game and cattle, finding the latter much easier to kill than their natural prey. They kill about once a week on the average and do not conceal their kills by covering them with leaves, etc.

Unlike the tiger which usually frequents dense forest and adequate cover, the lion prefers the open habitat of savanna and sparse tree growth. The Gir Forest is eminently suited to its requirements.

Human inhabitants of the Gir

Gir Forest is inhabited by pastoral communities locally called "Maldharis" whose main occupation is cattle breeding. There are as many as 845 families of Maldhari, with a total population of 4,800, and 17,000 cattle living in 129 nesses, or semipermanent camps, in the Gir Forest.

At one time the entire Saurashtra area was largely inhabited by pastoral communities. Most of the land surface was then covered by grass and scrub forests and this was the natural land use. Due to a rapid increase in population, more and more lands were brought under the plow. The Barda, the Alech, the Osam, the Girnar, and the Gir hills, which had all been covered by a continuous forest tract, were separated from each other by developed land, and the pastoral communities were forced to seek refuge in the forests. Gradually the Maldhari populations were concentrated in the Gir, the Barda, and the Alech forests. In the recent past, the Alech has lost its tree cover and the Maldhari population there is very small. Wildlife has been wiped out. In the Barda, the tree cover is fast disappearing due to overuse, and wildlife is nearing extinction. The Maldharis there will soon make the habitat totally unproductive and they will be forced to leave. Since Maldharis of the Gir have a larger forest area, it will take more time before the pressure of heavy and unregulated grazing destroys the habitat. The Gir is also burdened with 47,000 additional migratory cattle during the monsoon. These cattle belong to the cultivators of the adjoining districts. The migratory cattle which trample the forest soils during monsoon are most damaging.

The Maldhari of the Gir is poor to very poor. His worldly belongings are few. They consist of a few cooking utensils, a few charpoys, and equipment for churning buttermilk. The Maldhari economy is ghee based. Many of them still consider it irreligious to sell milk. On a rough survey, it was found that from a quarter to a third of their cattle were actually yielding milk and on an average their net income from a milking buffalo was Rs200/- per annum. Between two-thirds and three-fourths of their total income is spent on purchasing cattle-feed concentrates such as cotton seeds and ground nut cakes. Since a family seldom has more than six milking buffaloes at a time, average income is in the order of Rs1,200/- per annum. To make ends meet, some of the Maldharis living near the periphery have taken to illicit woodcutting and transporting the wood on their camels to nearby villages.

During periods when there is no grass in the forests, the Maldharis take to indiscriminate lopping of trees for fodder. These factors contribute to faster destruction of habitat.

Maldharis also sell manure by truckloads. The cattle dung which should have gone back to enrich the forest soil is now enriching farmlands outside. It is estimated that at least 6,000 truckloads of manure are being removed annually.

Because of heavy and unregulated grazing, especially around the nesses and in the areas bordering the villages, soil has become compact, and perennial grasses have been replaced by weeds and unpalatable annual grasses. Heavy grazing also has resulted in accelerated soil erosion and loss of soil fertility into the rivers. This is evidenced by the high turbidity of floodwaters. Heavy and unregulated grazing also prevents regeneration of forest "coupes," or areas of annual cuts. Although such worked coupes are declared closed to grazing, Maldharis are invariably tempted by good grass in such areas, and regeneration of forests becomes most difficult. Such nonregeneration is, of course, instrumental in gradual loss of tree cover. With the loss of tree cover, certain wild animals cannot thrive. Hodd carried out studies on the effect of grazing by domestic stock on the production and species composition of flora of the Gir Forests. His exposures showed that the cover of herbaceous plants was 80 to 100 percent in closed areas while the same was only 30 percent in open and grazed areas. Moreover, the open areas produced only 300 kilograms of ground flora per hectare, whereas the closed areas produced 2,100 kilograms per hectare. Within 2 years of closure, Hodd found that the weeds and annual grasses were being replaced by perennial grasses more useful to cattle and wildlife. Berwick reported that out of the total of 146 million pounds of grass produced in the Gir only 4 percent was consumed by wildlife and 85 percent by domestic livestock.

Lions and Maldhari cattle

Joslin has reported that at present more than 90 percent of the food of the lions comes from domestic livestock. This indirectly means that the present wild ungulate population, which provides only 10 percent of lions' food, has to increase tenfold before it can be relied upon to meet the needs of the Gir lions. This consideration demands that the removal of domestic livestock from the Gir be gradual and kept in conformity with the expected increase of wild ungulate populations. It is a vicious and paradoxical position that lions feed upon cattle, and cattle in turn are gradually destroying the habitat of the lion. With 30 percent annual increase in numbers, it is estimated that it will take 9 years for the wild ungulate population to multiply to 10 times its present total.

Maldharis occasionally resort to poisoning lions which have killed their cattle. However, cases of poisoning are few, and Joslin reports that the destruction of habitat is the cause of the recent decline in lion population.

The harijan community residing in villages bordering the Gir Sanctuary remove and collect the meat and hides of dead Maldhari animals and cattle which are killed in the sanctuary by the lions. The Maldharis in the nesses inform the harijans about the dead animals as soon as they learn about them. Harijans also drive the lions away from the kills, thereby depriving them of their food. The harijans thus compete with the lion in prey utilization.

National park

The Gujarat State Wild Life Advisory Board at its 1968 session made decisions to upgrade the central portion of the Gir Sanctuary to the status of a national park. This would be a major step in protection for the sanctuary.

In 1952, the Indian Board for Wild Life adopted the following definition for national parks: "National Parks are areas dedicated by statute for all time to conserve the scenery and natural and historical objects of national significance, to conserve wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations, with such modifications as the local conditions demand."

The Board also prescribed certain standards before an area can be declared a national park, as follows:

1. National parks must be areas of national significance as a whole, of importance to the rest of the world and not of mere local significance.
 2. The natural scenic beauty of the area must be carefully preserved. This means there should be no forestry operation such as extraction of timber or plantation. Certain areas should be left strictly protected as "Sanctum Sanctorum" or "Abhayaranya."
 3. No foreign or exotic species of wildlife or plants should be introduced.
 4. Tourist facilities such as paths, roads, and resthouses should be made available inside the park.
 5. National parks must be of such a size as to make them viable ecological units, embracing the amount of territory required for effective administration and for the continuance of representative fauna and flora.
 6. Buffer belts or buffer zones of sufficient width should be constituted outside the boundaries of national parks.
 7. National parks are to be established by an act of the State Assembly and any change in the area thereafter can only be done on the recommendation of the Assembly.
- The areas selected for the park include (1) the hilly and undulating regions of western Gir with the deciduous forest, and (2) the vast plains of the eastern Gir with acacia, savanna-type forests, the natural habitat for a large variety of game animals. Roads have been kept as the boundary, as far as possible, to facilitate management and administration. The park area includes a number of perennial rivers and nallahs with abundant water.

Future proposals

The welfare of lions and the wildlife in the Gir Sanctuary has attracted attention of wildlife conservationists from all over the world. The latest census of lions in 1968 revealed that the population had shrunk from 266 in 1963 to 177 in 1968. An Expert Committee was appointed by the Gujarat Government to probe into the reasons for the decline. Among its various findings, the Expert Committee had mentioned the excessive grazing by the domesticated cattle, both resident and migratory, as an important factor responsible for the deterioration of the habitat. The Gir Sanctuary shows overwhelming evidence of

progressive and accelerated degeneration. Due to the unrestricted and unregulated heavy grazing by the cattle of Maldharis, the soil has become compact and the perennial grasses have been replaced by unpalatable grasses and weeds. Heavy grazing has also resulted in accelerated soil erosion causing immense damage to the fertility of the soil. The heavy grazing has prevented the natural regeneration, and this has been instrumental in the loss of tree cover. The range conditions have also been responsible for the low milk yield of the Maldhari cattle and helped make cattle breeding uneconomic. The Maldhari has also resorted to illicit cutting of the trees to help earn his living. This has contributed to further and faster deterioration of the habitat.

Due to adverse competition for grazing, the ungulate population has considerably decreased and, as a result, the lion has come to depend largely upon livestock.

The observations and findings of Paul Joslin (University of Edinburgh), K. T. B. Hodd (University of Aberdeen), and Stephen Berwick (Yale University), all of whom worked under the Gir Project, have further confirmed these facts.

In order, therefore, to (1) break this vicious circle which has been responsible for the disturbance to the lion and also to (2) ameliorate the poor social and economic condition of the Maldharis, the Government of Gujarat has decided on the following:

1. To close the Gir Sanctuary to grazing by domestic cattle from outside.
2. To shift the Maldharis and their livestock out of the sanctuary and resettle them on the peripheral areas in the Government wastelands.
3. To prevent entry of the Maldharis, once they are shifted and resettled outside the Gir Sanctuary, and also entry of outside cattle—all with a view to improve the ecosystem of Gir—it is considered necessary to protect the sanctuary area by a physical barrier.
4. To barricade all the watercourses crossing the sanctuary periphery by the construction of special types of barricades.
5. Construction of a peripheral road along the inner side of the fence for frequent patrol of the boundary and of the fencing.
6. To provide an alternate food supply to the lions during the interim period, after shifting the Maldharis, until such time as the ungulate population increases sufficiently to meet the total food requirement of the lions.

The Government is also actively considering an end to commercial exploitation in the Sanctum Sanctorum for 5 years to eliminate completely all kinds of disturbances. All these steps are aimed at restoring the ecological balance in the Gir and to ensure the survival of the lion and other wildlife in perpetuity.

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NATIONAL PARKS IN ARID REGIONS

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Maps showing the arid lands of the world (e.g. Tannehill, 1947; Meigs, 1953) show that about one-third of the land area, in some 60 countries, is arid; and that about one-eighth of the world population is associated with arid environment. The inauguration of the UNESCO Arid Zone Programme in 1951 symbolized worldwide interest in scientific inquiries dealing with arid lands. Throughout the 20 years that followed, regional and international arid-zone meetings were held in the six continents of the world, and numerous volumes were published containing results of arid-zone research. The world directory of Arid-Lands Research Institutions published by the University of Arizona Press (1967) lists some 200 centers in 39 countries.

The general feature of arid environment is that it does not provide for sustained crop production. But arid regions comprise a series of varied environmental complexes that form a graded continuum. Four nodal areas may be pointed out for defining the scope of this continuum: rainless desert, runoff desert, rainfall desert, and manmade desert.

1. Rainless desert

The so-called "rainless" countries are areas where rainfall is not an annually recurring incident; an episode ranging from 12 months to several years may pass before the recurrence of rain. Central Sahara (North Africa), Rub-al-Khali (Saudi Arabia), Takla Makan (Central Asia), and Atacama (South America) are examples of rainless deserts.

The accidental rainfall is often in the form of cloudbursts that are localized in their spread and not associated with a marked season; that is, it may happen in summer or in winter depending on the incidental association of cyclonic storms with moisture-bearing air masses. These "rainless" deserts are in most instances situated in regions transitional between tropical (summer rainfall) and Mediterranean (winter rainfall) climates: the Central Sahara and Rub-al-Khali deserts are representative examples.

Rainfall, whenever and wherever it happens, is often followed by the appearance of some plant growth and animal populations especially in favored localities where runoff water collects. This accidental vegetation-form (Kassas, 1966) comprises short-lived ephemerals and may include a few perennials that may subsist for more than a year; but the plant growth will usually last for a short season before it eventually dries back to dormancy that extends for several years. (For a botanical survey of a part of the rainless desert of Egypt, see Kassas and Girgis, 1971.) The temporary plant growth may be so rich that it attracts nomads and their herds who may travel for 200 to 300 kilometers to take advantage of this so-called *gizzu* grazing (Rattray, 1960).

The rainless deserts (e.g. Central Sahara extending across North Africa) embrace various forms of oases: riverfed (e.g. Nile Valley); underground-water fed (e.g. oases of Libyan Desert), and mountain oases (orographic-rain fed). The irrigated oases are completely transformed by man's activity, but other forms of oases may still provide refugial sites for floral and faunal elements that are of particular interest. Boulos (1968) records the rediscovery of the medemia palm *Medemia argun* in two uninhabited oases (Dungul and Nakhila) in the southwest desert of Egypt. This palm was apparently common in Ancient Egypt (Täckholm and Drar, 1950) but its present existence in Egypt was queried by Täckholm *et al.* (1956).

The Red Sea coastal mountains include several mist-oases (Troll, 1935; Kassas, 1956 and 1960; Kassas and Zahran, 1971). The inland mountains of Uweinat (southwest corner of Egypt and southeast corner of Libya) and the Tibesti, Ahaggar, and Tassili n'Ajjer plateaus (central Sahara) provide especially favored habitats amid otherwise very hostile territories. The records of *Dracaena ombet* in the mist-oases of the Red Sea mountains and of *Cupressus dupreziana* in Tassili n'Ajjer are examples of special interest. The records of addax *Addax nasomaculatus*, scimitar-horned oryx *Oryx tao*, barbary sheep *Ammotragus lervia*, etc., in Gebel Uweinat (Osborn and Krombein, 1969; Misonne, 1969, etc.) are examples of the interesting animal life associated with these special habitats.

2. Runoff desert

Rainfall, though low (less than 100 mm a year) and variable (e.g. average rainfall at Atbara, Sudan, is 70 mm a year, but 141 mm in 1911 and 18 mm in 1912), is here an annually recurring phenomenon. Seasonality is one clear attribute of this low rainfall. Winter (Mediterranean affinity) rainfall prevails in the northern Sahara and the Near East deserts, including the Red Sea coastal plains, etc. Summer (tropical affinity) rainfall prevails in the southern Sahara (Sudano-Sahelian belt), the Central Asian deserts, the deserts of Peru and central Australia, etc.

Perennial plantlife is confined to especially favored habitats: wadis, depressions, mountains, etc. For this reason it is described as runoff desert (Zohary, 1962), restricted type (Walter, 1963), or *mode contracté* (Monod, 1954). Vegetation comprises a skeletal framework of this perennial plantlife and waves of ephemeral plant growth that often outflow the limits of these special habitats during spells of rain. These short-lived flows of plant growth eventually dry up and plantlife—as it were—recedes to the specially favored habitats. This dynamic rhythm of plantlife repeats itself on a seasonal basis, though the density and spread of plantlife vary considerably from one year to the other as does the volume of rainfall.

3. Rainfall desert

Rainfall is still below the requirements of sustained crop production: 100–200 mm a year with clear seasonality in most instances. Perennial plantlife, though much more dense in especially favored habitats, is widespread (diffuse) and not confined to water-collecting areas.

Within the range of the above-mentioned three types of desert, plantlife is intimately related to features and patterns of landform that control the processes of water and soil (surface deposits) redistribution. Levels low in relation to local topography receive runoff water and soil collected from extensive catchment areas. The thickness of the soil layer has a great effect on the moisture regime. A shallow soil is moistened during the rainy season and is subject to complete desiccation in the long rainless season, a situation that may allow for short-lived ephemeral plant growth. A deep soil allows for moisture storage in deeply seated layers which may provide the deep roots of perennials with a sustained supply of moisture. This explains Shreve's (1951) statement: "The profound influence of the soil upon desert vegetation is to be attributed to its strong control of the amount, availability, and continuity of the water supply." For detailed discussions on vegetational relationships with landform patterns in deserts see Kassas (1952, 1953, 1956a, 1960, 1966).

4. Manmade desert

Extensive areas of semiarid steppe country (rainfall more than 250 mm a year) have been transformed into desert due to ill-advised land-use pressures. This process of desertification has been described by scientists all over the world. Newman and Condon (1969) quote James Cotton (Stock Inspector at Cobar, Australia, in his evidence given before the Royal Commission, Report published in 1901):

"In the years 1880 and 1881 . . . the country was covered with heavy growth of natural grasses—kangaroo grass, star grass, blue grass, mulga and other grasses. . . . The ground was soft, spongy and very absorbent. One inch of rain in spring or autumn produced a luxurious growth of fresh green grass. . . . The country abounded also with numerous edible shrubs and bushes, and pine scrubs and other noxious scrubs were not noticeable. . . . There has been gradual deterioration of the country caused by stock which has transformed the land from its original soft, spongy and absorbent nature to hard, clayey, smooth surface, which instead of absorbing the rain, runs it off in a sheet as fast as it falls carrying with it the surface mould, seeds of all kinds of plants, sheep manure, sand, etc."

This process is further explained by Beadle (1948, 1959) who shows that overgrazing leads to degradation of pasture: (a) decrease and eventual disappearance of perennial fodder plants, (b) increase and eventual dominance of less palatable species, and (c) further degradation leading to removal of surface layer of soil by erosion. The result of erosion depends on the structure of soil and may be mobile sand dunes, "scalds," etc. Downes (1959) states that in semiarid parts of Australia, "the result has been large areas of scalded plains on which there is not a vestige of vegetation and the bare soil is in such a condition that it will not readily permit the entry of water."

These are features similar to habitat degradation described in North American semiarid country by Sears (1935), Branscomb (1958), Ellison (1960), Buffington and Herbel (1965), etc. For instance, Rockie (1950) states: "The rangelands of our western states also tell a story of despoliation. . . . Essentially the error involved grazing too many animals on too little land for too long a time and at the wrong time. . . . Gradually the more

palatable plants became weaker until, in time, they died . . . other unpalatable plants filled the bare spots. . . . With the decrease in cover, excessive trampling and packing of the soil followed. Inevitably, the sequence of events was followed by accelerated erosion." Lewis (1969) referring to desertification as induced regression, states, ". . . The vegetation is closely grazed. . . . mulch cover is reduced, microclimate becomes drier and more severe . . . water infiltration is reduced, run-off increased, and man-made drought is produced."

The desert creep in North Africa on both sides of the Sahara has been described by many authors including Stebbings (1937, 1938, 1953), Andrew (1944), Aubreville (1949), Arkell (1950), Shawki (1956), Monod (1958), Quézel (1958), Halwagi (1962 a & b), Le Houérou (1968) and Kassas (1968). The process is often described as comprising reduction of perennial plant cover, impoverishment of flora, soil erosion, formation of mobile sand dunes, and establishment of desert pavements; and is attributed to overgrazing, cutting, shifting cultivation, and other aspects of mismanagement of natural vegetation. Le Houérou (1970) estimates that "Desertification along the Saharan border probably proceeds at a rate of more than 100,000 hectares per year for the whole of North Africa. Many of these zones are man-made deserts."

Comparable, though less spectacular, forms of habitat degradation are described in semiarid parts of South Africa (Scott, 1951; Acocks, 1953, 1964; Talbot, 1961; etc.). There is also reference to "man-made deserts of Kenya and Tanzania" (Curry-Lindahl, 1968).

Degeneration of plant cover is followed by disappearance of animals. Cloudsley-Thompson (1970) writes: "In the journal of his journey up the Nile, in the years 1821 and 1822, Linant de Bellefonds commented on the woodedness of the countryside of the northern Sudan and mentioned that he heard a lion roaring at Ed-Debba near Old Dongola. In 1835, G. A. Hoskins wrote that lions were plentiful around Shendi, 190 kilometers north of Khartoum, and, in 1833, F. L. James recorded an abundance of game at Kassala." Similar accounts of animal life in semiarid Sudan are found in 19th century literature and "make almost incredible reading to anyone familiar with the barren appearance of these places today" (Cloudsley-Thompson, 1970a).

Historical reserve systems in Arabia

Draz (1965, 1969), Klemme (1965), and others describe ancient systems of range reserves (*Hema* or *Ahmia* in Arabic, *Koze* in Kurdish) "established throughout the mountains sections of western Arabia, extending from the Yemen frontier up north to Medina and perhaps even farther. . . . This practice . . . antedated Mohamed (seventh century) by several centuries (Klemme, 1965). Draz (1969) quotes *Hema Al-Rabza* (near Dariya in Saudi Arabia) protected by the Second Caliph (A.D. 634-644), with an estimated length of 250 kilometers. These reserves were apparently widespread. Draz (1969) records, for instance, 30 *Hemas* in the Taif area (Saudi Arabia), and states that surveys in Syria "revealed the presence of a large number of *hema* reserves (*Koze*)."

The objectives of these *Hema* reserves were varied and so was the system of their management. According to Klemme (1965), "some were reportedly set up by the military as a

place to hold camels, horses and donkeys during periods of inactivity. Others were established by local communities for various purposes. Some were reserved for the production of wild hay. Some were for dairy animals only. Others permitted all classes of livestock, but placed certain restrictions on number (of animals) and seasons of use . . . areas were set aside as a place for pilgrims to leave their animals while on the *Hijj*." Philby (1957, p. 10) describes the site of a *Hema* that is evidently associated with the management of a watershed: ". . . we came to al-Birka, an exceptionally fine specimen of the many great reservoirs scattered about the Arabian desert along the various routes by which in former times the pilgrims of Iraq and Persia traversed the Peninsula on their way to Mecca and Medina. . . . The reservoir of al-Birka is situated at a point where numerous runnels of the westward drainage system met from various directions to pour their floods into a rectangular catchment tank. . . . The whole of the area surrounding the reservoir to a great distance in every direction had until recent times been known as the *Hema* of Hanakiya, strictly reserved for the grazing of the royal camels. But the displacement of the camel by motor-transport has deprived it of its old importance; and Ibn Saud (the King) had recently relinquished his grazing privileges in the area in favor of the Badawin breeders."

Draz (1969) enumerates the following forms of *hema* management: (a) grazing prohibited, grass cutting permissible by controlled license during specified periods and droughts; (b) grazing and grass cutting permitted in certain season; (c) grazing allowed the year round, but number of animals controlled; (d) reserved for beekeeping; and (e) tree reserves where tree cutting prohibited.

This traditional system was abandoned in Saudi Arabia through misinterpretation of a Royal Decree issued in 1953; *hemas* were open and became accessible to everyone. Klemme (1965) reported that ". . . after ten years or so of unrestricted use . . . these formerly good grazing lands that had been protected for centuries have been reduced to a condition little better than that of the surrounding area." Draz (1969) adds, "Resultant denudation of the plant cover in these range reserves led to serious soil erosion . . . most ancient dams and water conservation systems which previously worked efficiently under prevailing climatic conditions and protective measures of the *hema* system, failed to withstand the flooding and siltation that occurred when protective vegetative cover was destroyed."

Natural reserves in arid Australia

It is no exaggeration to say that Australia was, until some 150 years ago, a large nature reserve (Carrick and Costin, 1959). The continent was thinly populated, its aborigines were few in number, and their environmental relationships exerted little pressure on the natural ecological systems, especially in the more difficult habitats including arid territories. The fauna and flora of Australia were not only rich and varied but also comprised several endemic taxa of unique scientific and esthetic attributes.

The recent development of land use in the arid parts of Australia (Wadham, 1961) is in many ways comparable to development of land use in certain parts of the world including North America (Logan, 1961) and South Africa (Talbot, 1961), and is radically different

from the situation in other parts of the world including North Africa (Monod and Toupet, 1961). Similarities or differences are here related to historical aspects of human occupation and to present stages of economic and sociocultural development. Our discussion of the Australian case is meant to illustrate the basic problems of nature conservation in arid countries.

During an initial phase (19th century) the principal land use of the arid parts of Australia was grazing, and development faced serious setbacks, due mainly to droughts. During the last decade of that century pastoralists tried "to meet the fall in their incomes by increasing the number of sheep and cattle they carried. The recorded figure for the sheep population in 1891 is 106,421,068. In addition rabbits... increased enormously in numbers..." (Wadham, 1961). The droughts of 1901-5, 1914, and 1943-44 focused attention on problems of arid and semiarid territories, and modern systems of land use incorporating sympathetic attitudes toward conservation of natural resources gradually evolved. This is described by Whyte (1957): "Under a modern system of land use based on the conservation of natural resources and their improvement, costs are necessarily higher than under an exploitative system. The cheap food era... is being replaced by a period in which there is increasing realization of this fact, and of the urgent necessity to restore damage which has been done."

Considerable progress has been made in recent years (1950-70) in Australia toward the establishment and extension of national parks and natural reserves. Costin and Mosley (1969) estimate that the area of natural reserves of arid Australia amounts to some 13 million acres (about 1 percent of Australian arid lands). Tanami Desert Sanctuary (9,273,600 acres) and Simpson Desert National Park (2,956,800 acres) contribute the principal areas of the reserves. The situation of these Australian reserves represents a large-scale example of achievements and problems involved in natural reserves of arid lands.

1. Choice of area. The Australian Academy of Science report on National Parks and Reserves in Australia (1968, pp. 19-20) shows that many reserve areas are chosen for their scenic attraction. Costin and Mosley (1969) state, "Most of the reserves have been chosen largely on a scenic basis or simply because they were available." They show that coverage of major communities is incomplete and quote the widespread and important Mitchell grass *Astrelba* spp. and old man saltbush *Atriplex nummularia* as examples of communities that are not extensively protected, while many minor communities and individual species of flora and fauna may be overlooked.

2. Conflict of interests. The Australian Academy of Science report on National Parks and Reserves in Australia (1968, p. 19) refers to places that remain undeveloped because of remoteness and that may form national parks of great interest, but that are now set aside as large aboriginal reserves. The report does not advocate the revocation of aboriginal reserves, but "if land is ever released from such reservations" it could form valuable addition to the national park system of the country.

3. Territorial and State interests. Political divisions, whether national (provinces, states, etc.) or international (countries), are often biologically unnatural. Boundaries of natural reserves often need to transcend political borders. This could be resolved in Australia through State-Commonwealth cooperation and organization of mutual responsibilities

for principal reserves. One finds in the Australian Academy of Science report (1968, p. 19) the statement: "If the States, South Australia and Western Australia, together with the Commonwealth with respect to the Northern Territory, would agree to pool their resources... they could create a great National Park." The report adds, "The most significant feature of National Parks administration during the year (1967) was the proclamation of a reservation over about 1,248,000 acres of the Simpson Desert situated in the far south-western corner of the State (Queensland) adjoining the borders of South Australia and the Northern Territories..." In sympathy with this Queensland move, the South Australian Government subsequently dedicated the Simpson Desert National Park of 1,708,800 acres..."

As an example of an area that needs to be conserved, we may quote the Gebel Elba district on the Sudano-Egyptian border (Latitude 22° N.). This coastal area comprises a series of mountains that form mist oases and represent the northeast outpost of the flora (and fauna) of the Ethiopian highland. (See descriptions of plantlife in this area by Schweinfurth, 1865; Troll, 1935; Drar, 1936; and Kassas and Zahran, 1971.) Yet this area is still the subject of a border dispute between Egypt and Sudan, a situation that is politically too sensitive for scientists to suggest practical steps for the establishment here of a natural reserve, although it would be of invaluable scientific interest.

4. Recreation and tourism. Tourism has become one of the largest items of world trade (Piesse, 1968) and is increasing at rates that will substantially escalate in the postindustrial eras of the next century. Costin and Mosley (1969) refer to the increasing tourist pressures in arid Australia, and quote the numbers of visitors to the Northern Territory as 28,000 (spending \$4 million) in 1964 and 41,000 (spending \$13 million) in 1966. Perry (1970) believes that the recreational potential of arid Australia is as yet virtually untapped, and tells us that the present tourist industry is concentrated around Alice Springs in central Australia. Tourists are attracted by remoteness, vastness, spaciousness, spectacular scenery of barren mountains, and strong colors of eroded landscape that are characteristic of arid lands; they are attracted less by particulars of flora and soil.

Logan (1961) refers to a tremendous recreational development in the warm-winter portions of the American deserts. But tourism and recreation require, as Drouhin (1970) says, "infrastructures such as freshwater supply, improved hotels and camping facilities, improvement of trails leading from centers of habitation to points of major interest, airstrips." The large-scale development of these recreation requirements may not be compatible with proper management of natural reserves.

5. Flora versus fauna: conflict in management. Conflict between requisites of plantlife and animal life may be a problem of natural-reserve management in all types of biomes. It is particularly obvious in semiarid territories where fire is often used for maintaining tracts necessary for easy movement of animals and for initiating some fresh plant growth. Fires are often too destructive to plantlife. But, as the Australian Academy of Science report (1968, p. 24) states, "Biologists claim that controlled burning, especially as practiced in Australia, destroys, or at least greatly alters, the ecosystem. Foresters disagree." Brynard (1964) gives a detailed discussion of this point.

In arid lands, the balance between plantlife (sparse vegetation and little primary production) and animal life is precariously maintained. Protection of animal life may increase

populations beyond the austere carrying capacity of the ecosystem. Arid zone reserves need to be extensive in area if they are to be representative of the variety of habitat and biota, and population management may not be easily practiced. It will also be noted that arid lands are subject to dramatic fluctuations due to incidence of exceptionally wet or exceptionally dry years (Kassas, 1968). The short-term and long-term effects of such incidence on animal life may not be on a par with their effect on plantlife. This poses special problems of management of reserves.

6. National development and conservation. The Australian success in establishing and maintaining arid zone reserves as parts of a national network of natural reserves, is an example of the close links between national development and conservation achievements. The availability of alternative choices of production, level of infrastructure development (roads, telephones, services, etc.), level of economic prosperity (availability of funds from governments and private sources), level of sociocultural sophistication including public awareness of such issues as need for nature conservation, etc., are all aspects that explain the contrast between natural reserves in Australia and in the less developed countries of the North African Sahara (Adam, 1968; Kassas, 1970).

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MOUNTAIN NATIONAL PARKS AND NATURE RESERVES

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The mountain national parks and nature reserves are of outstanding economic, scientific, and cultural value. Mountainous regions are like islands on plains and have exclusively specific natural conditions. All the anthropogenic impacts manifest themselves much clearer in mountains than on plains. The processes occurring in mountain areas determine to a great extent the destiny of nature and economics of lower regions. Excessive pressure of man on the mountain ecosystems (e.g., unwise cutting of forests or cultivating slopes) destroys soils and worsens hydrological conditions; storms, floods, landslides, and avalanches become more devastating; mud and stone streams rush down, destroying roads, waterworks, filling existing water bodies, and, when reaching the plains, overwhelm cultures and can enormously damage the local economy. In the U.S.S.R. and in West Europe, in Asia, and in America, millions of tons of fertile soil each year are washed down from mountain slopes and transported into lakes, seas, and oceans. Establishing national parks and nature reserves in mountainous regions hinders and may even stop such disastrous phenomena.

The mountain forests within national parks and nature reserves of the Caucasus, Middle Asia, the Carpathians, Southern Europe, and other mountain regions allow many valuable wild parents of cultivated fruit or nut trees to survive while these species may have been destroyed by man on the plains. Let us remember the wild pear, apple tree, plum, pistachio, pomegranate, fig, cornelian cherry, some nuts, etc. These wild parents that have been protected within mountain national parks are a precious gene pool to strengthen plant-breeding programs.

The mountains of Middle Asia, Caucasus, and Siberia harbor many valuable relict plants which have survived from prehistoric times (*Myricaria*, wild wheat and others). In 1972 the Central Laboratory of Nature Conservation of the U.S.S.R., Ministry of Agriculture, succeeded in establishing in Armenia some small special nature reserves for the protection of wild wheat, parents of the modern widely cultivated plant. These wild species are highly drought-resistant, less capricious as to their environment and, consequently, very valuable for plant breeding.

Moreover, in protected forests many relict tree species occur: yew box (Caucasus, Spain), white cedar (Japan), cherry-laurel, strawberry tree, *Pinus eldarica*, *Zelkova carpinifolia* (Caucasus), some *Juniperus* species, *Populus balsamifera*, etc. The protection of these plants is of special interest for science and culture.

Alpine meadows differ considerably from those of plains and are very special natural

features. Due to strong ultraviolet radiation, the alpine meadows of the Caucasus, Middle Asia, and the Alps manifest a high productivity and provide for a high quality of husbandry production. But because of overgrazing and generally inadequate pasture management these meadows are degraded and suffer through changes in their floristic composition. National parks and nature reserves can, therefore, play an important role in the preservation of alpine meadows.

Our observations in the Caucasus mountains show us that the hydrology of foothills and adjacent plains is determined mainly by the mountain forests rather than by alpine meadows, contrary to what is usually believed. The soil in the forest does not freeze in winter and so absorbs all the snow water and the spring flow, while the meadow sod, frozen in winter, is unable to absorb and retain the spring flow.

Within the upper parts of some mountain national parks and nature reserves, and in association with alpine meadows and below them, one can find large areas of marshes and peats. According to our studies, carried out in the Caucasus and the Middle Asia mountains, the streams born in these marshes and peats usually have a rich and stable runoff and so provide for a good hydrological regime of the agricultural land lying below. Evidently the alpine peats absorb huge quantities of snow and rainwater and become storage reservoirs which feed the streams. An excessive use of peats and their improvement for economic purposes bring on a disruption in the natural balance, a drying of the area; the rivers of the country lying below become shallow, the springs weaken, the air humidity decreases, droughts start to affect the fields, and the peat animals disappear. In mountainous Armenia, for example, one marsh at 2,500 meters elevation above sea level was drained and transformed into grassland; 2 or 3 years later the water supply of the plain below had shrunk. Thus, national parks and nature reserves are of paramount importance for the protection of important marshes and peatlands.

Much attention should be given to the protection of rare and vanishing animals characteristic of alpine fauna: *Ovis ammon*, *Capra sibirica*, *C. cylindricornis*, *C. caucasica*; *Eulabeia indica*, *Tetraogallus tibetanus*, and many others. Formerly, *Ovis ammon musimon*, *Capreolus capreolus*, *Cervus elaphus* e.a. were common in the middle-altitude forest zones of the Caucasus, Tien Shan, and Alps, but, owing to human activity, these animals moved up and now can be observed only at high altitudes. Through adequate protective measures, the Kavkazski zapovednik (a large Soviet nature reserve in the western part of the Main Caucasus Ridge) succeeded in preserving and actually increasing the number of valuable species such as *Capra caucasica*, *Rupicapra rupicapra*, and *Cervus elaphus*; once close to extinction, the bison, *Bison bonasus caucasicus*, is now very common in this reserve. During the 13 years of the existence of Khosrov Nature Reserve in the Armenian mountains, the number of large animals doubled (*Capra aegagrus*, *Ovis ammon*, *Cervus elaphus*, *Ursus arctos caucasicus*, *Panthera pardus*). The establishing of national parks and nature reserves is clearly a sure way to safeguard endangered animal species inhabiting mountains.

The role of insects (bees, *Bombus* spp., ants, dragonflies, some beetles and butterflies, etc.) is often underestimated. But they ensure the pollination of cultivated and meadow plants, and their activity determines the productivity and feeding quality of alpine meadows. Due to the decreasing number of beetles which pollinate tulips, these beautiful flowers

have become a rarity in the Tien Shan Mountains. Several relict species of insects (e.g., the giant beetle *Callipogon relictus* and *Cerambyx liciola*—red glowworm—in the Soviet Far East) are of a great value for science as living fossils. These insects are our friends since they control pests in mountain forests and alpine meadows. For their protection, it is necessary to create special reserves, usually of a modest size.

Intensive industrial development consumes a huge quantity of resources and, of course, leads to vast plowing of the plains and foothills, reducing the green cover of the earth; soil erosion increases, crops decline, the climate worsens, and water resources suffer depletion. Consequently, the food and raw materials for man's vital needs are decreased. But in the plain regions which have protected natural areas above them such sinister worsening of natural conditions does not happen. An example is Khosrov Nature Reserve in the Armenian mountains; in the areas below this reserve, disturbances of ecosystems are not observed; the biological balance is almost unaffected. Thus, national parks and nature reserves in the mountains actually protect the plains and this is their particular virtue.

The main scientific value of mountain national parks is the possibility which they offer to study interrelations and interdependences between natural components. Such studies permit us to understand laws of the evolution of the natural environment as a whole, and to elaborate scientific elements of the management and of the control of natural processes for a wise and rational use of natural resources to satisfy man's needs. These studies could be much more successful if the network of special research stations in mountain national parks were more extensive.

Recent explorations of mountain areas in Armenia, Azerbaidjan, and Georgia enabled the discovery of many new species of plants. These unknown and unstudied species are considered to be of great scientific and cultural value.

In order to build up a basis for projects of mountain ecosystem protection, the Mountain Committee of the IUCN Commission on Ecology has started to collect and record scientific publications on research and conservation carried out in many mountain countries of the world.

The nature reserves of the Caucasus are used for practical lessons by the students of biological and geographical departments of our universities, i.e., these nature reserves (*zapovedniki*) become bases for the training of professional naturalists and biologists. A large number of young people study the natural mountain environment and, when reading the great book of nature, they become friends of nature, worthy citizens and scientists; their creative activity can help make man's life more meaningful and beautiful. That is why all the students of the universities of Erevan, Tbilisi, and Baku have joined societies for nature conservation and repeatedly visit the nature reserves.

The clean, unpolluted environment of the mountains attracts many tourists and vacationers. Their number increases here along with urban development and population growth in industrial centers. The mountains are a preferred recreational area for urban people. This aspect is to be studied especially. The recreational potential of every mountain area, including national parks, must be carefully determined. The recreational explosion demands an extension of building activity, but this must not damage the beauty of mountain landscapes. It is necessary to avoid an excessive "beautification" of nature,

and changes in the landscape, particularly through introduction of plants, must be avoided. Various structures to be erected as recreational facilities should always be as unobtrusive as possible and be in harmony with the landscape. More attention should be given to ensuring silence, which is one of the most imperative conditions for man's relaxation.

Within many national parks and nature reserves, there are magnificent creations of nature—caves, those mysterious labyrinths, underground workshops of nature, *terra incognita* with wonderful stalactites and other formations, with relict fauna, prehistoric drawings, etc. Such caves are abundant in Yugoslavia, Austria, Bulgaria, Czechoslovakia, in the United States, and in the U.S.S.R. (in the Caucasus, in the Crimea, the mountains of Middle Asia, and the Far East).

Numerous and often very attractive waterfalls, volcanoes, geysers, giant canyons, and other wonders of nature have a great recreational value. Being of true scientific and cultural interest, they are also pleasuring-grounds for visitors. But increasing visits make special measures imperative in order to prevent deterioration of landscapes as the result of mass concentrations of people.

Mountain national parks of the world are to preserve picturesque landscapes, to ensure the protection of the organic life and inorganic formations, to prevent their unwise use, and to harmonize man's structures and natural beauties.

SESSION VII / PAPER 19

MANAGEMENT OF MOUNTAIN HABITAT ON A DENSELY POPULATED TROPICAL ISLAND

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Mountains, with their perpetual snowfields, exposed rock formations, waterfalls, canyons, and especially adapted plant and animal life, are among the most spectacular features of nature. They are vulnerable, however, to the forces of erosion. Their exposed surfaces weather and wear away rapidly, a process easily and tragically accelerated by man. Mountain habitats merit the special measures necessary for their conservation. Mountain habitats are especially vulnerable in the Tropics. There the hazards of accelerated erosion are extreme, yet mountain climates are preferred for human settlement and agriculture, both of which lead to drastic modification of the habitat. Isolated mountains tend to develop unique habitats. Plant and animal species adapted to the uplands are generally confined thereto by surrounding, very different, lowland

habitats. The seas which surround insular mountains present an even better barrier. Continued evolution in isolation leads eventually to new and unusual forms of life adapted to only an extremely limited geographical area. These species are unique, yet easily exterminated by modifications in the habitat caused by man.

The mountain habitats of the Caribbean Archipelago, a group of tropical oceanic islands, should, by this reasoning, have produced many species which are both unique and vulnerable. Their vulnerability should also have come to light because many of these islands are subject to the pressures of a dense human population. The result has been that 87 species of vertebrates (41 mammals, 21 birds, and 25 reptiles and amphibians) have been exterminated from these islands within historic time (Westerman, 1953). An additional 36 species are threatened. Habitat destruction is considered the main cause for these losses. The results of efforts to manage mountain habitat on Caribbean islands should be of general interest. Within the Lesser Antilles alone, there are 10 islands with 19 mountains considered of park quality (Carlozzi, 1965). The Caribbean is a part of tropical America, a region of many mountain habitats needing management. Finally, the Caribbean islands are already subject to the pressures of human population which may well be in store for many mountain habitats elsewhere. A mountain habitat of the Caribbean which has long been under management is the upper Sierra de Luquillo, in northeastern Puerto Rico. Although not a national park, its size, features, and objectives of management meet most of the qualifications for national parks proposed by the IUCN (1969).

The Sierra de Luquillo

The Sierra de Luquillo is an isolated mountain range in 18° N. Latitude (fig. 1). What is now Puerto Rico has never been connected to any continent, yet has been exposed above the sea for about 100 million years (Monroe, 1972). The nearest continent, South America, is 740 kilometers distant. In the direction of the prevailing winds and ocean currents there are no major landmasses or similar mountains for 4,000 kilometers. The Sierra de Luquillo rises isolated from the Cordillera Central of Puerto Rico to slightly more than 1,000 meters elevation. Its area (above 150 meters elevation) is about 20,000 hectares.

Of the five life zones (Holdridge *et al.*, 1971) represented in the Sierra de Luquillo (Whitmore, 1972), only the subtropical moist zone, making up 10 percent of the mountain, is contiguous to similar conditions outside the area. Two others, the subtropical and lower montane wet zones, making up 76 percent of the mountain, are separated from the nearest homocline in the Cordillera Central by a distance of from 30 to 75 kilometers to the southwest (leeward). The other two—the subtropical and lower montane rain forest zones—are isolated by at least 400 kilometers, the first to the southeast in the Lesser Antilles and the second to the west in Hispaniola. Two azonal forest associations at high elevations, the palm (edaphic) and dwarf (atmospheric) forests, have their nearest counterparts in the Cordillera Central, 30 kilometers to the southwest.

The natural forest of the Sierra de Luquillo exhibits the effects of its isolation. Of the more than 200 tree species native to the mountain, 30 percent evolved within Puerto Rico (and are not found elsewhere) and 13 percent evolved on the mountain itself (Little, 1970).

On the peaks, where the effects of isolation are most pronounced, as many as 90 percent of the trees are of species which evolved on the mountain (Woodbury, 1972). The animal life also reflects isolation. In the 100 million years before discovery by the Europeans, terrestrial mammals apparently never reached and became successfully established on Puerto Rico. Of the 40 species of land birds resident on the mountain (Kepler and Kepler, 1970), 10 evolved within Puerto Rico and one apparently on the mountain itself. Two species of amphibians and at least 200 species of insects are also endemic to the mountain (Drewry, 1972).

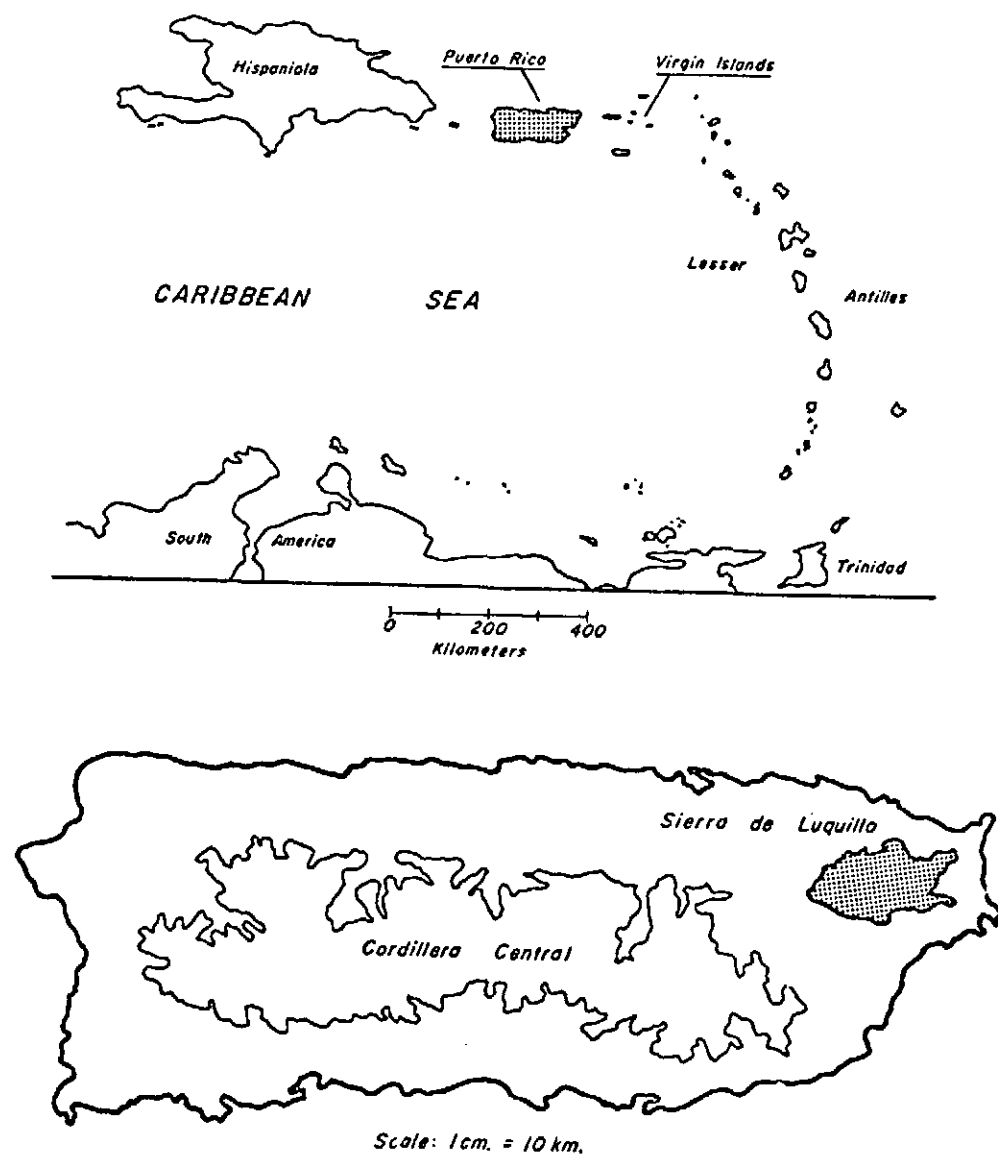


Figure 1. The Location of Puerto Rico and Sierra de Luquillo.

The history of management

There is no evidence of prolonged human occupation of the Sierra de Luquillo prior to the 19th century. Agriculture began in about 1820, and, by 1900, about three-quarters of the mountain, including most of the slopes below 500 meters elevation, had passed into private ownership. A population of 8,500 lived within this area, and more than 80 percent of the private land had been logged and/or deforested and farmed. The remaining Spanish Crown Lands were managed as a forest reserve from at least 1880 to the end of the century.

In 1903, after the change in government, the former Crown Lands, then some 5,000 hectares, were proclaimed anew a forest reserve, and later as Caribbean National Forest. Disposal of public land ended. Until 1930, administration was concerned largely with prevention of timber trespass. No sales of timber were made during this period. Since that time, an additional 6,300 hectares of land have been acquired, bringing public ownership to 56 percent of the mountain. The entire area was, in 1946, declared a wildlife refuge. Three years later a tract of 850 hectares of contiguous unmodified stands of four forest types was designated a research natural area, to be left unaltered in perpetuity. Research on the composition, structure, and growth of the forests of the mountain has been under way for 40 years.

National forest policies encourage use of the resources as well as their protection. To these ends both recreational and extractive uses and privately owned developments may be authorized if consistent with resource protection. Thus, in the Sierra de Luquillo, lands could be acquired even where it was necessary to leave their former owners temporarily cultivating them. Some 3,000 hectares of the deforested lands acquired were reforested with timber trees. Research and pilot timber management have been directed toward making these lands productive of timber and utilizing the crops they produce. At a central location with an elevation of 700 meters, a resort, including cabins, restaurant, and picnic facilities, was constructed by the government. Private construction of 40 recreation cabins and a youth camp was authorized under permit. Thirty-five permits for rights-of-way to transport water from river and streams for domestic and municipal purposes have been issued. Construction and operation of electronic communications facilities on two of the peaks have been authorized. To serve these uses, 80 kilometers of roads and 50 kilometers of foot trails have been constructed.

The areas assigned to these several uses are summarized in the following table.

Present land use within Caribbean National Forest

Primary land use	Present condition of the cover		Percent
	Unaltered hectares	Altered hectares	
<i>Forestry research</i>			
Ecosystems (natural area)	850		59.9
Silviculture	600	1,780	
Pilot timber management		2,740	
Reserve for watershed management	90	700	39.1
<i>Forest recreation</i>			
Developed			
Intensive		20	
Protective	350		
Reserve			
Intensive		90	1.0
Protective	1,240	240	
Wilderness	2,480		
<i>Other uses</i>			
Communications		40	1.0
Administrative sites		60	
Roads		10	
<i>Total</i>	5,610	5,680	100.0

It is apparent from the table that nearly all of the habitat acquired by the government in unaltered condition has so remained. The total forested area on the mountain is about twice as large as it was in 1930. No plant or animal species is known to have disappeared from the area, although the forest is the last retreat for a parrot on the verge of extinction. The contrast with the rest of Puerto Rico is becoming very sharp. On the privately owned foothills of the Sierra de Luquillo the population has reached 16,500, or nearly 200 per square kilometer. Since metropolitan San Juan, with a population of 840,000 (vs. 235,000 in 1930) has sprawled to within 15 kilometers of the base of the mountain, agriculture in the foothills is being replaced by residential use. More than 99 percent of the natural vegetative cover of the rest of Puerto Rico has been destroyed or altered, so that the Sierra de Luquillo now contains more than half of the unaltered vegetation of the island. Less than 3 percent of the rest of the island is legally preserved as forest, and none of the few relics of primary or relatively unaltered ecosystems outside the Sierra de Luquillo is proclaimed as a natural area.

Growing population pressure is also manifest within the publicly managed mountain habitat of the Sierra de Luquillo. During 1970 there were more than a million visitor-days of use within the public lands. This impact is concentrated on less than 100 hectares. About 40 percent of the use is picnicking, 30 percent touring for pleasure, and 10 percent organizational camping. Tent camping and hiking off constructed trails are insignificant. Introduced animals and plants are less particular. The Norway rat and the mongoose are both widespread, having invaded even the primary forest. Abandoned cats and dogs have become feral in areas frequented by visitors. Aggressive exotic plants such as *Impatiens* and the tree *Eugenia jambos* have also invaded the habitat, probably never to leave it.

Human pressures of another type, less visible, are nevertheless persistent. These are proposals for changes in the habitat which appear unnecessary, incompatible, or potentially harmful, and have therefore been disapproved administratively. Extreme, but not uncommon, examples include amusement parks, botanical gardens, zoological gardens, roving food vendors, hotels, public roads to the peaks, tramways, trailer camps, overhead powerlines, private clubhouses, military training exercises, churches, commercial farming, hunting and trapping of birds, and insect eradication by aerial spraying.

Lessons from experience

Management of the habitat of the Sierra de Luquillo was first undertaken many years ago, when policies were untested locally. Changes in the size, mobility, and demands and needs of the Puerto Rican population have been a severe test for the durability of any policy. Therefore, whereas many of the more basic goals appear to have weathered these changes, a number of policies have been revised to meet them. Among these, three may be of general interest:

1. Combined cultivation of agricultural and forest crops did not provide, as had been hoped, a land use which would sustain the families "acquired" with the new public lands. A suitable rapid-growing tree adapted to the sites was not found before social and economic changes elsewhere on the island made agriculture on the mountain unpopular. As a result, 15 years ago, the families moved outside of the public lands and all cultivation was discontinued.
2. Overnight facilities have become incompatible with the objectives of habitat management. New roads have brought the most remote roadside point in the mountains to within an hour of San Juan. Picnicking use serves far more people per unit of land area on sites such as those used for cabins, and cannot now be accommodated on developed picnic areas. All publicly owned cabins have been converted to picnic shelters and one-fourth of the privately owned cabins have already been removed.
3. Electronic communication facilities permitted on the peaks constitute a potentially serious esthetic conflict with new prospects for recreational demand for these same peaks. Alternative communication sites are being evaluated. In the meantime, a moratorium has been placed on further expansion of facilities on the peaks.

Looking ahead

The population of Puerto Rico is expected to double in the coming 30 years. Tourism is expected to increase manyfold. The scientific, educational, and recreational values of the mountain habitat will grow apace. Continuation of present policies in the management of the public lands in the Sierra de Luquillo will increase still more the already sharp contrast with the rest of Puerto Rico. Whereas future public appreciation of this contrast might grow to a point that it will eventually vindicate these management policies, the restraints required, so apparently absent in the feverish construction of a suburban environment with high-rise apartments in prospect outside the boundary, must be justified now.

How must this apparently anomalous situation be met? Certainly not without a very high order of planning—planning based on broad support from an enlightened community and providing for maximum prolongation of open choices among land uses which can accommodate intensification without intolerable deterioration of the habitat. Indicated steps toward these ends include the following:

1. Intensification of interpretation of the mountain habitat to the public with emphasis on those features which merit public appreciation and concern. Integration of the interpretive program with public school curricula.
2. Development with representative groups from affected communities of a set of physical, social, and economic goals for the mountain habitat, in terms of ecological values to preserve and compatible locations and intensities for each use of the area consistent with protection of the habitat.
3. Development from the local community goals, coordinated with national policies, of a plan for integrated protection, development, and use of the public lands. Incorporation of the elements of this plan into the interpretation program described under step 1, above.
4. Comprehensive study of the various ecosystems of the Sierra de Luquillo to provide information for improved interpretation to the public and to identify sensitive indicators of environmental change or deterioration.
5. Full utilization of the recreational resources of the lower slopes within the public lands on the mountain to minimize prospective pressure on the more fragile uplands.
6. Encouragement of the development of alternative forest recreation opportunities in the Cordillera Central to share the growing population pressure.

The ultimate character and quality of mountain habitats will be as good as the public demands, or as bad as the public tolerates. No amount of governmental administrative genius can change this unless it is directed toward (1) edification of the public, (2) full understanding of current motives for public attitudes, and (3) anticipation therefrom of trends in time to prevent foreseeable conflicts from compromising enlightened policies.

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SESSION VII / PAPER 20

NATIONAL PARKS IN WET TROPICAL AREAS

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In the 100 years since Yellowstone National Park was established, national parks have been set up in all the larger, and many of the smaller, countries of the world, though not all areas designated as national parks fit the somewhat exacting definition demanded for inclusion in the *United Nations List of National Parks and Equivalent Reserves* (Ed. 2, 1971). In addition to the several hundred parks which are included in the list, there are in many countries numerous other protected areas. These are not nationally controlled, or are too small, or in some other way do not measure up to the requirements of the United Nations List. Many are of great scientific or cultural value and play an important part in the conservation of nature and in fulfilling the aims of the national park movement. It is in the nature of things that national parks were established first in the wealthier and more highly developed countries, particularly those like the United States of America having large tracts of land with attractive scenic, geological, and biological features, yet thinly enough populated for effective reservation to be possible without encountering unsurmountable financial and political obstacles. In tropical countries and other less highly developed parts of the world, the need for national parks, game parks, and biological reserves was for long less clear to governments and public opinion, and for this and other reasons their establishment took place later. Nevertheless, the first national park in the tropics, Albert Park in what is now the Republic of Zaïre, was founded by the Belgian colonial government as long ago as 1925 and will thus soon celebrate its 50th anni-

versary. Since the establishment of Albert Park, most tropical countries have followed its example, and in some of those for which there is at present no entry in the United Nations List, it is believed that the establishment of national parks is being given serious consideration.

Before going on to survey briefly the present position of national parks in the wet tropical areas, it is perhaps desirable to remind ourselves that the aim of a national park, as understood at this Conference, is twofold: to conserve natural landscapes or ecosystems, with their flora, fauna, and geomorphological and geological features, and to make these areas accessible for the study and enjoyment of present and future generations. The two aims cannot always be easily reconciled, and it is not surprising that in some densely populated countries such as Great Britain it has been necessary to separate conserved areas into two categories, national parks and nature reserves, according to whether the first or the second of these aims has priority. In tropical countries, it is not normally possible or even desirable to make such a distinction, but it is important not to forget that the two aims often conflict and that biological reserves and "strict nature reserves" are needed as well as national parks as defined in the United Nations List.

The present position

For the purpose of this discussion, tropical environments have been divided into wet areas, arid regions, and mountain habitats. The term "wet areas" is presumably the equivalent of the more usual "humid tropics." There is no simple or universally accepted definition of the boundaries of the humid tropics, but since some sort of separation between them and the arid regions is necessary, I propose to adopt the boundary based on vegetation criteria shown in A. W. Küchler's map (Fosberg, Garnier, and Küchler, 1961): this corresponds approximately with the boundaries of the tropical closed forest (*forêt dense* of French authorities) and includes both the true tropical rain forest and various types of semideciduous and deciduous forest, as well as certain types of moist savanna. Though the national parks considered in the present paper are mostly wholly within the humid tropics so defined, it may be remarked that some of the largest tropical national parks are in regions where there is a considerable diversity of climate and vegetation within a relatively small area; in some, such as Albert National Park, humid, arid, and montane habitats are all represented.

In the wet tropics, there are some 71 independent states and dependencies: of these 47 have national parks or equivalent reserves meeting the requirements of the United Nations List. Ten of these are in tropical America, 27 in tropical Africa, and 10 in tropical Asia. It may be noted that, as might be expected, there are more and larger parks in large countries such as Brazil and Indonesia, but even Singapore with an area of only some 580 square kilometers and a population of nearly 2 million has four parks in the United Nations List. Among the largest national parks in the tropics (and in the world) are Upemba (more than a million hectares) and Albert (800,000 ha) parks in Zaïre and some very large parks in South America.

More important than the actual area and number of national parks, or the fraction of the national territory which they occupy, is whether all the principal types of natural

landscapes and ecosystems of the humid tropics (or at least a sufficiently broad spectrum of them) are now within national park boundaries or otherwise protected. Since the equivalent tropical ecosystems in the New World tropics, Africa, and southeast Asia/Oceania have different floras and faunas, each with its own distinctive characteristics, samples of every type of ecosystem in each biogeographical region should be protected. This aim has certainly not yet been attained; how near it is to achievement would be difficult to assess on the information at present available.

Meanwhile, it is important to note that within the national parks of the humid tropics, some ecosystems are much better represented than others and some are hardly represented at all. Thus an examination of the United Nations List shows that savannas and grasslands are strongly represented in national parks, especially in Africa, while the lowland tropical rain forest, an ecosystem which is rapidly disappearing and in urgent need of protection, is seriously underrepresented. The reason for this difference is not far to seek: savanna areas are, in general, of low agricultural potentiality and are often the habitat of large mammals such as lions, giraffes, and antelopes, the protection of which has been one of the important aims in setting up these national parks. Rain forests on the other hand may have somewhat greater, if often very limited, agricultural possibilities; their timber is a resource which it is relatively easy to exploit, and their fauna, though of equal or greater biological interest than that of the savannas, is less spectacular and has much less popular appeal. Some other tropical ecosystems of great biological importance, such as fresh-water swamps and mangrove communities, seem to be represented very poorly, or not at all.

Some national parks in the wet tropics seem to consist very largely of one type of landscape or ecosystem, but others are much more diversified. Huge Albert Park, for instance, includes rain forest (or similar types of closed forest), savanna woodlands, treeless grasslands (steppes), marshes, and a large lake, Lake Edward, as well as volcanos, both active and extinct, and a snow-capped mountain range, Ruwenzori. But even very small Bako National Park in Sarawak has a wide variety of habitats ranging from sandy, rocky, and muddy coasts to open *padangs* (heathlike communities) and forests of several kinds.

Though for some national parks it would be true to say that the aim in their establishment has been to conserve samples of whole landscapes, with their natural flora and fauna, in other tropical parks the protection of a particular species or group of animals or plants seems to have been the first consideration. Thus in Indonesia and Malaysia, parks have been established primarily for the conservation of single species such as the orangutan and the giant parasitic plant *Rafflesia*. Others have been built around a single outstanding scenic feature such as Kaieteur National Park in Guyana and Iguaçu Park in Brazil, both of which contain a world-famous waterfall. A unique example of a national park established to protect groups of organisms of exceptional scientific interest is found in the Galapagos islands. A good part of the island of Santa Cruz was established as a national park by the government of Ecuador, mainly in order to protect the giant tortoise and the unique birdlife made famous by Darwin in his *Journal of Researches* (*Voyage of H. M. Ship "Beagle," 1839*).¹ Some of the other islands are also protected.

¹ Because exact boundaries of the national park still remain to be determined, some unfortunate friction has resulted.

It may also be noted that though the commonest aim in the establishment of parks in the wet tropics has been to conserve biological, geological, and scenic features, some parks have been instituted for other reasons. Important examples are Angkor National Park in Cambodia (at present, alas, gravely threatened by the circumstances of war), and several "Parques Prehistoricos" in Peru, which protect the remains of ancient cultures and civilizations. In some parks, the aim has been to conserve *Homo sapiens* himself. Famous Xingú National Park in Brazil, formed for the protection of primitive Amerindian tribes, is a remarkable, but not unique, example of such a park.

In aggregate, the area and variety of tropical ecosystems protected in national parks is considerable, but the outlook for the survival of many tropical plants and animals would be bleak indeed if there were not, as has already been mentioned, other protected areas as well. These are mostly small in size and their aims, in addition to the protection of nature, are usually to provide opportunities for scientific research and education rather than for the enjoyment and instruction of the general public. The authorities administratively responsible for such protected areas are frequently nongovernmental bodies such as universities or scientific organizations. One of the oldest of such reserves in the tropics is Barro Colorado in the Panama Canal Zone which became an island when Gatun Lake was formed by the construction of the canal. In 1923 the United States declared the island a biological reservation, and since 1946 it has been in the care of the Smithsonian Institution. It has long been the site of much important research. More recently constituted examples of small scientifically important reserves are the forest area of the University of Malaya near Kuala Lumpur; Finca La Selva in the Sarapiquí district of Costa Rica, which is a small area of primitive tropical rain forest acquired in 1970 by the Organization for Tropical Studies for research and teaching purposes; and Welchman's Hall Gully, one of the few uncultivated areas remaining in the densely populated and highly cultivated island of Barbados.

A large increase in the number of such reserves owned and managed by universities, research institutions, etc., would supplement effectively what can be done by the establishment of national parks and would be a most welcome contribution to the protection of nature in wet tropics.

Some mention should be made here of "forest reserves," as their nature and purpose is often misunderstood by the lay public. In most tropical countries, areas have been set aside—in some, very large areas—sometimes as future reserves of exploitable timber, and sometimes for other purposes such as the protection of water catchments. These are not primarily intended as nature reserves and many of them have been actively exploited for timber for a long time. In countries with very large forest resources, some forest reserves may remain unexploited for years to come and in others only part of the reserved area is economically valuable. Some forest reserves, such as Colony Reserve in Sierra Leone, now contain little readily exploitable timber but are maintained because of their protective functions and amenity value. Forest reserves are thus making an important contribution to the protection of nature, but since their primary purpose is economic, it is necessarily a temporary, rather than a secure, one. At the recent symposium on the Planned Utilization of the Lowland Tropical Forests (Tjipajung, Indonesia, August 1971), Reksodihardjo stated that in Indonesia, out of a total forest area of 120,000 ha, 48,000 ha

had been at some time designated as "protection forests and nature reserves," but a large part of this area was not in fact effectively protected. He added: "It became clear that the term 'reserve' does not anymore imply a guarantee against exploitation by logging companies" (Mueller-Dombois, 1971, p. 19).

The present position in the wet tropics may be summarized as follows. Considerable areas in the major sectors of the tropical zone now have national park status, and, in addition, an increasing number of small biologically interesting natural areas are protected in other ways, but the total protected area is still inadequate. Some tropical ecosystems are well represented in the permanently protected areas, others are represented poorly or not at all. In particular, there is an urgent need for the complete protection of more tropical forest areas, especially of lowland tropical rain forest.

Management problems

The administrative and scientific problems of management of national parks in the wet tropics are perhaps not basically very different from those encountered in other parts of the world, but because tropical countries are, for the most part, less advanced economically, politically, and educationally, they are not quite the same in practice.

The setting aside of large areas of land, which governments and large sections of the lay public tend to regard as unproductive, inevitably tends to bring national parks and other forms of nature conservation into competition with other possible types of land use, leading to economic and political conflicts. One difficulty of this kind that is particularly troublesome in the tropics is the legal and illegal demands for land for shifting cultivation and other kinds of subsistence farming. This demand is, of course, most severe where the population is rapidly expanding into previously little populated areas, especially if, as in many parts of Latin America, there is, in any case, a scarcity of fertile land for agricultural purposes. In former colonies, uneducated people easily come to believe that the reservation of land for forestry, nature protection, and aims other than food production was a device of the colonial masters for withholding their rightful heritage, and they expect such restraints to end with the passing of colonial regimes. Governments subjected to such pressures and to demands for mineral rights and the like are loth to accept the view that national parks and similar reserves must be protected effectively and forever if they are to serve a useful purpose.

This means that those interested in conservation and the protection of nature need to be even more vigilant, and the policing of such areas needs to be even more strictly enforced than in developed countries with large, well-educated and informed populations. Governments (and unfortunately this applies equally to those of some of the most advanced countries as well) need to be constantly reminded that some forms of land use may be desirable and consonant with the national interest in some areas, but are entirely incompatible with the aims of national parks.

A particular problem of population pressure to which Budowski (1970) has recently drawn attention is the catastrophic effects on the natural ecosystems of many tropical areas following on the construction of roads and the improvement of land communications generally. This is very striking in Central America and the interior of Brazil: as

the roads are extended into areas previously almost inaccessible, the neighboring land is converted, sometimes illegally, into pasture and farmland of low quality, often with little or no prospect of continuing productivity. The improvement of communications is clearly necessary, but it should always be realized that it inevitably leads to threats to natural vegetation and wildlife of the areas made accessible.

The scientific problems of park and reserve management in the wet tropics are made difficult by the relatively poor state of knowledge about the ecology of tropical ecosystems and the biology of the plants and animals of which they are composed.

One particularly difficult scientific problem is to determine the minimum area for a self-maintaining natural reserve. It seems that, in general, the permanent maintenance of tropical ecosystems in a natural state demands the protection of very large areas; small areas are unsatisfactory because the plant and animal populations within them are unlikely to be self-maintaining (Richards, 1971). This applies to both savanna and forest communities in the humid tropics. In the savanna areas of East Africa with their herds of elephants, ungulates, and other large animals, the problems are well known and have been much discussed. It is now recognized that because these animals are migratory and require large areas of vegetation for their nutrition, reserves which are not large enough, or which cut across seasonal migration routes, will do little to ensure their survival.

In humid, tropical forests the situation is somewhat different because there are fewer very large mammals and they tend to be less migratory in their habits. Nevertheless, because of the limited amount of food available for large grazing animals, the area needed to support populations of large herbivorous animals, such as the forest elephant and the Sumatran rhinoceros, or even considerably smaller animals feeding mainly on plants such as the larger primates, is necessarily very large. Unfortunately there is very little reliable scientific information on the minimum area required to maintain populations of these animals; even on the densities at which they at present occur there are few data other than the figures of Bourlière (1963) for the rain forest of Ghana. Large mammals not only merit protection for their own sake, but our very inadequate knowledge of tropical forest ecology suggests that their presence may be necessary for the proper functioning of the system and for the survival of at least some of its plant components. For instance, according to Van Steenis the giant parasitic plant *Rafflesia* of Borneo and Sumatra depends on the presence of large mammals which wound the stems of the woody vines on which it is parasitic and so make it possible for the seedlings to attack them.

The plant populations as well as the animals require a certain minimal area for survival. Tropical forests are extremely rich in plant species: the number of tree species 30 centimeters (12 inches) in diameter and over usually exceeds 70–80 per hectare and often considerably more. Among this vast assemblage of tree species many occur at very low densities (0.3 per hectare or even less) and some require special conditions for their reproduction such as a gap formed by the death of a preexisting tree. Whether all these tree species form an essential part of the ecosystem or whether its species diversity could be considerably reduced without seriously endangering its survival, is quite unknown, but in any case it seems probable that very small tropical forest reserves are not likely to be permanently viable.

This is not to say, of course, that small reserves containing much less than a complete

sample of the total fauna and flora may not survive for many years and prove of great value for scientific and educational purposes. An example of very small reserved forest areas which have been extremely productive of scientific information are the small relics of Amazonian forest almost within the city boundaries of Belém where João Murça Pires and his associates in the A.P.E.G. (Guamá Ecological Research Project) have done so much valuable work.

The problem of the minimum size of protected areas is clearly of great practical importance but it is only one of many management problems of tropical nature reserves which remain difficult because of the lack of adequate background scientific information. Other examples are the control of fire in savannas and fire-tolerant forests and the control of the numbers of large animals such as elephants. In dealing with these and many other management problems, policies have, at present, to be based on less than a fully adequate scientific basis. Research is being carried out on such questions in various tropical countries, but it must be emphasized that in the wet tropics even more than in other regions of the world, the successful protection of nature depends on scientifically based management policies. National parks and other protected areas should always be closely linked with ecological research programs and the maintenance of properly staffed and equipped research stations.

In conclusion, it may be added that, though it is commonly supposed that to merit declaration as a national park, an area must be in a more or less "natural" condition with only a sparse human population, or none at all, this is not necessarily the case. Sometimes, indeed, it is possible for the declaration of national park status to bring about the restoration of near natural conditions where the original ecosystems have been drastically modified by man. A striking example of this is Tijuca National Park in Brazil, situated on steep mountain slopes almost in the suburbs of Rio de Janeiro. This delightful area of streams, waterfalls, and subtropical forest is, in fact, a secondary forest which has grown up on land abandoned after the collapse of the coffee boom less than 100 years ago.

Future prospects and aims

At the present moment, the landscapes of the wet tropics, especially the forested areas, are changing fast. The forests everywhere are being felled and replaced by plantations of trees suitable for pulping, rubber, cocoa, oil palms, fibre plants, and other export crops, as well as by subsistence farming and grazing land often of a shifting or at least very temporary character. This is partly the result of the growth of the indigenous populations and their demands for food and living space, but, probably even more, it is because of the import of capital and advanced technological methods from the developed countries into tropical areas previously with sparse and technically backward populations. The consequence is that the forests, which 200 or even 100 years ago covered by far the greater part of the tropical land area, are now disappearing so fast that, by the end of the century, it may well be that no undisturbed tropical forests will remain except in a few inaccessible areas or where they are protected.

It is important to realize that much, probably the greater part, of the original forest area is not being permanently converted into food-producing or other economically produc-

tive forms of land use. A very large fraction of the original forest area in tropical America, Africa, and elsewhere is now occupied by secondary vegetation, scrub, fern and bamboo brakes, alang-alang grasslands, derived savannas, and secondary forests of various types which are at present quite useless or of very low economic value, though some can perhaps eventually be converted into more useful types of land use.

Under such circumstances the role of national parks and other protected areas is of vital importance. The wonderful diversity of plant and animal life in the tropical forests of the world is a most important part of the human heritage from both the esthetic and the scientific points of view. If reasonably large samples of tropical forests are to survive for posterity to admire, study, and enjoy, it is urgently necessary for the number and extent of national parks and other protected areas to be increased and, as this survey of present conditions has indicated, the additional protected areas must be carefully located so that tropical ecosystems at present underrepresented in national parks, or not protected at all, may be more adequately safeguarded.

In the tropics at the present time, changes in the natural landscape similar to those which took place in Europe over many centuries, and in temperate North America over the past 300 or 400 years, are taking place in a much shorter period and will probably be virtually complete within the next two or three decades. These changes will have rapidly converted natural ecosystems resulting from millions of years of slow evolutionary and climatic development into a manmade landscape of very different character. At present, the conversion of natural into manmade landscape is taking place mainly in an unplanned and haphazard fashion, generally in response to short-term economic pressures and with little or no regard to basic ecological considerations. But, if the tropics are eventually to take their place as a seemingly salubrious, esthetically satisfying, and productive part of man's environment, it is important that the conversion should be guided by rational ecological considerations so that various elements of the landscape such as agricultural land, productive forests, urban and "wild" areas are harmoniously combined, each occupying a due proportion of the whole. In such an ideal tropical landscape, national parks and nature reserves would play an important part.

To many, such a policy for nature protection and rational land use may seem idealistic in the present state of international and national politics in the tropical countries and unrealistic in the light of current population trends in most parts of the world. It is true that if the rate of increase of the world population continues unchecked, this and all other conservation policies are doomed to failure, but, on the other hand, it should be pointed out that though the use of land for national parks in the tropics comes into competition with some other possible types of land use, it need have little bearing on food production. In most parts of the tropics there are very large areas of forest land which seem to have only a very low potentiality for food production: some, such as the extensive "pseudo-caatinga" forests on podsollic soils in the Rio Negro region of Amazonia and the similar (but much smaller) "kerangas" forests of Borneo, probably have almost none. Such areas could possibly be used for some type of timber or wood pulp production, but if the greater part of them were set aside as national parks or biological reserves, the economic loss would hardly be significant. It is likely that in the tropics, as in the temperate zones, much greater increases in food and wood production could be achieved by a more inten-

sive use of fertile soils than by attempts to bring marginal and infertile land into cultivation, and to some extent the same could probably be said of forest production.

A more serious objection to increasing the number of national parks is that the governments of tropical countries are often poor and struggling with difficult social and economic problems that leave them little opportunity for considering longer-term objectives. They can hardly be expected to divert scarce resources of money and manpower from more immediately urgent problems. This is not an argument against pressing on with the establishment of national parks in the wet tropics, but it is a reason for regarding it as an international rather than as a national obligation.

What is required is international cooperation in which the wealthy "developed" countries could collaborate with the less highly developed countries for the general good. The right administrative framework for such collaboration hardly exists at present. What is urgently needed is to consider how the wealthier nations, either through existing international agencies, or in some other way, could find acceptable means of helping the tropical countries without offending their national susceptibilities.

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DISCUSSION

Prof. John Stewart Turner (Chairman): As we have six background papers in this session, I will not take up any time by way of introduction but call on the authors to outline their main points and the panel members to make their comments in such a way as to leave as much time as possible for discussion.

Mario Andrés Boza (Author of Paper 15): My paper is concerned with the progress made in Costa Rica in breaking out of the vicious circle, whereby what is needed is a system of national parks with a solid basis of material and technical resources, but this cannot be obtained without funds and public support, and these in turn are unobtainable without the existence of the parks. Our experience has been that the two best ways of

making a start are to set up parks in an area of historical and archeological interest, since no one questions the importance of protecting the country's historic patrimony, and adequate interpretation can then "sell" the natural features through the historical ones; and, secondly, by choosing an area of an active volcano, where the scenery and volcanic activity are of such general interest that no one has objected to the area being designated. By concentrating all available resources, including those offered by international agencies and aid programs, on these two "model" parks, insisting that national parks are an integral part of development and that their social, cultural, and economic benefits will contribute to the welfare of all the people, making a special point of encouraging the interest of the press, academic and professional associations, youth groups, and of the First Lady of our country, and expanding the facilities for public participation and enjoyment, we hope to build up the popular support for the park movement which is so essential.

J. R. Desai (Author of Paper 16): The Gir Forest reserve, formally constituted as a wildlife sanctuary in 1965, is an example of a semiarid area of grass and scrub forest, world famous as the last home of the Indian lion, which has suffered progressive and accelerating degeneration. The stages by which this has come about, the effects on the habitats and the faunal and social factors involved are described in my paper, leading up to steps now being taken by the Gujarat State government, in consultation with ecologists and wildlife experts and, above all, the Maldhari, the pastoral inhabitants of the area, to restore the ecological balance and ensure the survival of the wildlife and prosperity of the people. I would stress that this is in keeping with a long tradition dating back more than 2,000 years to Emperor Ashoka, and that, if it is successful, it may well show the way for other areas under similar pressures.

Prof. Mohamed Kassas (Author of Paper 17): The three main topics of my paper are, first, the classification of arid lands, which I divide into four main groups (the first three distinguished by the reliability and amount of rainfall, the last by the fact that it is the result of human activities); second, a review of the ancient *hema* reserve system of the Arabian Peninsula and its ultimate collapse due to changes in sociocultural attitudes; and third, for comparative purposes, a study of the development of national reserves in arid Australia.

Prof. John Stewart Turner (Chairman) on behalf of **Prof. Kh. P. Mirimanian** (Author of Paper 18): The main arguments of the paper concern the scientific value and the protective value for watersheds of mountain national parks. Under the first of these headings, emphasis is given to the many relict and endemic plant and animal species, and hence the importance of protection, the maintenance of gene pools, and facilities for ecosystem investigations. Under the second head the point is made that alpine meadows may be very productive although often overgrazed, but that it is the alpine forests, where frost does not penetrate deeply, which determine the hydrology of the foothills, while marshes and peat bogs also play an essential role in stabilizing runoff.

Dr. Frank H. Wadsworth (Author of Paper 19): The special problems of protection, development, and management of natural areas in the tropics tend to culminate in mountainous areas of densely populated oceanic islands. My paper is a case study of one such area, the Sierra de Luquillo in eastern Puerto Rico. The sequence of events

by which this 20,000-hectare area has survived and effective steps now being taken to ensure its survival in perpetuity are described. The necessary conditions are considered to be (a) continued research for a better understanding of the values, limitations, and relative compatibilities of different prospective uses of the area; and (b) a high order of involvement of community leaders in the planning of its protection and development.

Prof. Paul W. Richards (Author of Paper 20): Despite the shortcomings of my survey of the present position of national parks in the humid tropics, due to my having to depend on the 1971 edition of the United Nations List supplemented by personal knowledge limited to only a few areas, one fact which clearly emerges is that humid tropical forests are much underrepresented. This is very serious because of the rapid destruction of such forest—the fact that thousands of rain-forest plant and animal species are threatened with extinction before their biology has been investigated. I mention the names of Darwin, Wallace, and Humboldt to show how much vital human knowledge has been derived from the rain forests of the tropics. Later in my paper, I consider the problem of reconciling development needs with those of conservation. Much of the tropical world is now in course of transformation from a natural to a manmade landscape, a process which Europe experienced centuries ago. The need is for rational land-use planning so that urban and agricultural land, productive forest, and wilderness can be harmoniously combined. In this ideal landscape of the future, national parks will have to play a much larger part than they do now. I try to spell out how this could be achieved, and might add here that some very interesting suggestions on this theme have been made in a paper by Dr. Kenton Miller presented last week at the IUCN Technical Meeting at Banff.

Michel Louis Anna (Panel Member): Referring to Professor Kassas' paper on arid zone problems, the ones that chiefly affect us in Chad are, first, the overgrazing and consequent desertification by domestic stock of which the 1–2 million before the war have now increased to 4 million. Another factor of importance is that whereas, formerly, travelers were dependent on camels for transport and limited to routes between water points, the motor vehicle enables people to go almost anywhere and wild species have no respite; entire herds of oryx, addax, and gazelle can too easily be massacred.

Koffi Attobra (Panel Member): The importance of reserves for scientific research needs emphasis, in view of the rapid changes taking place. In the Ivory Coast, we envisage a chain of reserves from the Sahara to the Coast, the most recently established being Tai National Park (formerly a forest reserve); this area of more than 400,000 hectares represents the last substantial sample of tropical rain forest in the western part of West Africa. In its management and in the choice of further samples of important ecosystems, it is essential to have the advice and assistance of inter-African and international organizations. It has to be admitted that there are many difficulties in the development of lowland rain-forest parks, not least the fact that the heat and humidity are unlikely to make them popular with visitors.

Dr. Vittorio Agnelli (Panel Member): The delicate equilibrium of mountain areas, which is indicated in Papers 18 and 19, is well illustrated by Stelvio National Park in Italy. Steps which have had to be taken to prevent deterioration include the closing of certain

roads in the peak season, improvement of footpaths and transportation, and other facilities designed to spread the visitor load over a longer season.

José Arreola Tinoco (Panel Member): Unlike the situation in some of the countries so far mentioned, the establishment of national parks in Mexico has tended to outrun the possibilities of proper management and research: about, half the 50 parks are focused on recreational use, the governmental policy being that the first duty is to serve the interests and needs of the middle and lower classes rather than those of the wealthy and elitist groups.

Prof. John Stewart Turner (Chairman): A point which has emerged from the discussion is the need for a somewhat larger percentage of big parks, but such areas are very vulnerable to pressures unless they can be efficiently managed and properly protected. I now open the three topics to general discussion, beginning with the arid regions.

A. Arid regions

C. Warren Bonython (Australia): Eight-five percent of South Australia, or 320,000 square miles, has less than 250 millimeter rainfall, so falls into Professor Kassas' rainfall desert class, since there is no completely rainless region. Further areas, termed "conservation parks" (with the same legal protection as national parks), have been reserved since Paper 17 was written, notably the Elliot Price Conservation Park of 65,000 hectares in the 100-millimeter rainfall belt around Lake Eyre (the driest piece of Australia and exhibiting some of the characteristics of Professor Kassas' runoff desert, with an augmented growth of shrubs and herbs in the shallow gullies); and a vast new unnamed park of 2,130,000 hectares in the northwest of the State, bringing the total for South Australia to about 3 million hectares. These desert parks are distinguished by never having been grazed by exotic animals, except for some feral ones like the rabbit. The pressure of exotic livestock falls on the semiarid rather than arid areas, and there is no doubt that much land could be heading for manmade desert (Professor Kassas' group 4) under present exploitative practices, including the impact of feral animals such as wild goats.

Dr. Donald Fred McMichael (Australia): Paper 17 quotes the statement by Costin and Mosley that most Australian reserves "have been chosen on a scenic basis or simply because they were available." This is no longer the case for the arid and semiarid regions. All national park and wildlife authorities are aiming to include samples of distinctive ecosystems and wildlife habitat in the park system. One difficulty with arid lands is that very large areas are required, but at least there is much less settlement and the cash value of the land is considerably less than in coastal regions.

Bajis Ismail Issa (Jordan): It is worth emphasizing that the main difference between the arid lands of the Middle East and those just discussed is that the former have a long history of human activity; for instance, Jordan's Azraq National Park has settlements and nomadic (beduin) land use dating back through the Caliphates to Roman times. One

result of this is to accentuate management problems, for example, in respect to oasis water supplies; much expert advice is needed.

Dr. Dieter Mueller-Dombois (U.S.A./Hawaii): In subsection 5 toward the end of his paper, Professor Kassas suggests a management conflict between areas reserved for forestry and areas reserved for animal life, particularly in relation to the use of fire. This may sometimes be true, but the precise role of fire, and how it operates as an evolutionary stress factor in the environment, always needs to be very carefully studied in each individual situation.

Andrew Allo Allo (Cameroun): I would go further and argue that fire can be and is used as a management tool, with a scientific basis and due regard to plantlife as well as animals. Although as mentioned in Paper 20, most national parks in Africa have been established in savanna areas, it is quite common, especially in West Africa, for forest reserves to serve the double purpose of maintaining production or protection forest and also of game preservation. The main reason why tropical rain forest has not been much favored lies in difficulty of access and the fact that their more monotonous scenery and the absence of easily seen faunal resources make them disappointing from the point of view of developing them as tourist attractions.

Baba Dioum (Senegal): The deterioration of arid zones under nomadic land-use practices, uncontrolled grazing, burning, poaching, and so on, is generally recognized—overgrazing being perhaps the most important factor and one which is often aggravated by the provision of more watering points. Yet, the fact remains that animal husbandry is usually the only economic activity open to inhabitants of arid lands and also that it is becoming more and more difficult in many places because of a drier climatic cycle. So what solution can be suggested?

Prof. Mohamed Kassas (Author of Paper 17): Under certain conditions, nomadism is the best adapted way of life, but it seems clear that this depends on the populations involved remaining low, although more detailed studies are certainly needed. For example what are the ecological effects of modern mechanized nomadism?

Zafar Futehally (India): It is relevant to recall a remark Sir Frank Fraser Darling made at the IUCN General Assembly in New Delhi in 1969, when he went much further than Professor Kassas just now and claimed that nomadism is a very desirable form of land use based on ecological principles. Unfortunately modern social and political attitudes have discriminated against it.

Avraham Yoffe (Israel): About half my country falls into the class designated as runoff desert in Paper 17. Nevertheless, although it seems unproductive, it has been shown that proper protection can soon build up a good variety of wildlife, both birds and mammals. It is usually so long since such wildlife species were exploited as a source of diet that there is little complaint against the application of protective regulations.

André-Roger Dupuy (Senegal): It is worth drawing attention, perhaps with a view to a specific recommendation, to the fact that arid ecosystems are among the most threatened in the world and those of North Africa are very poorly protected by national parks.

B. Mountain regions

Patrick Shea Pineda (Philippines): My comment refers to an area which comprises both mountain and tropical rain-forest habitats. What is happening in the Philippines is that the Kaingeros, who are "slash-and-burn" farmers, move into the forest on a steep mountainside, cut down about 2 acres per family, burn the felled trees, and plant rice and corn for three seasons, by which time the fertility is gone and they have to move on and repeat the process. In one 150,000-hectare watershed, there are about 700 Kaingero families, which gives a good example of the pace of destruction. What we are trying to do to repair this is to reafforest 40,000 hectares of the most denuded hills with 100 million seedlings over the next 4 years, employing Kaingeros for the purpose. In addition to planting, other forestry activities including proper exploitation, will qualify for governmental and commercial support, and we also aim to retrain the people in agricultural practices which will not lead to destruction, thus saving the Kaingeros themselves just as much as the monkey eating eagle and the tamarau.

Miss Nadia B. Khawand (Lebanon): Our Government would like to establish national parks to protect the mountain environment of our small country, the most important being the Cedar of Lebanon forest to the north, the Barouk cedar forest, the umbrella pine forest near Beirut, and the cypress forest at Kammona. At present we have no areas at all included in the United Nations List.

Dr. Dieter Mueller-Dombois (U.S.A./Hawaii): A problem which seems likely to arise in connection with the Puerto Rico situation described in Paper 19 is how to guard comparatively small areas of relict vegetation against invasion by exotic species.

Dr. Frank H. Wadsworth (Author of Paper 19): The problem referred to has unfortunately already arisen, with the presence in the area of a number of exotic tree species, the mongoose, and some feral animals. Whether and how they can be controlled remains to be seen.

Dr. Marc J. Dourojeanni (Peru): A rather special instance of mountain-area management worth mentioning is that which concerns the preservation of the vicuña in the high plateau of Peru. This has to be done on the lands, which are inalienable, of ancient peasant communities, so it can only be based on making contracts with them whereby they benefit from the production of vicuña; it has been estimated that by doing so the productivity of land now used for sheep and cattle only can be raised by 150 percent. In this way, the vicuña population has been raised from about 700 in 1964 to about 8,000 today, which has made a substantial social and economic contribution to the development of the High Andes. Direct utilisation, as well as tourism, can therefore be of great value for the conservation of a species, especially when there is no question of obtaining ownership of the land in which the species ranges.

C. Wet tropical regions

Dr. José Candido de Melo Carvalho (Brazil): The borderline case of Tijuca National Park of Rio de Janeiro, in a mountain situation in the middle of a great city, where secondary forest has now regenerated into beautiful rain forest, deserves mention. The

Amazon forest problem has been referred to in previous sessions; up till now the 3 million square kilometers of this habitat has virtually constituted a huge reserve, but now that extensive development is proceeding, it is vital to set aside formally reserved areas. At present in Brazil, four or five large national parks, nine national forests, and a number of ecological reserves are envisaged. There are still untouched fauna and flora even in Belem State.

Prof. Paul W. Richards (Author of Paper 20): Barro Colorado Forest in the Panama Canal Zone is another very important secondary forest worth mentioning. The Brazilian proposals of which we have just been hearing are as welcome as they are vitally necessary. **Neville C. Gare (Papua New Guinea):** Lowland rain-forest areas of Papua New Guinea, are under the impact of the rapid surge toward economic and political independence, since they provide the most easily accessible resources for forest industries; the impending introduction of wood-chip operations by companies based in developed countries, with little understanding of the implications on the part of the local people, will accelerate the process and lay waste thousands of hectares of rain forest. In these circumstances, as I emphasized yesterday as a panelist in Session III, the essential is integrated land-use planning. In view of potential developments, nature conservation must be recognized as a justifiable use of land; reserved areas will have an even more critical role than elsewhere. There are all too many examples of the losses suffered where these principles have not been observed, as for instance the case of the megapode in New Britain.

Prof. Antoon de Vos (FAO): We are fast running out of supplies of tropical natural woods and, therefore, the value of remaining stands continually increases. Moreover, regeneration of these hardwoods is often poor or ruled out by man's activities. The result is growing pressure on governments to allow the remaining stands to be cut, regardless of their conservation status, and it is becoming even more difficult to establish protected areas or national parks in tropical rain-forest regions.

Prof. Paul W. Richards (Author of Paper 20): The only solution, apart from assistance in insuring controlled development (which might include the establishment of reserved areas), would seem to be to lay special emphasis on the World Heritage Trust concept.

Prof. John Stewart Turner (Chairman): Perhaps one method, suggested by the previous speaker's remark, would be to channel aid only to those regional planning programs in which parks formed an essential part of the regional plan.

Dr. Gerardo Budowski (IUCN): The Amazonian problem is basically a political one and everything possible should be done to impress administrations at the highest level with the need for conservation. One negative impact which needs to be discouraged is the conversion of forest into uneconomic and unproductive grassland. On the other hand, case studies of positive developments and successes, such as that described earlier by Dr. Dourojeanni with reference to the vicuña in Peru, should be brought to the notice of the authorities.

K. S. Sankhala (India): Tropical forests in India are intensively worked for timber, bamboo, and minor forest produce, and it is probably only possible to establish national parks in such areas if a formula can be devised which would allow these operations to continue. In fact, some sort of forestry operations are conducted in almost all the national parks and sanctuaries in India.

Egizio Corazza (Italy): My concern is that, whether or not any particular area of Amazonia is developed or reserved, it seems only too likely from what we have heard that it will not be to the profit of the indigenous populations, and that, if these are to be won over to the new way of life, it will only be through force or through more insidious forms of "sugar" and "clothes."

John E. Clarke (Republic of Zambia): Referring to the very relevant comments on public support in Paper 15, the situation in Zambia is precarious despite the fact we have one of the largest national park systems in the world, comprising 17 parks totaling 55,000 square kilometers or about 8 percent of the country. Unfortunately this system has not grown out of a climate of general enlightenment toward conservation, but from the efforts of a few dedicated men, helped by the fact that with only 4½ million people in 700,000 square kilometers, land hunger is not yet a very potent factor. But we have a population growth rate of 3 percent, so it is essential to secure the support of the general public; this is why the Wildlife Conservation Society of Zambia stresses the importance of conservation education. People must be persuaded that national parks do not exist merely to earn foreign exchange through tourism; unless real public concern, based on valid appreciation of parks, can be secured, we cannot hope to maintain the fine existing system of national parks much beyond the end of the present decade.

Prof. John Stewart Turner (Chairman): Before closing the session, I will ask Professor Richards and M. van der Goes van Naters to table the drafts they have prepared of recommendations arising out of our discussions (see Recommendation 2, p. 442 for the final text adopted by the Conference).

SESSION VIII

WILDLIFE AND RESOURCES MANAGEMENT

Sunday, September 24, 2 to 5 p.m.

CONTROVERSIAL ASPECTS OF WILDLIFE MANAGEMENT PROGRAMS IN NATIONAL PARKS

Chairman: Dr. Raymond F. Dasmann, IUCN
Rapporteur: Dr. Douglas H. Pimlott, Canada
Author: Paper 21: Dr. Hugh F. Lamprey, Tanzania
Panelists: John E. Clarke, Republic of Zambia
Prof. Antoon de Vos, FAO
Dr. Marc J. Dourojeanni, Peru
Dr. Robert M. Linn, U.S.A.
Prof. Edgardo Mondolfi, Venezuela
Akbar S. A. Packeer, Sri Lanka

RAPPORTEUR'S SUMMARY

In a sense, this session was of historic significance because, in the past, administrators of national parks in many countries have been almost afraid to think of the topic of management, let alone discuss it in a public forum! Dr. Lamprey, in his background paper, stated firmly that the matter was of urgent practical concern and "... goes to the roots of national park philosophy." Despite its importance, it had only been discussed in committee at the First World Conference, the conclusions reached, in which the seven guiding principles of management were summarized, occupying less than two pages of the published record. Here, during the discussion in Session VI, John Owen, who had been one of the 15 members of that Seattle committee, called for a revision of the principles in the light of experience during the past 10 years. In Dr. Lamprey's view their only serious deficiency was that they tend to stress the maintenance of the *status quo* and do not adequately recognize the need to allow for changes of a successional nature in park ecosystems.

Seven topics relating to management were identified in the background paper: "... using the degree of naturalness as a basic criterion; ... the need to recognize ecological succession and to reconcile it with conservation objectives; ... promotion of biological diversity; ... the problem of excessive populations of dominant species; ... policy on the introduction of exotic species or species that have been extinct in the area concerned; ... the status of predators in parks and the role of parks in the rehabilitation of large predators; and finally ... research as a basis for rational management and the need

for such research to be closely integrated and to relate primarily to management objectives. In conclusion, Dr. Lamprey claimed that recognition of the need for habitat management is vital to the future of national parks and would be the most important point that could come out of this session.

The comments of the panel members included a suggestion by Akbar Packeer for an addition to Dr. Lamprey's list, namely the development of policies and procedures to deal with domestic or feral animals which invade park areas in many parts of the world. Dr. Linn thought that a rational objective for management could be stated as "to maintain as nearly as possible, and re-create when necessary, those ecological conditions that would prevail within the park were it not for the direct or indirect influences of man." He questioned the need to deal directly with overpopulations of large herbivores and wondered whether control of such overpopulations might not be responsible for the slow rate of recovery of top predators and secondary consumers. The last-mentioned point was later disputed by Dr. Scotter, from the floor, who stated that in North America deliberate management of some species of large herbivores was necessary except in the most ideal situations.

Of the other panel members, Professor Mondolfi and Dr. Dourojeanni drew attention to some further particular points as well as commenting generally: the former referred to the large number of specialized mammals and birds of cloud and rain forests that have very little capability for adapting to disruption of their habitat. In their case, maintenance of the *status quo* is essential. He also listed a number of important but rapidly disappearing carnivores, including the jaguar, whose behavior and ecology are still virtually unknown. Dr. Dourojeanni focused on resolving many of the problems of human influence through the application of zoning procedures, and considered that 70 percent of the larger parks should be kept free of people; this was later questioned by Koffi Attobra from the floor, who insisted on the principle of fully integrating national parks into regional development schemes if conflicts over land use are to be avoided.

The problem of dealing with excessive populations of large mammals was taken up by the other two panel members: John Clarke suggested that the principles for cropping or culling were: do it as a matter of routine; recognize the interests of local organizations and keep them informed; try to prevent a split in your park personnel over the policy to be followed; and ensure that commercial aspects are never allowed to take precedence over park management aspects. Professor de Vos added the point that it is vital to the future of large mammals, particularly migratory species, that landowners be convinced that such wild animals have an economic value, which demands proper utilization and the rejection of indiscriminate slaughter.

Much of the discussion which followed turned to this problem of management and cropping, with the elephant as the focus of attention. The majority of speakers supported the view that the elephant should not be allowed to drastically modify an ecosystem, but there was considerable debate on who should do the control and what managers need to know before carrying out control programs.

There was also a brief discussion of predator management, with calls by Dr. Pimlott and K. S. Sankhala for national parks and reserves to play a more positive role in helping society to develop a better understanding of the "hated" predators such as the wolf and

tiger. This led to a final reference to the threat posed by exotic feral species, notably the domestic cat, and the problem of introductions generally. Altogether, this was an interesting afternoon, and, although this was the first public discussion of these topics by a distinguished and worldwide group of park administrators, the expression of views was quite uninhibited.

SESSION VIII / PAPER 21

MANAGEMENT OF FLORA AND FAUNA IN NATIONAL PARKS

by Dr. HUGH F. LAMPREY
Director, Serengeti Research Institute,
Tanzania National Parks, P.O. Seronera, Tanzania

The management of flora and fauna in national parks is a matter of urgent practical concern. It also goes to the roots of national park philosophy and is bound up with the fundamental question, "What is the function of a national park?" Yet the subject appeared in the record of the First World Conference on National Parks 10 years ago almost as an afterthought. No paper on management was presented and no discussion took place except among the committee of 15 whose brief but remarkable report appears (on p. 364) in the Conference's published proceedings. To many of us who are involved in the management of national parks, that short document (reproduced at the end of this paper) with its seven guiding principles was the most important result to emerge from the Conference. It was remarkable because it recognized that, in conserving the flora and fauna of national parks, we are dealing with assemblages of interacting plants and animals, which we term biotic communities, and that their rational management will depend on an understanding of the ecological structure and function of these communities. There is a common misconception that the management of wildlife in national parks consists mainly of the protection and control of animal life. The truth is that the greater part of wildlife management lies in the conservation of the animals' habitats. Given reasonable freedom from disturbance, animal populations will require little or no management, provided the natural vegetation of their habitats remains intact. The management of animal life in national parks in most aspects is so closely associated with the management of the vegetation which supports it, that it is unprofitable to discuss one without the other. Moreover, it is only popular opinion which, in regarding many national parks as animal sanctuaries, attaches more value to the animal life than to the plantlife. This paper follows the lead of the Committee on Management in National Parks at the 1962 World Conference and discusses the aims of management of biotic communities.

Management objectives

Objectives for the management of flora and fauna will vary from one park to another, and it is to be expected that each national park authority will have its own ideas embodied in general policy statements and more detailed management plans for individual parks. Nevertheless, it seems desirable to suggest an acceptable general goal for the world's national parks, with respect to their flora and fauna. E. W. Russell (1968) who examined this question in detail, said, "A National Park is an area set aside where man can enjoy, as a privileged visitor, the plants and animals that are indigenous to that environment under conditions that are as little affected by his presence as possible." In proposing this as a guide to management, Russell noted that it may be difficult to interpret in practice. It seems justified to recognize Russell's goal as that of the majority of national park authorities. However, it is in the interpretation of this goal that difficulties are experienced and where there is scope for a great deal of discussion. Indeed the past decade has witnessed the appearance and recognition of several national park management problems of frightening proportions, especially in Africa, the solutions to which are matters of controversy.

Natural or artificial?

Probably no part of the Earth's surface is wholly unaffected by man (even penguins in the Antarctic contain DDT), so there may be no truly natural environment left. Nevertheless, we can recognize degrees of naturalness and use this as a criterion for management in national parks. So-called climax communities such as rain forests, in the absence of disturbance by man, may perpetuate themselves virtually indefinitely. There is little difficulty in describing such communities as natural, or nearly so. The difficulty lies in recognizing the ill-defined borderline between the natural and the artificial where man has played a part in shaping the environment. At what stage in man's technological development does he cease to be an element of the natural world and become an intruder (or more correctly, perhaps, a major environmental influence)? This question can, of course, only be answered in an arbitrary way.

Dynamic environment

Some early attempts to define management objectives for national parks have called for the choice, explicit or implicit, of baselines such as the time of the establishment of a park, when the flora and fauna could have been regarded as being in a natural, optimal, or simply a desirable state. Any subsequent changes were most likely to be seen as undesirable trends. This approach, not necessarily wrong, was made in ignorance of the naturally dynamic character of most biotic communities. The concept of ecological succession, under the influence of the variable environment, was not understood. With our present knowledge of the variability of ecosystems with time, this capacity for change might be regarded as one of the features which, under certain circumstances, it is desirable to preserve. Whether it is to be welcomed or not, successional change is a very important

factor to be taken into account in the management of flora and fauna in national parks. The relative merits of stability versus change can only be assessed on the basis of a knowledge of the ecology of the communities concerned. Research is needed to obtain this information.

Certain successional changes may be considered unwelcome either for ecological or esthetic reasons, and management activity to arrest them or change their direction may be attempted. Alternatively, a change may be initiated or accelerated by artificial means to bring about a desired condition in the flora and fauna. Whether the objective is to maintain a stable situation, to arrest a change taking place, or to promote a desired change, some form of management action is likely to be necessary. On the other hand, the decision may be made to allow the communities to respond to the prevailing environmental influences without interference (whether natural or artificial).

The following simplified example will illustrate the principles involved in making management decisions concerning stability and successional change in biotic communities: The form of many woodland habitats, both in temperate and tropical situations, is affected by the frequency and intensity of grass fires. In many communities, fire is a normal phenomenon to which plants and animals are adapted in several ways. In the absence of fire, woodlands tend to become denser and the extensive thickets which eventually result may be relatively poor habitats for birds and mammals, as well as rather undesirable vegetation from the point of view of the human observer in the national park. Fire often induces a mosaic pattern of woodland and grassland, and the length of vegetation boundary so produced may be the optimum habitat for many of the mammal and bird species that it is desired to encourage. However, this favorable habitat may only be a successional stage which is capable of changing either toward dense woodland, through protection from fire, or toward open grassland, through frequent burning. If the area is limited, it seems likely that every effort should be made to perpetuate the mosaic pattern by fire control in order to maintain a viable area of the habitat concerned. On the other hand, if the area is large, it may be possible to allow some parts of the woodland to become dense and others to be replaced by grassland, while a proportion assumes the mosaic pattern. In these circumstances, there may be considerable advantage in managing for the greater variety of habitats, provided that each is extensive enough to support a viable community of a type wanted. Experiment and observation will indicate whether the prevailing incidence of fire will induce approximately the required balance of habitat types, or whether the fire should be controlled to obtain desired conditions.

This example shows the necessity for an understanding of the structural and functional ecology of the area to be managed and emphasizes the need for suitably orientated research by plant and animal ecologists to give an account both of the status and of the successional options for management.

Species diversity

Another approach to the problem of defining management aims for the plant and animal life of a national park is to ask the question, "What is the ecological potential of the area concerned?" The potential may be expressed in several ways, of which the most useful

for management purposes are absolute biological productivity and species diversity. Sustained biological activity (usually measured by ecologists as the amount of energy flowing through the system) often seems to reach its maximum where the species diversity is as high as possible for that particular biogeographical situation. Thus the two criteria of biological potential may lead to the same result. However, as it is unlikely that the main exploitation of a national park will take the form of harvesting plants and animals (although such use of the biological resources is sometimes advocated), the potential quantitative yield is probably less suitable as a management criterion than the number of species present. One possible management objective for national parks is, therefore, the maintenance or promotion of high biological diversity, and this probably comes very close to the goal of conserving natural ecosystems. It would probably be generally accepted that this aim should not be achieved by the introduction of nonindigenous species. The problem of introduction will be discussed later.

We have recognized that many successional changes in biotic communities are natural processes and are the almost inevitable results of such environmental influences as fluctuating climate, changing water tables, and varying incidence of grass fires, but how can we reconcile such changes with the goal of promoting the maximum diversity of species? The answer to this question appears to be that, provided the changes remain within certain quantitative and qualitative limits and never reach irreversible levels, fluctuations and successions may not constitute a problem. Nevertheless, the capability of communities within national parks to fluctuate without exceeding viability thresholds may be marginal, and we should recognize that in very small areas an environmental change may irreversibly alter the nature of the flora and fauna, perhaps resulting in a reduction in the number of plant or animal species present.

In large areas, however, ecological change may take the form of an ebb and flow of different stages in the succession across the face of the country. Thus, over the area as a whole, the species composition and total biomass may remain relatively constant but there may be a continuing redistribution of habitats and their attendant animal populations. This is a feature of the acacia savanna vegetation of Africa where mosaic patterns of grasslands and woodlands of many types occur, with the trees commonly distributed in even-age stands. The advance and retreat of vegetation boundaries is itself a natural phenomenon and may often be accepted as a normal characteristic of some national park communities. It may be less acceptable when the movement of a vegetation boundary conflicts with the planning of national park facilities. For example, an overmature stand of trees may be providing scenic attraction and shelter around a tourist lodge and the dying back of the old trees will leave the lodge standing out on open grassland. To prevent this unwelcome development, special efforts might be made to prolong the life of the old trees and to plant new ones.

Human influences and the viability of national parks

Many national park authorities, faced with the practical necessity to define their conservation objectives, have justifiably attempted to do so on largely intuitive grounds, invoking esthetic and ecological criteria somewhat arbitrarily. Often no management

objectives have been defined other than the exclusion of some human activities. The policy of allowing nature to follow its own course (whether implemented by design or by accident) appears to have operated advantageously in most national parks in the past and continues in many at present. If there is doubt about the course to follow and if there are apparently no immediate management problems, it seems better to do nothing, trusting in the self-regulatory properties of nature to maintain the status quo.

The integrity of biotic communities wholly or partially enclosed within national park boundaries is a major problem for many national park administrations. Absolute size will not necessarily be the main criterion for viability although it is undoubtedly a very important one. A small, fresh-water pond, with its plant and animal life, may function as a self-perpetuating unit, while a large national park, several thousand square kilometers in area, with migratory large mammal populations, may be incapable of maintaining itself in a stable condition if the boundaries of the park have been sited without regard to the total range of movement of these populations. National parks tend to be ecological islands which can rarely be self-regulating systems but which are subject to the influences of human populations in neighboring areas. Their management will call for action to minimize the problems caused by the presence of artificial boundaries and the activities of cultivators and pastoralists in adjacent areas. In practice, the best that can be achieved is the establishment of "buffer zones" around national parks where such activities as conservation forestry, controlled hunting, and animal husbandry may continue without serious detriment to the wild animal populations. Where buffer zones of this kind have not been established, the immediate proximity of cultivation and settlement to the park boundary may cause serious administrative problems for the national park authority due to the inevitable interaction of people and large wild animals along the boundary. In the experience of many African national park authorities, the presence of intensive settlement on the boundaries produces a *de facto* zone of "limited conservation" inside the park, within which some poaching, tree-felling, grazing, grass burning, and other illicit activity may occur, necessitating constant policing.

The survival of the indigenous flora and fauna of a national park in the long term will depend on the ability of the natural communities to retain their self-regulatory function in the face of increasing disturbance both inside and outside the boundaries, helped by such protective management as park authorities are able to afford them.

The problems caused by legitimate human activity inside national park boundaries are no less serious and often much more difficult to solve than those caused by people outside the boundaries. The presence of visitors and the national park staff will inevitably have disturbing effects on plant and animal life. At first, such disturbance may appear negligible, except in the immediate vicinity of tourist and administrative centers where the artifacts of man may at the best achieve a carefully contrived attempt at harmony with nature. The effects of human disturbance on plant and animal life will radiate from the centers of activity, the most conspicuous being roads and tracks. Even walking and riding will have their impact on some vegetation and soils. Where visitors are very numerous, protective measures, such as artificial pavements and boardwalks, may become necessary to preserve fragile plant communities from trampling and also, perhaps, to prevent soil erosion. However, apart from fire, the greatest potential for damage by people to vegetation

lies in the destructive effects of wheeled and tracked vehicles upon grasses and other small plants.

Where vehicles are permitted to travel across country, wheel-impact kills plants. The proliferation of wheel tracks, many of them leaving virtually permanent scars, is a serious development in some East African parks, and the trend, if allowed to continue, threatens to damage a substantial proportion of the total grassland area over hundreds of square kilometers. The long-term effects of this damage can at present only be surmised, but some indirect effects on vegetation and soils have been noted; for example, vehicle tracks across country in Serengeti National Park have had marked effects on drainage patterns by diverting the normal slow wash of rainwater over grassland into rapidly flowing streams along the tracks, interrupting extensive catchment patterns and sometimes causing serious gullying. Other inconspicuous but important effects of wheeled traffic could be mentioned. The answer to these problems seems to lie eventually in confining all vehicles to prepared roads as is done in many national parks. Unfortunately such a restriction would greatly reduce the pleasure of visitors to those parks where cross-country travel is now customary and where the opportunities to see animals are increased very much by leaving the roads. Nevertheless, the conservation of vegetation in such areas (and hence of the animals depending upon it) will necessitate protection from the effects of large numbers of people. The time may come when, for the continued survival of natural communities (as well as for logistic and esthetic reasons), the numbers of visitors to many national parks will have to be limited.

Many adverse effects of people on animal populations could also be described; a familiar example is the hazard caused to humans and animals through the feeding of bears in North American parks. In East Africa, tourists cause many ostriches to desert their nests every year by driving their cars too close to the sitting birds. In Gombe Stream National Park in Tanzania, chimpanzees apparently caught poliomyelitis from neighboring village people among whom there had been several cases of the disease.

Although such acts of disturbance are serious, they are to some extent offset by the largely beneficial effects of the increasing tameness of large animals in contact with people and their vehicles. The control of people in national parks is one aspect of the management of flora and fauna which will become more important as the numbers of visitors increase.

Introduction of exotics

If the policy of a national park is to conserve natural communities, the introduction of exotic plant and animal species will be avoided as a matter of principle. Almost inevitably there will be accidental introductions. Although many introduced species will not be expected to survive under wild conditions, experience shows that some species will do so and may propagate themselves abundantly. While there may be esthetic objections to an introduction, there will also be the more cogent objection on ecological grounds that the exotic species may suppress one or more indigenous ones.

Even if a policy exists to exclude or exterminate exotics in a national park, action to control them will have to remain within practical and economic bounds, for their removal may be difficult or very expensive. In some cases, species will have been introduced to

areas prior to their declaration as national parks and it may be possible to tell whether the exotic species are likely to die out. If there is doubt, it is obviously safer to eradicate the introduced species.

There will be cases where national park authorities are aware of apparently empty ecological niches which could be occupied by the introduction of attractive exotic species. Most park authorities would rightly resist the temptation to make the introduction. However, there is one circumstance where introduction might be justifiable and that is in the case of a species that has been extinct in the area within the recent past and where the appropriate habitat still exists. There may be uncertainty about the period since the original extinction, but the existence of the right habitat is likely to be accepted as the criterion for the reintroduction of a species.

There will also be doubt about the wisdom of introducing a species from an adjacent area, but if the introduction amounts to a small extension of the species' known geographical range and suitable habitat is present, then the introduction may be thought justifiable. It has been assumed that an area having the function of a zoological garden for the care of exotic species will not be given national park status, but there is the possibility that a national park might be declared for the purpose of providing a new habitat for a very rare introduced species, the natural habitat of which has been destroyed.

Status of predators

Indigenous predators are an integral and important element of natural ecosystems, living in quantitative balance with their prey populations. Biologists have shown or suggested that large predators probably have the effect of damping down the potentially dangerous oscillations which arise in ungulate populations in response to varying climate and food supplied. They exert directional selection pressure by taking a large proportion of sick animals; much of the inherited behavior of the prey species has evolved as a response to predation. Thus, in addition to their value as one of the greatest of all attractions for visitors to parks, the large predators fulfil several important biological functions in the ecosystems of which they form a part. Before their decimation over a great part of North America, the cougar and the wolf probably fulfilled similar ecological roles. Their absence today probably deprives the large mammal communities there of an important component which formerly contributed to the stability and health of their ungulate populations. The price that may have to be paid in terms of compensatory management is unknown.

It would be unrealistic to expect a rehabilitation of the large predators in Europe, Asia, and North America except in the most remote areas. The attitudes of pastoral and agricultural people toward predators are unlikely to change, but there is hope that national parks can play a part in saving the wolf and the cougar from extinction in North America and the tiger in Asia.

Rare species and communities

In general, the best conditions for the maintenance of a rare plant or animal species are provided by the complete physical and biotic environment to which it is adapted, so that no special measures other than the conservation of the community as a whole

are needed. Nevertheless, it may be necessary to control predators to accelerate the recovery of a very rare animal or to fence the habitat of a rare plant to protect it from animals and, possibly, from human plant collectors.

A related problem is that of the rare species which is threatened by competition from another species. If the successful competitor has been introduced artificially, there can be little doubt that its removal from the area will be desirable. Where the successful competitor is indigenous, an unknown additional environmental factor may be also causing the decline of the rare species and the problem may be insoluble. Of course, rarity by itself is not a cause for concern unless a species is getting rarer still. Rarity is a characteristic of some species and, although often difficult to account for, may be simply the result of a very specialized and uncommon ecological niche. The possibility of increasing artificially the availability of habitat sites for a rare species (if possible with no detriment to the rest of the community) should not be overlooked. The artificial provision of habitat sites for animals that are not rare, such as nesting boxes for hole-nesting ducks, might be regarded as unacceptable in a national park; but where no adverse effects can be detected or predicted, the decision may be taken to provide such facilities. The extent to which the principle of minimum interference is followed will ultimately depend on the judgment of the national park authority. There may be times when that judgment will be severely exercised, particularly when major ecological changes are taking place in a national park.

Problem of gross ecological change

A property of biological communities is their capacity for self-regulation. Most ecosystems are in a state of fluctuating equilibrium and exhibit cyclical changes which remain within characteristic limits unless subjected to large disturbances. Others undergo linear changes such as the degradation of arid land toward desert conditions under the influence of excessive exploitation by man, reinforced by periodic drought. The national parks have the opportunity to protect delicate communities from human impact. Unfortunately, national park authorities are often frustrated by their inability to protect areas under their control from serious disturbance which originates outside the parks. Several instances have occurred in Europe, North America, and Africa where such manmade disturbances have disrupted the equilibrium between large mammal populations and their habitats. In Europe and North America, a frequent problem is the overpopulation of deer on their winter range due to the reduction of the area available to them at that time of year. In Africa, perhaps the most difficult management problem has been caused by the compression of large mammal populations, notably of elephants, into the limited areas of several national parks. Increasing agricultural settlement and other human activity have destroyed former habitats, and elephant populations have concentrated in the remaining undisturbed areas. Animal populations are ultimately limited by their food supplies and in relatively natural ecosystems; the regulating mechanisms tend to limit animal numbers at levels below those at which they damage their habitats. A decrease in habitat is normally followed by a proportionate decrease in animal numbers, so that an equilibrium is eventually restored. However, the response

of animal populations to reduced areas will not be immediate, and in the case of elephant populations, the reduction in numbers appears to take place with a timelag of many years after the initial overpopulation occurs. During this time, elephants may drastically alter the vegetation of the habitat before a new balance is restored (if indeed it is restored).

"Elephant problem" in African national parks

It might seem inappropriate to dwell upon one example of the management of national park flora and fauna. The justification for doing so here is that the serious difficulties caused by the imbalance between elephant populations and the vegetation in many African parks seem at present to outweigh other management problems there. Moreover, as an example it is relevant in a general way since the issues of ecological, esthetic, ethical, political, and administrative implication are similar to those with which most national park authorities are obliged to deal from time to time.

In several African national parks, elephant populations, which have apparently exceeded the carrying capacity of their habitats, are killing large numbers of trees and clearing previously wooded and forested country. The complexity and the sheer practical difficulty of this management problem are reflected in the varied measures being taken to meet them from one country to another. Unfortunately, it is not possible, within the scope of this paper, to describe the situation as it has affected each national park. Stated briefly, several park authorities have been shooting elephants to reduce their numbers; in one national park, this has taken place even at an advanced stage in the elephant-induced change to save what is left of the woodlands and in the hope of eventual rehabilitation of the vegetation. Another authority has decided not to shoot elephants on the grounds that the admittedly great reduction in the woodlands is not a wholly retrograde change, but appears to have compensatory advantages through the resulting increase in habitat for the grazing ungulates. Recent drought in that area has had the predicted result that several thousand elephants have died of starvation, thus alleviating the problem at least temporarily and also indicating that natural regulation may be taking place.

Another national park authority is awaiting the results of current research on elephant-woodland interaction before making management decisions. There is recent evidence that the increased woodland regeneration resulting from fire-control measures may, in some areas, be sufficient to replace the trees being killed by elephants.

In each national park affected by the problem, the passage of time will help to provide answers to questions concerning the management of elephant populations and their habitats in order to achieve the most acceptable compromise for the maintenance of the vegetation and the animal life it supports, including the elephants themselves. In order to obtain these answers, it is necessary to establish long-term programs of ecological monitoring of the climate, the vegetation, animal numbers and distribution, and the distribution and density of adjacent human populations. With accumulated and progressive quantitative information on these environmental factors, there is every hope that we shall be able to detect the causal mechanism behind changes in the ecosystems and also to provide predictive advice on future trends. In the absence of such ecological monitoring, our ability to interpret rationally the experience being gained in the course

of the present intensely instructive events and of current management practices will be seriously limited. Ecological research in national parks is further discussed below. Only a few of the many management issues arising from the difficulties of the elephant-vegetation problem can be mentioned here. A basic ethical question is: How can national park authorities reconcile their widely accepted traditional role of protecting plant and animal life with the possible necessity to employ drastic corrective management such as the shooting of large animals? The decision to shoot is fraught with difficulties. There may be initial doubts about the necessity for shooting; there may be uncertainty about the numbers to shoot, the methods, and the place and time; the method must minimize disturbance within the park; there will be practical difficulties involved; and there will be the question of who should do the shooting and what should be done with the meat, the hides, and the ivory. There may be a serious public relations problem. Many people may challenge the necessity for shooting animals in a national park. There will be the problem of assessing the results of shooting, involving a reasonable knowledge of the ecological situation before shooting begins and the ability to monitor the operation itself and the years which follow it. There will be the question of obtaining the maximum scientific data from the animals collected.

There can be no attempt to answer these questions in a short paper such as this. It is hoped that they will provide a basis for discussion.

Research in national parks

The need for research as a basis for the rational management of flora and fauna was stated in the 1962 Report on Management and has been emphasized in several documents published subsequently (Leopold *et al.*, 1963; Nat. Acad. Sci. 1963; Russell, 1968; Leopold, 1970).

In the last two of these publications, which were written at the request of Tanzania National Parks, Russell named two essential services which research should render to a national park organization and Leopold added a third:

1. A monitoring service to keep continuous check on the changes taking place in the vegetation and animal numbers and distribution within the parks.
2. Conventional ecological study of individual species and communities to clarify life processes and relationships.
3. Supplying accurate information to the interpretive services of the park system so that the visiting public can learn as much as possible about the interaction of plants and animals in natural areas.

Numerous other functions for research in national parks can be named, several of which have been mentioned earlier in this paper: the making of inventories of plant and animal life, geology, soils, and water as baselines for further investigation; the analysis of communities and successional trends within them as steps in the process of analyzing the structure and function of the ecosystems of which they form part; observation and experiment to clarify the position of fire in the ecology; and observations on diseases, parasites, predation, accident, and undernutrition as factors in the limitation and regulation of animal populations. A large amount of fundamental knowledge on the biology

of the flora and fauna is likely to be relevant to the management of national parks in the long run, although the immediate use for much of the information may not be readily apparent.

Of more direct value is research on plant productivity; on the roles of climate, soils, animals, man, and fire in determining the character of the vegetation; on animal habitat requirements; and on population sizes and trends. Studies carried out to assist in solving the more urgent management problems caused by serious ecological imbalance and trends toward excessive populations of plants and animals or toward rarity and extinction are of even greater immediate relevance.

National parks offer unusual opportunities for so-called pure research into the biology of flora and fauna in a relatively natural state. Where such studies can be conducted without detectable harm to the parks and where there is no doubt about the competence of the biologists, they can add very greatly to the total value of the national park system.

Integrated research programs

With the beginning of research on wild mammals and their habitats in the national parks of East Africa 15 years ago, a tradition of ecological investigation developed there which has evolved into the present broad concept of integrated studies of the ecosystems. In varying degrees, the three research establishments in the national parks of Kenya, Tanzania, and Uganda have adopted the function of research divisions of the park authorities. In Tanzania, in order to ensure the maximum coordination with the national park administration, the Serengeti Research Institute was formally constituted as a division of the Park Authority, with a closely defined set of objectives, one of which is the study of all aspects of the ecosystems which are related to park management. This has been interpreted by the Trustees of Tanzania National Parks, on the advice of their Scientific Council and research staff, as a program of closely integrated studies on the climate, geology, soils, vegetation, and animals, including an ecological monitoring program to record change and to ensure continuity of observation (Lamprey *et al.*, 1971). The institute has a staff of 15 research workers. It is affiliated with the University of Dar es Salaam, and is intended in future to train graduate biologists in field research and management techniques for service with the national parks.

The presence of scientists in national parks is likely to be viewed by park administrators as a somewhat mixed blessing since almost inevitably they create problems of their own. Research workers should be subject to rules which define their responsibilities and the limits to their freedom of action in the pursuit of their research (Leopold, 1970). In particular, the collection of plants and animals for scientific purposes should be regulated according to agreed principles which ensure minimum disturbance to the parks but which provide adequate material for the research being undertaken. The organization of scientists under their own research director, who is responsible to the park administration for their activities, will help to achieve the control required. The research and administrative staffs in a national park organization should work together very closely to achieve a common understanding of park objectives and policies as well as agreement on research priorities and the significance of research results. When

disagreement arises, it should be resolved by a panel of specialists who can evaluate the problems and the application of research results to them. Fears of "scientific imperialism" by the administration can be allayed if scientists act in an advisory capacity only and where scientific programs are jointly planned and evaluated by a team of administrators and scientists.

The last decade has been one of accelerating human activity in and around the boundaries of many of the national parks of the world. The ability of the natural flora and fauna to survive their human onslaught already is being severely tested. Conservation management in many parks in the next decade will call for imagination, discipline, and, above all, an understanding of nature's response to this changing environment.

COMMITTEE REPORT¹

Management in National Parks

Chairman: F. Bourlière

Members of this committee were M. A. Badshah, Irven O. Buss, Clarence Cottam, Antoon de Vos, L. A. Garrison, I. R. Grimwood, Rocco Knobel, A. Starker Leopold, Albert Ory, John S. Owen, Lee M. Talbot, Martha H. Talbot, Jacques Verschuren and Jack Vincent.

1. Management is defined as any activity directed toward achieving or maintaining a given condition in plant and/or animal populations and/or habitats in accordance with the conservation plan for the area. A prior definition of the purpose and objectives of each park is assumed.

Management may involve active manipulation of the plant and animal communities, or protection from modification or external influences.

2. Few of the world's parks are large enough to be in fact self-regulatory ecological units; rather, most are ecological islands subject to direct or indirect modification by activities and conditions in the surrounding areas. These influences may involve such factors as immigration and/or emigration of animal and plant life, changes in the fire regime, and alternations in the surface or subsurface water.

3. There is no need for active modification to maintain large examples of the relatively stable "climax" communities which under protection perpetuate themselves indefinitely. Examples of such communities include large tracts of undisturbed rain-forest, tropical mountain paramos, and arctic tundra.

4. However most biotic (or natural) communities are in a constant state of change due to natural or man-caused processes of ecological succession. In these "successional" communities, it is² necessary to manage the habitat to achieve or stabilize it at a desired stage. For example, fire is an essential³ management tool to maintain East African open savanna or American prairie.

¹ From First World Conference on National Parks, 1962.

² The only changes necessary, in my view, to update these principles would be to substitute the words "may be" for "is" and to delete the word "essential" in item 4. - H. F. Lamprey, in *lit.*, 7 November 1972.

5. Where animal populations get out of balance with their habitat and threaten the continued existence of a desired environment, population control becomes essential. This principle applies, for example, in situations where ungulate populations have exceeded the carrying capacity of their habitat through loss of predators, immigration from surrounding areas, or compression of normal migratory patterns. Specific examples include excess populations of elephants in some African parks and of ungulates in some mountain parks.

6. The need for management, the feasibility of management methods, and evaluation of results must be based upon current and continuing scientific research. Both the research and management itself should be undertaken only by qualified personnel. Research, management planning, and execution must take into account, and if necessary regulate, the human uses for which the park is intended.

7. Management based on scientific research is, therefore, not only desirable but often essential to maintain some biotic communities in accordance with the conservation plan of a national park or equivalent area.

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DISCUSSION

Since the session was specifically aimed at providing an opportunity for debating some of the more difficult problems which face national park managers, both the Chairman and the author of the background Paper felt that it was unnecessary to take up time with introductory remarks and left it to the panel members to open the discussion.

John E. Clarke (Panel Member): Only two of the 17 national parks of Zambia are not primarily wildlife areas, so that our management problems have tended to be mainly concerned with antipoaching and fire-control activities and, in two of the parks, with the cropping of animal populations. The purpose of cropping, to which I propose to confine my remarks, has been partly to collect research data and partly to remove what were considered to be surplus animals, in the sense that the size of the populations concerned was believed to account for undesirable trends in the ecosystems.

Whenever cropping is undertaken, one has to be specially aware of public relation aspects, since adverse public opinion, on what is always an emotional issue, can be embarrassing and disrupt the program. With us, the species concerned, in the order in which they generate emotion, are the elephant, the Kafue lechwe, and the hippopotamus. In one park, where there were about 20,000 elephants as against 8,000 hippos, there was much more public feeling about the former and very little about the latter. The lessons we have learned from our experience can be summed up as follows:

1. Don't make a great noise about the cropping project but equally don't try to conceal it; just treat it as any other routine management exercise.
2. Don't ignore the local conservation societies even if they are "amateurs"; if they understand your aims, they can help greatly to allay anxieties and misunderstandings, but, if ignored, they can easily make things difficult through politicians or other influential people.
3. Don't allow the personnel of the parks themselves to separate into two camps of "procroppers" and "anticroppers," which would mean that all rational consideration would be jettisoned and replaced by conflicts of personality.
4. If meat or other by-products are sold commercially, don't allow the commercial aspect to take precedence over the park management aspect, and make sure that this principle is made known to all concerned and included in any publicity material.

Prof. Antoon de Vos (Panel Member): The justification for wildlife utilization in and around national parks is that it should be "corrective," but it can perfectly well be argued that if nature is left alone, species exceeding the carrying capacity will be reduced without man's help. However, the fact is that in Africa, for example, excess over carrying capacity, whether or not man-induced, can cause serious environmental damage, and that very few parks are self-contained ecosystems, so that there will be movement of animals across boundaries. This raises the question whether it is harmful to the ecosystem of a park if cropping occurs outside. There is no simple answer; if large numbers of ungulates migrate out of a park for part of the year, increasing human population pressure and pressure on the land are sure to bring them more and more into conflict with man. If people cannot be convinced of the economic value of these animals, they will slaughter them without regard for proper utilization, and ultimately the wildlife population in the park itself will be adversely affected.

In these circumstances, it is the objective of an FAO project in Kenya, financed and executed jointly with the Government, to demonstrate that utilization outside parks can be of public and private benefit but also of benefit to the parks themselves. It is based on the combination of consumptive (sustained yield) and nonconsumptive (including scientific research) types of utilization. FAO and many of the governments concerned are convinced that in Africa and other developing countries a rational consumptive or commercial use of wildlife outside the parks is necessary, and that it also contributes to the survival of animals themselves, including, of course, not only the large ungulates, but also rodents, hares, crocodiles, and turtles. In short, it is our contention that wildlife in national parks cannot be managed in isolation from surrounding areas and, in fact, should be managed as an inherent component of rational wildlife management on a regional basis.

Dr. Marc J. Dourojeanni (Panel Member): In my view, which coincides closely with that expressed in Paper 21, the objectives of management in national parks are (1) to prevent undesirable successional changes, for ecological and aesthetic reasons; (2) to promote favorable successional changes, for example, making possible greater diversity of ecosystems; (3) to increase the number of plant and animal species which naturally correspond to the park ecosystems; (4) if necessary, to reintroduce species which have become extinct; (5) to maintain predators, although in some cases regulating their numbers; (6) to assist the multiplication of rarer species, by controlling limiting factors; and (7) to control species which for various reasons are disturbing the equilibrium of ecosystems. These aims are not necessarily applicable to the whole area of a park nor for an indefinite time; the key to the solution of the problems involved lies in the zoning principle.

The Peruvian view on this subject envisages four main categories of reservation. First, there is the national park, with 70 percent of its area forming a strict conservation zone, and 30 percent a touristic zone (through only one-third of this will be in actual use by visitors—usually the sector of greatest scenic attraction); each park needs to be supported by a "zone of influence," what Dr. Lamprey calls a buffer zone, equal in size to the strictly managed zone, and normally bordering the park; this will be managed for production purposes, including cropping. Second, the national reserve is a temporary category, zoned in the same way as a park, if it is designed to protect particular species, and ultimately intended for conversion to park status. On the whole, we have succeeded in Peru, in the reserves created for the guano birds and the vicuña, in providing for productive exploitation without undue disturbance of the ecosystem. Finally, there are the national sanctuaries and the national forest/national hunting reserve complex, which, as their names imply, are areas zoned, respectively, entirely for conservation or entirely for rational exploitation. The broad aims of these provisions are to conserve nature, while at the same time making it contribute effectively to social and economic development. In marginal lands, wildlife resources can be made the basis for a significant improvement in the standard of living of the inhabitants. What this means is that conservation areas must embrace but extend much further than the national parks.

Dr. Robert M. Linn (Panel Member): My definition of the management objective would be "to maintain as nearly as possible, and re-create when necessary, those ecological conditions that would prevail within the park were it not for the direct or indirect influences of man." The approach to this must be based on the biotic community, which is completely dependent on the primary producers, and it is the latter, the vegetative matrix, which must be fully understood and managed accordingly. Occasional assistance, such as the use of fire, may be necessary for the perpetuation of some communities, though in others, such as the eastern deciduous forests of North America and presumably of Asia, as well as some desert areas, fire is not important and, in any case, wherever used, must be used very carefully to avoid adverse effects on interests outside park boundaries.

Turning to the mammals, my view is that if a park represents a reasonably complete ecosystem, natural population regulation (i.e., without man's influence) is certainly best except in extremely rare situations. Elsewhere, there are only the two choices, namely to allow populations to come naturally to a new equilibrium, even though they may be smaller than previously, or to artificially maintain populations, which means, in effect,

operating a kind of farm or zoo. One question to be asked, if the last-mentioned alternative is followed, is whether our zeal in preventing "overpopulation" in herbivores has anything to do with the rate of recovery of the top predators or even the loss of some of these secondary consumers. It is a question which needs to be investigated rather thoroughly in the years to come, especially as the answer, no doubt, differs with geographical, political, and other factors.

Prof. Edgardo Mondolfi (Panel Member): One function of national parks needing more emphasis is that of providing protected habitats for rare and endangered species: for example in South America, the vicuña, mountain tapir, Andean bear, pudu, huemal, maned wolf, giant otter, and armadillo; and in Central America, the lowland tapir and various remarkable birds, such as the quetzal and horned guan. Particular attention needs to be paid to research into the ecology of fruit-producing and other food plants used by animals in tropical America, if management is to succeed. Many of our species are strictly attached to and dependent on specialized habitats, and, if the latter are destroyed, nothing can save the animal species concerned. Another factor as yet little studied or understood in tropical America, is the predator-prey relationship: the habits and life history of even the largest cat, the jaguar, remain almost unknown. If the necessary research is to be undertaken, we need many more Latin American scientists to be trained with the help of organizations such as the U.N. agencies and the universities, and it is also vital that the fullest use of the local scientists who are available is made by organizations such as the World Wildlife Fund when they are planning assistance for conservation in Latin America.

Akbar S. A. Packeer (Panel Member): Looking at these controversial problems from the point of view of Ceylon, a country of 26,500 square miles (of which 375 are in national parks) and with a population of 12 million, the more dynamic management objective of our parks (to which everyone has free right of access, under the Fauna and Flora Act) is to help in the fight against hunger and poverty. We cannot afford an emotional approach, however meaningful and endowed with funds, in our attitude to conservation, but must depend on a very broad basis of specialized knowledge, covering such fields as biology, ecology, land management, economics, and social relations. Among our many problems is the incursion into one of our parks of large numbers of semiwild cattle, carrying disease, pollution, and the risk of deterioration to wild stock through crossbreeding. Religious susceptibilities ruled out the destruction of these animals, attempts to capture them were a failure, and the problem remains unsolved. Another one concerns the clearing of forest lands and the resulting conflict between the wild elephants dislodged from their habitats and the owners of cultivated land. An attempt has been made to solve this by linking remaining forest areas by corridors 2 or 3 miles in width, but these corridors are vulnerable to increasing human pressure. Yet another technique which has been tried is to improve by mechanical means, the natural waterholes in the parks and forests in the hope that elephants and other animals will not have to move out to the rivers during the height of dry seasons or times of drought; but this has been criticized as artificial and possibly damaging to the ecosystem.

Dr. Raymond F. Dasmann (Chairman): To judge from the number of requests received, we shall only have time for about two-thirds of the interventions from the floor, but the points which would have been made by those who cannot be called on, will be mentioned in the record if they are submitted in writing.

M. K. Ranjitsinh (India): Translocation of animals from national parks, where there is a surplus, to parks which have a deficit and could easily accommodate them, seems to me to be commonsense management. Secondly, I do not know of any area where there is an overpopulation of predators, since they have their own built-in mechanism for maintaining a balance with their prey: witness the stable tiger population in Kanha National Park which has remained much the same for many years.

Prof. Donald J. Kuenen (Netherlands): Despite Panel Member Clarke's remarks, I believe that the distinctions between the scientific and emotional arguments regarding utilization of wild animals are far from clear and still need a great deal more thought.

Dr. George W. Scotter (Canada): The views expressed by Panel Member Linn about self-regulatory herbivore populations seem to be based on experience of areas which are very unusual; most parks are far from self-contained ecosystems and Dr. Linn's ideas would be very impractical in relation, say, to wapiti. Controlled harvesting often has to replace lack of predation.

Dr. Robert M. Linn (Panel Member): I still question if it is necessary to interfere if ecosystems are relatively intact, regardless of whether, in the case of the elk or wapiti, the North American Indians used to crop 2,000 or 3,000 per year. It is possible that certain types of areas are consistently overgrazed even under quite small herbivore populations. A large winter kill may be an important factor in an ecosystem.

Emmanuel O. A. Asibey (Ghana): Are we not, in fact, faced by a choice whether to kill and utilize or to leave animals to a slow death through starvation?

Rocco Knobel (Republic of South Africa): If the definition of national parks adopted by the IUCN General Assembly of 1969 is followed, then there is no doubt that we must manage national parks on the basis of scientific research. Referring to Dr. Linn's remarks, we are not worried in South Africa about the future of large mammals and we control them mainly to protect the habitat for smaller animals, because it is their existence which is really threatened, by factors such as the superabundance of large species. We do not want to find the smaller species in the Red Data books.

Albert L. D. Mongi (Tanzania): The guiding principle of management should be naturalness and the avoidance of artificiality, and emphasis should be on the dynamic quality of the ecology of both micro- and macro-ecosystems. To content oneself with just maintaining such systems is a subjective attitude and opposed to the natural dynamism which plant communities move toward their climax. It can degrade parks to open zoos. What we need is research into the dynamic processes rather than into management problems, because intervention at any one stage is contrary to the aim of retaining the dynamism in identified viable ecosystems. Only those areas no longer viable or capable of rectifying themselves should be left to subjective management. Continuous inventory is essential and cropping may not be necessary for that purpose; for example, we know that in the Tsavo some 4,000 elephants out of 12,000 died in the recent drought, which is probably twice the number that would have been killed if a cropping project had been put into effect.

Perez M. Olindo (Kenya): I would like to say a few words about the Tsavo elephant problem, which no doubt has been in many people's minds as we discuss this question of culling or cropping. As Professor de Vos has said, wildlife utilization in Kenya is the subject of an experimental joint Government/FAO project undertaken outside the parks and game reserves. There is close cooperation between the Park Authority and Game Department in deciding what species may be hunted and in what numbers, based on the principle that the parks should be research orientated, while controlled hunting continues in all areas outside the parks. Adjacent to Tsavo National Park, where the main problem of damage to the environment by an apparently excessive elephant population has arisen, we have a mixed wildlife/cattle ranch of a million acres, and our view is that, before a cropping policy is extended into the park itself, we must have enough information available from this ranch and from our own research project. One important point is that if and when it is decided to crop the elephants in the park, then the Park Service itself will be responsible, so as to eliminate the profit motive that continues to lurk in the background of the controversy.

Ponsiana Ssemwezi (Uganda): Representing a country where cropping as a method of park management has been adopted for some years, I feel I should say something in its defense, in view of some of the criticisms we have heard from previous speakers. First, the cropping decision was only made after lengthy research and discussion, in which the Nuffield Unit of Tropical Animal Ecology and the Board of Trustees of the Uganda Parks played leading parts. Second, the fact that cropping inside the parks has been necessary is an indication that the cropping by licensed hunters outside the parks has not been sufficient to reduce the number of elephants to the required level. Third, there has never been a real controversy about the issue in Uganda itself, except for the fact that when tenders were invited, and one was put in by a noncitizen, obviously aimed at maximum profit, this was objected to by citizens, and in the event it was decided that it should be a joint Park and Game Reserve project. Finally, I need hardly add that the Uganda national parks are using many other techniques besides cropping for management purposes, including the controlled use of fire; experimental continuously monitored plots; special studies of relations between elephant, other species, and the habitats; and translocation (of white rhinos).

Dr. Douglas H. Pimlott (Rapporteur): Turning from cropping to another controversial issue referred to by Dr. Lamprey, he suggested that it may only be possible to save large predators such as the cougar, wolf, and tiger, in national parks, and then only if these areas are sufficiently remote. I would like to point out that there are still many places in Canada where wolves are living close to human population centers without serious conflict. They occur, for example, within 100 miles of Ottawa and Toronto. I believe people will become still more tolerant of the wolf as they learn more about it, as specific methods of control are developed, and on the basis of compensation payment for livestock losses caused by the predator. It is only because in the past the problem has been dealt with in a general rather than specific way that the notion that the predator can only be tolerated in remote areas has grown up. My second point is that the main role of national parks may be to help people to come to terms with animals that have been traditionally hated, like the wolf and tiger. Algonquin Provincial Park in Ontario has, for example, done

much to encourage a more positive attitude toward the wolf, so that the Government has been able to discontinue bounty payments for its destruction. The change in thinking dates from the establishment of research on wolves in Algonquin in 1958.

K. S. Sankhala (India): In the light of the references in Paper 21 and the previous speaker's remarks on the tiger, this seems an appropriate moment to table for the information of all who are interested copies of the paper I have very recently completed as special duty officer for "Project Tiger" of the Government of India. To summarize the main points of the project, which aims to secure the survival of the Bengal tiger, *Panthera tigris tigris*, in the wild lands of India: it is based on the intensive development of eight areas incorporated in our National Park System; within these areas, no commercial exploitation will be allowed for at least 6 years and, in particular, an inner sanctuary of not less than 300 square kilometers will be demarcated and kept free of all disturbance. Management of, research into, and publicity for, these areas will be specifically directed to the aim of securing the future of the tiger; for example, game cropping would be out of the question for the next 2 years—the job will be left to the tiger! A project of this size will need substantial funds, estimated at Rs58 million (about \$8 million) for the 6-year period 1973–79, and the fullest support of international organizations such as WWF and IUCN is anticipated and required.

Robert G. Lyons (Australia): It is, perhaps, fitting that a delegate from Australia should now raise a third controversial issue referred to in Paper 21 and by one or two of the panel members, namely the problems caused by the introduction of exotic species into park environments; the introduction of the rabbit into Australia is the classic example of man's folly and lack of forethought in this field. In my State of South Australia, many native species are threatened by competition from exotics: the yellow-footed rock wallaby by the feral goats in our two Flinders Range National Parks, where some of the last surviving colonies are preserved; in a different way, our black duck by crossbreeding with the introduced mallard. Other introduced species to be found in our reserves include feral dogs, foxes, pigs, horses, donkeys, and, even, camels. However, the most insidious introduction, which, apart from habitat loss through land clearance, is the greatest single threat to the smaller marsupials and ground-nesting birds, is the domestic cat; its feral populations now occupy the ecological niche of predator, which scarcely existed previously, and have spread everywhere, even to the Simpson Desert of central Australia. Unfortunately eradication programs meet with continual reinfestation, due to the actions of persons whose only solution to the distasteful problem of destroying unwanted litters is to dump them in the bush. Unless eradication based on detailed scientific knowledge of the ecology of the cat and combined with education of the community can be more successfully applied, many native species will soon become endangered.

Dr. Hugh F. Lamprey (Author of Paper 21): To draw a few conclusions, I would say that the management principles set out at the First World Conference 10 years ago are only defective to the extent that they overstress the importance of the *status quo* rather than succession. There has perhaps been some confusion in the discussion between cropping and sampling (e.g., for research purposes). As for the extent to which ecosystems are disturbed, this need not necessarily affect their potential for ultimate self-regulation; but the problem in Africa is the elephant and the length of time it may take for regulation to

operate in its case. Finally, it is clear that regional planning extending beyond park borders is essential: intensive agriculture near a park may be very problematical compared with animal husbandry or forestry.

Dr. José Candido de Melo Carvalho (Brazil): It is worth noting that in the neotropical region the fauna is extremely abundant in numbers of species but quantitatively poor in numbers of individuals. Consequently, at least in Brazilian national parks, the problem of cropping or any other type of management aiming to reduce the number of any species is nonexistent. On the other hand, the main problem is how to repopulate with endemic species most of the recently established parks. This is being done with fairly good results in Tijuca National Park of Rio de Janeiro, of which previous mention has been made.

Dr. Alceo Magnanini (Brazil): In amplification of what has been said, the Tijuca re-stocking program has been going on for 5 years, based on careful scientific studies. It is satisfactory to report particular success with the golden lion marmoset *Leontopithecus rosalia*, previously restricted to a few remnant forests along the neighboring Atlantic coast and, at the last count, a maximum of about 300 individuals, plus less than 70 in captivity. With IUCN and WWF help we now have a project for reintroduction in Tijuca based on captive breeding facilities. Starting with 10 pairs, we believe that a second generation is (for the first time in captivity) now in existence; the stock is kept as wild as possible, so that the young will learn to survive on their own, and the establishment of a special biological reserve area, with a research center nearby, for the eventual release of the species, is now awaiting final approval by a Federal decree.

John T. G. Page (Republic of South Africa): The extent of capture and translocation to depleted areas of surplus animals in South African parks is worth putting on record. It amounts to between 4,000 and 5,000 individuals each year, and up till now more than 1,000 white and black rhinos have been immobilized and translocated. A great deal of experience of methods and techniques has therefore been gained and can always be made available to those needing information.

Pierre Chimits (France): A management point which always rouses much argument but has not yet been mentioned (except incidentally by Nathaniel P. Reed in the Yellowstone sessions of this Conference) is whether sport fishing should be allowed in national parks. Three factors need to be taken into account; the high breeding rate of fish; the fact that fish behavior is very little affected by sport fishing; and, on the other hand, the fact that the fisherman, unlike the hunter, is unlikely to switch to photography. I suggest that the conditions for permitting sport fishing in parks should be that (1) part of the waters should always be out of bounds; (2) only artificial lures should be used; (3) the fishing should be strictly controlled, with a very limited open season, a limited catch, and a lower limit on the size of fish which may be taken; (4) no fishing from motorboats; and (5) no wading in the smaller streams.

W.J. Eggeling (U.K./Scotland): No reference has been made to one controversial problem, namely the management of bird populations in parks and reserves. As an illustration of this, I would quote one small island national nature reserve in Scotland, which formerly

had a varied and stable vegetation and a diversified breeding bird fauna but has been turned into what has been termed a "gull slum," with the vegetation adversely affected, eroding soil and barren rock, by an escalating overpopulation of gulls *Larus argentatus* and *L. fuscus*. In 1907 only one pair of gulls nested on the island, in 1971 the number had increased to 20,000 pairs and has recently been doubling every 6 years. This year it was decided to launch a large-scale control program and about 18,000 adult gulls were killed, a figure which is expected to be repeated in 1973, after which it may be possible to hold the population at an acceptable level by a small annual kill. This has been a controversial operation, but the public relation problem was dealt with satisfactorily much on the lines advocated by Panel Member Clarke. If only Professor de Vos's formula were applicable and people could be found to eat seagulls!

Dr. Wolfgang Erz (Federal Republic of Germany): Two final points: first, that in the deteriorating conditions in most natural areas, including national parks, under the impact of increasing isolation and visitor pressure—the conflict referred to at previous sessions between conservation and development for man—I fear that the management objectives outlined in Paper 21 may be too idealistic or only applicable in a strict wildlife sanctuary. Second, in our discussions, the special situation of wildlife management in European parks has received no attention. Most of the problems mentioned would look very different in the context of Europe than they do in Africa.

SESSION IX

SPECIAL PARK ENVIRONMENTS, PART 2

Sunday, September 24, 2 to 5 p.m.

SOCIAL, SCIENTIFIC, AND ENVIRONMENTAL PROBLEMS OF MARINE, ISLAND, POLAR, AND SUBPOLAR PARKS AND RESERVES

Chairman: Dr. Donald Fred McMichael, Australia
Rapporteur: Juan Black M., Ecuador
Authors: Paper 22: Dr. G. Carleton Ray, U.S.A.
Paper 23: Prof. Jean Dorst, France (presented by
Dr. Peter Kramer, in author's absence)
Paper 24: Prof. W. A. Fuller, Canada
Panelists: Dr. Peter Kramer, UNESCO
Dr. Hans A. M. de Kruijf, Netherlands (Antilles)
Prof. Mohamed Hyder, Kenya
Dr. Ricardo Luti, Argentina
Dr. Dieter Mueller-Dombois, U.S.A. (Hawaii)
Dr. Edward L. Towle, U.S.A. (Virgin Islands)
Dr. Tsuyoshi Tamura, Japan
Dr. Christian Vibe, Denmark

RAPPORTEUR'S SUMMARY

The main points mentioned in the papers and discussions on the three subject heads of this session were as follows:

Marine Parks. At the present time the sea is still looked at only from an economic point of view and each nation stakes its claim on the ownership of what is treated as a common exploitable resource. It is time that ideas about this were changed, that we should keep in mind that marine species also may disappear, and that certain areas of the ocean should be reserved and protected for scientific research as well as recreation. The general view is that marine parks cannot be established and managed like terrestrial parks, if only because it is not possible to fence the sea. Moreover, we have to consider the wide extent of marine ecosystems.

Islands. Long-standing isolation, geology, and size are all factors which affect islands and produce special features, such as peculiar plant and animal species or unique ecosystems, which are particularly susceptible to influences brought about by direct human action and by the introduction of exotic animals, plants, or diseases. The destruction of island environments usually involves the loss of exceptional opportunities for evolutionary, genetic, and ecological research. It is, in many cases, caused by exotic influences, the

elimination or control of which is essential if native species and conditions are to be safeguarded. But it has to be remembered that some changes are irreversible and further human intervention may do more harm than good. In island situations, special care and knowledge need to be exercised in the development of tourism, though such development may, in general, be desirable, and sometimes necessary, for the welfare of the people concerned.

Polar and subpolar regions. These environments are younger and more unstable than many others, subject for example to drastic temperature changes from time to time; animal and plant migration or modification induced by these changes have always to be anticipated. The ecosystems are also fragile so that industrial developments and resource exploitation may be fatal unless properly controlled. Hitherto, the Antarctic as opposed to the Arctic has not been affected by industrialization problems, although its fauna has suffered severe destruction as a result of hunting for fur and meat. Nevertheless, adverse influences are now being caused by the establishment of scientific bases and tourist facilities, and the extension of these developments must be carefully watched. The meeting was in favor of the idea of an international Antarctic park, although the intensive research required for such a project was emphasized.

In conclusion, two main factors affecting the establishment at least of marine and island parks, if not those of polar regions, were identified as the social conflicts caused by tourism and the problems of food scarcity resulting from the removal of feral animals.

SESSION IX / PAPER 22

AN ECOSYSTEM APPROACH TO MARINE PARKS AND RESERVES

by Dr. G. CARLETON RAY
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The Johns Hopkins University, Baltimore,
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The application of the "park concept" to the ocean is relatively recent. It has only lately achieved worldwide acceptance as an important conservation priority, due, in part, to the realization that the sea is man's last resort for food and, in part, to a concern that the previously "immune" seas are already vitally perturbed at the hands of man. Marine ecosystems, especially the rich inshore ones, are being destroyed at an accelerating pace and, therefore—the rationale goes—some samples should be protected intact, fenced off from exploitation as it were.

It would be useful, at this point, to report on the status of the marine park movement and to tell of some of the rules and bylaws whereby marine parks are established and regulated. I hope it will not come as a surprise to tell you that this is not my intent. Rather, I refer you to Wallis (1971) who has covered this subject in excellent summary fashion. My purpose is to point out some of the real difficulties that emerge when we place our visualization of a "park" within the framework of marine ecosystem ecology.

Modern conservation began essentially in the protectionist vein at a time when the word "ecosystem" did not exist and when man's destruction of species and habitats demanded a "fencing off." In the century since the establishment of Yellowstone National Park, ecology has shown us that such a fencing off does not always reflect the workings of nature. Parks, as we all know, rarely encompass ecosystems and are often threatened irrevocably by activities outside their boundaries. Yet, the protectionist philosophy remains strong in conservation and has, most unfortunately in some instances, led to a confrontation between protectionists and ecologists. Again, it is not my purpose to detail this conflict. What I wish to do is outline some ecological realities which affect marine parks and conservation in the hope that these considerations may be placed in the forefront of our thinking. Indeed, I think it true that marine parks are but a small fraction of the problem of marine conservation—a portion that could become irrelevant unless we achieve a broader respect for the preservation of the health of the oceans.

Nature of marine ecosystems

An ecosystem is defined by its core characteristics of food webs, recycling, and tropho-energetics. On land, we recognize the boundaries of some ecosystems as equivalent to habitat, as a grassland, a pine wood, or a pond. At sea, ecosystem boundaries are deceptive. Some coral reefs appear to be ecosystems in that recycling may occur within them. Most coastal areas, however, are but fragments of ecosystems or are "ecotones," i.e., boundary zones. I shall speak of one such, the mangrove-lagoon complex, below. The point is that unless conservation is ecosystem-wide, it is doomed, eventually, to failure. In the sea, systemic conservation is fraught with difficulties, not the least of which concerns a matter of scale.

The differences between terrestrial and marine conservation are vital. Marine ecosystems are immensely larger, more complex, and less well known. The drawing of parallels between them is hazardous. In addition to size, the major difference between the two is that of their encompassing media—between the atmosphere and the hydrosphere. Terrestrial environments contain life as a skin only a few meters thick; in the sea, life exists throughout the entire water column. Winds sweep about our planet, but they contain little that is living—dust, clouds, aerosols, a few insects and spiders, and birds, none permanently. Many are attenuated by precipitation. No recycling occurs in air. No food webs exist there. And there is no trophic structure. The atmosphere swirls about and above us, mostly unoccupied.

But the sea is a bouillabaisse of a multitude of living things large and small, of nutrients from the land, of decomposition products, of particulates, and, lately, of the toxins of civilization. Its "winds" are the ocean currents which move at all levels. With them move

their living contents and, for many of this multitude, the buoying waters support the whole life cycle, away from either surface or benthos.

A second major difference is expressed as the "inverted pyramid of life." We are all familiar with the trophic structure of the land in which the greatest biomass is at the level of primary production, the least at the top. In the sea, this is not the case; the primary producers of the phytoplankton are most often outweighed by primary and secondary consumers. What the phytoplankton lacks in standing crop, it makes up by a high reproductive rate. In the sea, we think, therefore, more often of "rates" and plankton composition than of static biomass.

Another vital difference is called the "downstream effect." This means that primary production may be removed spatially, horizontally or vertically, or both, from secondary production. One does not look on the sea as on a forest where soil nutrients determine standing crop, also to find this energy converted to primary consumers at the same locus. At sea, plants are not usually rooted in decomposer systems and currents give mobility to whole fractions of the system. There are, of course, exceptions; eel grass, *Zostera*, derives most of its nutrients from the benthos, rather than from the water column.

Further, the mobility of many organisms which we may wish to conserve is often so great that the application of a park principle may cover only a tiny portion of their range. The grey whale, *Eschrichtius*, which breeds in Mexican lagoons and which takes its food in the Bering and Chuckchi Seas, is a case in point. Many marine organisms carry out different stages of their life cycles in totally different places. The importance of estuaries as breeding grounds for offshore fishes is an example. Many fishes of the coral reef spend only a portion of their lives there. Three-dimensional mobility is a major feature of marine systems; even local movements can confound our thinking if compared to the smaller scale and two-dimensionality of land-based models.

And lastly, the sea has a complex texture of its own. We must put aside, once and for all, the historic view of the sea as a surface, the assumption that all beneath is a vast homogeneity of water. The sea is strongly compartmentalized; water masses of characteristic temperature and salinity bear characteristic biota. And the land and sea form a continuum. Though vastly different, they grade imperceptibly into one another in marshlands, estuaries, and river mouths. Land use, as it effects runoff rates and siltation or as it determines amounts of nutrients and toxins which reach the "ultimate sink" we call the sea, is a part of marine conservation. I recall in Kenya how drainage from the Sabaki River periodically brings massive siltation precariously close to the marine parks just south of its mouth. Similarly, in Tanzania the volume of flow from the Rufiji and the quantity of its suspended matter, determines the distribution of corals inshore of splendid Mafia Island. Coastal zone management, of which parks and reserves are a significant part, cannot be successful without recourse to land management as well.

Man's use of the sea

It is a fact that man has already perturbed the entire Earth to the extent that management—including preservation, protection, and manipulation—is the major chore before us. There are ominous signs that man's intervention is already having deleterious effects on

the sea and that some of these effects could be of a semipermanent nature. To cite but one example, the National Academy of Sciences (1971) stated: "As much as 25 percent of the DDT produced to date may have been transferred to the sea." Marine mammals have accumulated greater concentrations of DDT than any other living things, up to 800 parts per million. The California sea lion, *Zalophus*, has shown increased abortion rates lately and the aborted pups contain two to eight times the DDT of normal pups. Where the other 75 percent of the DDT man has produced is at present no one knows. Should it reach the sea, as some or most of it is bound to do, the effects are frightening to contemplate, for DDT affects virtually all living things. It is true that the concentrations of DDT in ocean water is not yet at levels where all life is affected, but the warning signs are there for all to see. The threat of an ocean poisoned by chlorinated hydrocarbons, which could either alter or reduce productivity, is so great that the Academy study concludes, in part: "A massive national effort should be made immediately to effect a drastic reduction in the escape of persistent toxicants into the environment, with the ultimate aim of achieving virtual cessation in the shortest possible time."

DDT is but one of more than one-half million foreign substances which man has introduced into nature, many of which reach the sea. However, man's use of the sea has not always been deleterious. Until recently, man has had relatively little effect. I have recently reviewed man's present use of the sea (Ray, 1970) and will not repeat. But it is necessary to remind ourselves that the world's oceans are exploited today almost wholly by hunting and gathering, just as man used the land prior to the "agricultural revolution." The hunter-gatherer simply reaps his harvest in the assumption that environments will remain diverse, stable, and healthy. Mariculture or "sea farming" is a present fact and a possibility for increased and widespread application. It is practiced today on a small scale in altered, or manipulated, enclosed bodies of water of small size or by the introduction of new substrates for the attachment and growth of sessile forms in a still healthy ocean environment. It still remains impossible for man to alter the open sea in a predictable and controlled way so as to select desirable species or to increase productivity, analogously to land farming. Sea farming remains a product of sea health and it is my point that sea protection is also such a product. We must recall that we are trying to protect, as parks and reserves, parts of environments we do not yet understand nor can manipulate. The paradox is enormous.

Perhaps the most significant feature of the "marine revolution" in which we find ourselves, is that man, for the first time, is altering the marine environment significantly. Historically, man has had a relatively null effect. Hood (1971) states: "No longer is man an insignificant influence on the sea . . . a poisoned ocean is untenable for man's existence on the Earth." Herein lies the broadest point and the greatest danger.

Ocean regime

Derivation of the "rules" by which we regulate or utilize the oceans has been dominated by commerce, military considerations, and the hunter-gatherer's desire for "rights on the high seas." It has resulted in conventions which are utterly out of joint with the realities of ocean ecology (Ray, *op. cit.*). The Geneva Conventions of 1958 separate territorial

waters, the benthos, the superjacent waters, and living resources (nonsessile) in ways related to historical and mostly nationalistic interests, rather than providing a pattern in which the health of these ecosystems can be maintained. Special conventions and treaties, as for the northern fur seal, *Callorhinus*, have successfully conserved species. Others, as for the great whales, have been directed more toward the preservation of the industry, and, in this case, may only be beginning to function for conservation of the whales. Others, as for oil pollution, have scarcely functioned at all.

The vast majority of the ocean is a "commons." Hardin (1968) has eloquently put "the tragedy of the commons" in perspective. He points out that the commons—for the sea, encoded as the doctrine of *res communis*—"is justifiable only under conditions of low population density." The sacrifice we must make to a burgeoning population, which demands more and more "necessities" of the "good" life, is that of freedom. Otherwise, inexorably, the commons will be destroyed through overexploitation. The best examples of this remain in the sea. Yet, there are few signs that nations will be willing to give up their historical rights to freedom of the seas. The 1972 U.N. Conference on the Human Environment will grapple with this problem subsequent to this writing, but as I have said before: "... provincialism and tradition have stood in the way of control of ocean resource use. Should an over-riding consideration be given to ecology and internationalism, the Marine Revolution will effect man's future life far more beneficially than a mere evaluation of resources alone would indicate." Indeed, the problem of the "commons" is the problem of man. For marine parks, it contains the essence for eventual success or failure.

Two models for marine conservation practice

By now it should be ultimately clear that, although the establishment of marine parks and reserves must accelerate, there are no realistic ways to establish land-type "fences" in the sea. The point of this paper is to urge a new look at marine parks and reserves, a broader one than most of us might heretofore have considered sufficiently. If marine conservation is to be realistic, it must deal with marine ecosystems, even more so than is the case with terrestrial systems. Marine ecosystems are large; most are international and of the commons. What is required is a repudiation of *res communis* and the promulgation of international regional management on a scale which boggles the imagination. This requires a high degree of scientific and technical knowledge and skill, and that scientists, conservationists, and politicians work together intensively in the framework of marine ecosystem ecology. It also requires the application of the concepts of "limited entry," "most concerned nation," and "burden of proof." It requires management, not necessarily of organisms of most direct interest to man, but of ecosystem health, namely of the "most sensitive organism." It also requires a true sharing of the responsibilities and of the harvest throughout the world community. I will not dwell on these concepts. Rather, I will draw on two examples by way of illustration.

The first example is that of a large, relatively remote, productive boreal sea. The Bering Sea took its name from its major explorer who ventured over its southern portion in the early to mid-18th century. Soon after his voyages, the marine mammals there were

exploited extensively, notably the fur-bearing fur seal, *Callorhinus*, and the sea otter, *Enhydra*. By the end of the 19th century, both were vastly depleted, practically "commercially extinct." Then in 1911, the United States, Russia, Japan, and Canada signed a treaty for their protection. The fur seal was to be brought back so that a harvest could be on a "maximum sustainable yield" basis, harvested by "limited entry" by these "most concerned nations."

By 1930, the fur seal population had reached about 1 1/3 million on the Pribilof Islands and by 1950 it had exceeded 2 million (reports of 4-5 million proved to be in error) and there were evidences of overpopulation, namely a reduced reproductive rate and an increase in disease. So, according to the treaty stipulations, the population was reduced to about the 1930 level. The prediction would be, according to the complex mathematics of population dynamics, that the reproductive rate should be at the 1930 rate also. But it is not. Why? Nature turns out to be more complex than management on a species level can indicate. The answer may lie in an ecosystem phenomenon and two possibilities have been suggested. First, the seals could be effected by various pollutants, as for the sea lion, mentioned earlier. More likely, recent exploitation of Bering Sea fish by man may be decreasing the seal's food supply. Either way, we see that fur seal conservation is no longer a problem of single species management nor of the establishment of a rookery sanctuary for the seals on land. It is one of management of a whole sea. But how does one manage a whole sea?

The Bering Sea is one of the richest seas on Earth. Its waters support probably about 1 million tons of marine mammals and 100 million sea birds. Yet, this is a young, shallow, relatively small area of the world's oceans. It dates from the Pleistocene and is mostly less than 100 meters in depth over its 5,000,000 square kilometers of epicontinental area. It is relatively unpolluted, but looming on the horizon are oil, gas, and mineral development and increased transport by ship. The question is an urgent one. How are we to understand this sea's living system well enough and in time to allow the proper social decisions for its use to be made? Will man, once again, use this sea as a commons for short-term gain? The answers to these questions will determine the fate not only of the fur seal, but of the sea itself, including the extensive reserves already in existence there. All of the latter are terrestrial, but their fauna is inextricably bound to the sea.

Fortunately, the Bering Sea is presently underutilized and bordered by only two nations, the U.S.S.R. and the United States. Theirs is the key to fisheries, pollution, and mineral exploitation, and only if all these things are considered together will the Bering Sea ecosystem remain a healthy one.

For a second example, let us turn to a tropical biome, that of the mangrove and lagoon, often bordered by coral reefs. Ray and Sprunt (1971) have recently outlined the parks and conservation problem in a report on the Turks and Caicos Islands, an area ecologically typical of this biome, but, like the Bering Sea, underutilized at present. The role of mangroves in the island-building process is a familiar one. I will not dwell on it. What has only lately been revealed is the importance of the mangroves to the nutrition of adjacent waters. In Florida, about 90 percent of water-borne debris is derived from the red mangrove, *Rhizophora*. About half of this is exported to adjacent waters in the form of suspended fine materials so that about 35-60 percent of all suspended matter on the

oolitic banks is of mangrove origin. The high productivity of associated estuaries and banks is due to such suspended matter.

Tracing the path of the mangrove leaf from the time of its fall to its contribution to the seston (suspended fine material in water), large organic materials, such as leaves which are termed "debris" or "litter," are first reduced in particle size by autolysis, hydrolysis, oxidation, mechanical fragmentation, and grazing, until the particle size is 2-3 millimeters in smallest dimension; then it is called "detritus" and is capable of suspension in water. Detritus is reduced in size further to colloidal size and this reduction is accompanied by an increase in attached animal protein, due to the surface-volume ratio increase. The contribution of this process to the surrounding waters is complex and vital. Each particle is an actively metabolizing entity at the base of the food chain on a micro-organism level. Micro-organisms on debris and detritus particles are among the most important food sources for many crustaceans, worms, and fishes of inshore waters. The importance of the mangrove should now be obvious. It is unfortunate that submerged lowlands which are among the most productive regions on Earth (no terrestrial system can compare with them with the possible exception of sugar-cane) are also prime targets for development. Who loves a "swamp"? About two-thirds of all commercial and sport fishes of the eastern United States depend, at some stage of their life cycle upon similar estuaries with similar ecologies to the one described here. Coral reefs, bordering the mangrove lagoon region, also depend, in part, upon them. The obvious conclusion is that the preservation of both coastal productivity and of scenic coral reef parks also depends upon the maintainance of submerged lowlands which are a part of the total system, though not usually thought to be so by either exploiter or conservationist.

Conclusion

The park idea, like any worthwhile idea, must evolve. I do not envisage a sea cut up by boundaries which separate the preserved from the exploitable while, offshore, the *laissez faire* of the commons is maintained. For marine parks, this would spell disaster. I see parks existing only with the framework of regional management, including both land and sea, or else they will not work at all.

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PARKS AND RESERVES ON ISLANDS¹

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In many ways, islands are among the most interesting portions of emerged lands. Life there is quite remarkably differentiated both at the species level and that of communities and ecosystems. Richard Wallace drew attention to this fact as long ago as 1880, which is a fair indication of the importance biologists attach to insular populations and their history.

Islands, which tend to comprise particularly fragile habitats although many of them have been populated from very ancient times, are at present the subject of ambitious economic and touristic development planning. Because of this, they are among the areas most threatened by a disruption of the ecological balance. The future of their flora and fauna is often badly compromised. There is no doubt that it is at this level that the most urgent measures should be taken to safeguard a natural capital of inestimable value.

From the biological angle, it is useful to begin by distinguishing the various categories of islands, following the classification established by biogeographers (Darlington, 1957). Thus, certain islands are in fact only recently isolated portions of continents, formed as a result of the extension of shallow arms of the sea, partly covering the section of continental shelf joining them to neighboring emerged land masses. This is the case with the British Isles, Ceylon, Taiwan, Japan, and the Malaysian islands. Their plant and animal life is generally closely related with that of the neighboring continent with which they were once connected but shows some impoverishment and a fairly noticeable amount of endemism.

The second category of islands comprises the outer or offshore archipelagoes situated on the edge of great continental masses with which they have had no close or continuous contact during the course of their history. Nevertheless, their proximity has resulted in obvious affinities with the mainland in their flora and fauna, although both impoverishment and endemism are more marked. Examples are the Philippines and the West Indies, the biological originality of which needs no stressing.

Islands of the third category are those which have been deprived of all connections with any continent since very early geological times, or even in some cases have never had any such connections, being truly oceanic islands in the sense that they have risen from the bottom of the sea as a result of volcanic action. This applied to Madagascar, which has been separated from Africa since the Tertiary, and in particular to a very large number of islands in the Atlantic, Indian, Pacific, and Antarctic Oceans.

¹ Original: French.

For present purposes, islands will be taken to mean only those emerged lands of relatively small dimensions. Madagascar, for example, may be regarded as a miniature continent. The problems of wildlife conservation in islands, then, are closely linked with their small size and more limited ecological diversity. Both factors have had a profound influence on the evolution of living things.

Importance of "Islands for Science"

The variety of islands stems essentially from their origins and the length of time during which they have been isolated, as well, of course, as from their location in a particular climatic zone. Generally speaking, all of them have unusual, and some of them unique, features of interest. As many biologists have repeatedly pointed out, islands are really laboratories of top importance for the study of essential biological phenomena, and first and foremost for the study of evolution in natural experimental conditions. We shall mention here only a few of the most prominent characteristics of insular ecosystems which ought to be borne in mind for the purpose of interpreting the impact of man on the communities they comprise and drawing practical conclusions for their preservation. Although we shall chiefly refer to islands classified as oceanic, similar considerations may also apply to all kinds of islands in direct proportion to the antiquity of their isolation. Compared with continents, islands are, in general, poorly off in the number of their living species. Due to the difficulty of crossing the intervening strip of sea, which even when quite narrow may be impossible for forms of life ill-adapted to make such a passage, or because of what Lack (1970a) considers the major obstacle for some would-be immigrants, namely, the absence of suitable habitats in the island concerned, only a limited number of stocks succeed in obtaining a foothold. Furthermore, the always poorly endowed oceanic island tends to suffer from flagrant imbalances.

Endemism on islands reaches a degree unequalled in any other part of the globe. Islands have played a leading part as a refuge for relic or relict species which have disappeared elsewhere, and the archaic character of a segment of insular floras and faunas is well known. They often include forms which have vanished or can only be found as fossils in continental areas. Endemism is of course also derived from what might be described as the superevolution of forms of life which have become differentiated locally. The typical conditions which exist on islands—in particular, the reduction of the pressure of competition and the absence of mammal predators—has brought about a situation in which various phyla have given birth to forms which very probably would not have survived in the more balanced communities of continents. Examples are wingless forms or ones that have lost the power of flight, often found among birds and insects, a great majority of the species of which inhabit oceanic islands (the flightless rails of Oceania; the Galapagos cormorant; the terrestrial pigeons, such as the dodo and solitaires; and, to some degree, the penguins).

Islands are in fact the theater for a very special type of genetic evolution, arising from the fact that a population of rather limited size is placed in a state of isolation. The genetic stock introduced by individuals establishing that population is of limited extent and liable to be deformed by fortuitous genetic variants. Indeed, as Lamotte (1961) has

pointed out, the mechanism of genes provides an explanation of the way in which, in certain island populations, evolution is so rapid, often going far outside the normal bounds of a particular genus or, even, family.

It is just because the initial stocks are so limited in size that they have had the power to differentiate or give full play to all their genetic potentialities, which they could not have done if they had been under limitations imposed by competition from other groups. They have thus occupied a very wide range of ecological niches, some of which are very different from those to which their ancestral forms were accustomed. The evolutionary phenomenon which has been given the name of "adaptive radiation" is confined to islands, except for some very special environments, such as high mountains. Classical examples are certain molluscs and Darwin's finches (*Geospizinae*) of the Galapagos islands, molluscs again and the *Drepanididae* (honeycreepers) of the Hawaiian Islands, and the *Vangidae*, which are passerines close to the shrikes, found only in Madagascar.

Another point, which needs to be mentioned, is the role of islands in providing a breeding refuge for animals which must find shelter against predators at this crucial period of their annual life-cycle. This applies, for instance, to marine turtles which very often frequent island beaches to lay their eggs, to seals, and, especially, to many species of birds. Pigeons sometimes gather in large numbers on tiny islands to nest, particularly in Oceania. The *Procellariiformes* (petrels, shearwaters, and albatrosses) have a marked predilection for breeding on islands in the middle of the ocean or at least well offshore and therefore without terrestrial predators. Nesting on the ground or in burrows, these birds would be specially exposed to predatory mammals. As is well known, their fertility rate is extremely low and only compensated by a mortality rate very much below that of other birds, especially at the egg and young stages. There is thus an indisputable correlation between the structure and dynamics of their populations and the fact that their nesting sites are protected from all disturbance by predators.

Finally, it must be stressed that insular ecosystems themselves are highly unusual. Because of the reduced number of their constituent elements, they are greatly simplified in comparison with their continental homologues, other things being equal. Species identical or close to those of neighboring continents often occupy different or more diversified ecological niches. The endemic species exhibit still more originality from the ecological point of view. Otherwise the highest trophic levels are often missing, which results in population reproduction and renewal rates radically different from those to be seen on continents.

The systems to which islands give shelter, therefore, tend to be highly differentiated both by the quality of their components and the mechanisms of their functioning. The diversity and complexity of island ecosystems depend, of course, broadly speaking, on their dimensions and are, to some extent, proportional to them. Nevertheless, islands big or small are all, in effect, laboratories of fundamental importance for science. Not only do they house floras and faunas of remarkable interest and allow the study of evolutionary phenomena on a full natural experimental scale, but they also provide for the ecologist a field of choice which is still insufficiently exploited.

Fragility of island systems

Islands give evidence of great biological fragility. In accordance with a general law of nature, the basic reason for this lies in the simplification of island ecosystems. In addition, every insular species, and especially endemic species, has developed in very peculiar circumstances, protected from the evolutionary currents which have modified the flora and fauna of great continental landmasses. Having lost much of their capacity for adaptation, island species also display very peculiar population structures and dynamics. They are, on the whole, incapable of resisting effects of predation and competition to which they are in nowise genetically or ecologically adapted. Archaic or overevolved—often both at the same time—they are so narrowly specialized that they can maintain themselves only if the whole ecosystem is preserved in its original condition. These considerations, which apply equally to individuals, species, and the entire community, should always be borne in mind when one is dealing with the conservation of insular environments.

Islands and man

Man has established himself on habitable islands during many different epochs. His action has been uniformly detrimental to insular ecosystems and their constituent elements. Islands provide the most deplorable examples of wasteful utilization of natural resources and of the unprofitable destruction of the unique scientific capital of the world.

The massacre of animals has dramatic consequences when it takes place among populations that are naturally low in numbers because of the limited area available to them. Due to this factor, it is impossible to compensate for the extermination of a local population by restocking from a neighboring, still densely inhabited zone. Moreover, island animals are usually very specialized and unable to resist man, incapable, like the dodo and solitaire, of escaping from the hunter and his dogs. They are not always ethologically adapted to predation—the notion that they can have enemies being often quite alien to them. A good example of this can be seen on the Galapagos islands, where even today, after several centuries of human predatory activities, wild birds will let man come close enough to touch them, without showing any fear.

The destruction of original habitats, which very often are of extremely limited extent, is a no less dangerous factor in the situation. Most of the plants and animals of islands are strictly dependent on a highly specialized environment and niche and do not possess the ecological flexibility of their equivalents in the great continental masses. The slightest disturbance to their habitats may cause their disappearance. This is especially true with deforestation. In the West Indies, the number of extinct bird species is directly proportional to the extent of deforestation, and, in Mauritius, the few indigenous species that are left maintain themselves only where a few scraps of their original forest cover have survived.

Man may bring about a further modification of the ecological balance in an island by introducing exotic elements. These may include many species which have a much greater capability for expansion than the indigenous populations. It results in a struggle for existence in which the latter are most often the losers. Man often begins by devastating

the original vegetation, and, following upon this, the land is reconquered more quickly and more easily by introduced species, forming artificial associations from which indigenous species are largely excluded. From New Caledonia to Hawaii, one finds that native plant associations have been largely replaced by artificial ones mainly composed of ubiquitous tropical species. The introduction of animals has resulted in a similar evolutionary process. Thus the mynah, *Acridotheres tristis*, has eliminated many native species in the areas it has colonized.

The introduction of predatory animals can have dramatic effects on vegetation. Many island plants have evolved in complete freedom from the animals that are liable to consume a proportion of the plant productivity. Being quite unused to this kind of predation, they start regressing from the moment they become subject to it. This is what happened in New Zealand, where the flora which is highly specialized but poor in species has been laid waste by introduced herbivores (opossum, deer, and rabbits). In the subantarctic islands, the herbaceous plant cover, composed of highly specialized species incapable of regeneration after grazing by rabbits and sheep, gradually disappears, leaving the soil bare and at the mercy of accelerated erosion. Wherever goats have been introduced and have run wild, their harmful effects are well-known. In the Galapagos Islands, they are eliminating edible plants and competing for food with the giant tortoise, which is therefore unable to find nourishment.

"Natural" predation by animals on animals is generally less active on islands, since carnivores are very often absent, so that the introduction of a predatory species is liable to have grave consequences on the environment. It is equivalent to the artificial creation of a supplementary trophic level, which is a serious matter for animals with a low reproduction rate and also generally incapable of escaping from carnivores. In the Antarctic islands, ground or burrow-nesting petrels and shearwaters have thus fallen victim to rats and cats. As a result, several species have become greatly reduced in numbers or have deserted their main breeding grounds, remaining only in marginal sites which are protected from predators by their topography. The story of the mongoose which was introduced into the Antilles for the biological control of rats, but instead attacked the indigenous birds, is a classical example. On the Galapagos, rats prevent any recovery of giant tortoise populations on several islands of the archipelago by eating their eggs as soon as they are laid. The same applies to pigs from whose predatory activities only tortoises of more than a foot in length have some chance of escaping. Stray dogs are a scourge on many islands, especially in Oceania and more particularly in New Caledonia. Feral cats are equally destructive, and one need only recall in this connection the extinction in 1 year of the wren, *Xenicus lyalli*, on Stephen Island off the New Zealand coast, as the result of the predatory activities of the lighthouse keeper's cat. The flightless rails, which were endemic to many of the predator-free islands of Oceania, have disappeared or become very scarce largely because of the marauding pigs, rats, cats, and dogs introduced by man.

Disease pathogens introduced onto islands where they were previously unknown are yet another danger. Although we still have too little information on the subject, it is possible that the disappearance of honeycreepers or Drepanididae, the endemic passerines of the Hawaiian islands, is partly due to the introduction of avian diseases transmitted by mosquitoes, themselves accidentally acclimatized on the islands (Warner, 1968).

It is worth emphasizing at this point that the various disturbances caused by man in island environments are generally concomitant. The extreme vulnerability of island ecosystems at all levels of their operation is thus only too clear.

Taken together, all these factors have had a profound effect on islands throughout the world. The cultivation of lowlands, especially in the intertropical zone, mineral prospecting and exploitation in other areas, and all the other impacts that have been briefly mentioned above have everywhere played their part. Wonderful faunas and floras have already disappeared or become mere vestiges of what they once were. Many examples could be quoted, among others that of the invertebrate fauna of the Hawaiian Islands, which was dominated by endemic species that are now greatly reduced and only survive at the highest altitudes. The same applies to the indigenous birds, especially the Drepanididae, the number of which is constantly diminishing despite the protection which they now enjoy. New Zealand has experienced some spectacular upsets of the natural equilibrium as the result of the introduction of innumerable animal and plant species. In the Galapagos, native reptiles and birds have suffered from the action of man and of introduced mammals, and many islands are still seriously threatened. Taking birds as a whole, one need only recall that no less than 236 out of the 396 species included in IUCN's Red Book, or world list of endangered species, are endemic to islands. Practically all the birds that have become extinct inhabited islands, and, to a more varying degree, this applies to all other groups of animals.

So it is that man has destroyed an important proportion of the natural communities of islands and gravely endangered the survival of the remainder, depriving himself in the process of scientific capital assets of untold value. He has often done this without gaining any advantage, and indeed his activities have equally often turned against his own interests. This has happened when, for example, a fragile equilibrium has been disrupted and resulted in the deterioration of plant cover and catastrophic erosion. There is no doubt that it is on islands that the effects of man's neglect and mismanagement of his natural resources can best be measured.

Essentials of island conservation

There is no island in the world that has, in fact, remained wholly untouched by man's activities. Even those which—because of their climate or the poverty of their resources—have never been inhabited for any length of time, have been affected directly by his predatory actions or by the consequences of deliberate or accidental introductions for which he was responsible. Everywhere this has brought about the disturbance of the original balance, usually in an unfavorable direction.

The situation, already serious on all islands and even catastrophic in some, now threatens to become still more disquieting. It could well lead, on some islands, to total ruin in the very near future.

The fact is that many islands are now being subjected to the pressure of a strong population increase, which could have the gravest consequences for what remains of their original habitat. Others again are experiencing rapid economic development, which would be all to the good if this development were not being carried out in a "wildcat" fashion,

without the slightest regard for the scientific heritage that is being demolished. Such is the case with New Caledonia, where the natural habitat and, in particular, an incomparable flora, already under attack in the past, are now being laid waste in a scandalous way by ill-considered mining operations and mineral prospecting.

On top of this, tourism, which long ago discovered the islands, is now making them the chief target of its activities. It is, of course, possible to organize a "scientific" type of tourism, enabling interested persons to enjoy the landscapes or plant and animal life which may be unique in the world. Thus, people now go to see the Galapagos tortoises, seabird colonies, and various rare species of the Indian and Pacific oceans, as they once went to the nearest beach. This flow of tourist-naturalists, which is still relatively moderate, can easily be controlled. But already it is possible to notice disturbance caused by tourists of this category, who are bound to increase in number. An albatross on its nest does not mind being photographed from a certain distance by a careful observer, but will not tolerate a dozen tourists each wanting to get a bit nearer. The social organization of sea-bird colonies, which is essential for successful reproduction, may thus be easily upset by the presence of blundering visitors, even if they have the best intentions. On the Galapagos islands, changes have been noted in the behavior patterns of reptiles and birds, involving undesirable reactions of both a positive and negative kind. However, as long as people are well controlled by their guides and the latter can provide them with the kind of information that will enhance the interest of their tour, this type of tourism can be regarded favorably, since it contributes to the protection of nature by investing it with an economic justification in the eyes of those who can only think in terms of profit.

Unfortunately the same considerations do not apply to big-scale tourism, with its usual accompaniment of housing estates, villas, superpalaces, and casinos. This type of exploitation has already completely transformed islands such as the Bahamas, parts of the Hawaiian and Polynesian archipelagos, the Balearics, and some of the Canaries. Many promoters would like to extend this kind of development to other islands, and cash in on the obvious interest of the public. Attracted by exotic conditions and the allegedly romantic island life, tourists are now losing interest in the continental coasts, which have been spoiled by too many touristic installations in the places where industry and pollution have not yet been to work. In the Mediterranean, Indian Ocean, and Pacific, even the smallest islands have become the subject of development plans which would spoil for ever not only their charm but also the natural associations they support. Obviously it is impossible to prevent all these developments, but it is essential to exercise the utmost vigilance to reduce their impact to the minimum, and ensure that they do not ruin islands which possess a unique fauna and flora, but are integrated in a comprehensive plan; the aim of this would be to confine each project strictly to well-defined sites and balance it by the establishment of unalterable reserves in areas chosen for the outstanding interest of their natural environment. What is needed for islands, even more than for great stretches of the Earth's surface, is to have a global viewpoint rather than rely on haphazard action.

Any conservation measures to be applied must take into account the diversity of islands and their ecosystems. They will depend also on the level of development reached on an island and, above all, on its population density. The economic potential of each island

will be taken into consideration, as well as its scientific interest and the present state of its biological equilibrium. Fortunately the majority of islands still have not reached the point of deterioration beyond which nothing more can be done to preserve at least a fragment of their natural heritage.

The establishment of reserves and national parks is obviously the way in which one may hope to preserve a representative sample of all island environments. Conservation measures in this category are still quite applicable to highly populated islands, where it very often happens that some portions of land are still relatively intact because of their steepness and inaccessibility. On islands of rugged terrain, therefore, after carefully choosing such sites, one should apply immediate conservation measures, before one of the innumerable "development" projects that are now being planned on a universal scale arrives on the scene to disfigure beyond repair and convert into a total loss the last vestiges of wild nature. Flat islands and, in particular, coral islands set somewhat different problems. A choice still certainly has to be made, but it will be for the purpose of selecting the most representative and least disturbed islands and turning them into total reserves on which, in principle, all human activities will be banned.

It is, therefore, essential that the establishment of reserves should be an integral part of island development plans, always bearing in mind the extreme fragility of insular environments. Here, more than anywhere, the preservation of significant samples of environments must be an accepted method of managing and exploiting the capital resources of nature. From a scientific point of view, it is important not to neglect the very small islands situated offshore of larger ones, rather like satellites. These have often kept their original state of equilibrium, having been ignored by man and not even used for the introduction of exotic animals. Such islets, the scientific value of which is out of all proportion to their size, are particularly valuable witnesses to the past which should be preserved as total reserves. Thus the island of Port-Cros, near the French shore of the Mediterranean, has conserved a plant population which completely disappeared long ago from the neighboring continent, as a result of human activity and fire. It fully deserves its classification as a national park, having been jealously protected by its former owners. Several islets in the Galapagos have the same kind of value, and all over the world, including the Antarctic region, similar examples can be found.

The interaction between the terrestrial and marine ecosystems of islands, more especially atolls, is another point that is worth remembering. Any disturbance of the terrestrial environments has immediate repercussions on the marine communities of the coast; one notices this, for example, when after severe erosion the material carried down the rivers sterilizes corals and profoundly affects the whole coastal ecosystem. The implication is that the reserves established on land should also be extended into the sea, so as to keep in equilibrium the totality of interdependent ecosystems, which cannot be preserved separately.

Finally, it is essential to take special steps to protect seriously threatened species of animals and plants, such as those featured in IUCN lists. In the long term, only effective protection of habitats can ensure their survival, but in very urgent cases there is often a need for immediate individual measures. It is scarcely necessary to add that new introductions of plants and animals should forthwith be prohibited, for the effects of such disastrous

operations, which certain very backward and old-fashioned people still nevertheless continue to recommend, are all too well known.

Campaigns for the rehabilitation of island environments have in point of fact already yielded some results, notably in connection with the extermination, or at least control, of introduced animals. One might quote as an example the success achieved on Cuvier Island, off the coast of New Zealand, where the elimination of goats and wild cats has made it possible to reconstitute the original vegetation and endemic avifauna (Merton, 1970). In the Galapagos, a systematic campaign, carried out by the Ecuadorian National Park Service and the Charles Darwin Foundation with WWF support, is now in progress and is aimed at bringing under control pigs and goats throughout the archipelago. This has already resulted in the eradication of these destructive animals on Barrington Island, where the vegetation is now recovering in a quite spectacular fashion. The control of rodents is more difficult, but is under study in various parts of the world.

Conservation should always be accompanied by and indeed based on biological research. Islands have still much to teach us in the domain of fundamental science. Modern studies in quantitative ecology ought to be undertaken on islands selected for their suitability, for the purpose of analyzing and quantifying the workings of insular ecosystems. Few comprehensive studies have yet been made in this field, apart from current research on the productivity of coral. The Charles Darwin Foundation is proposing to launch such a program on Barrington Island, but it needs to be extended to islands of diverse types, so as to make it possible to compare them with one another.

It is precisely because of this diversity and their distribution in all regions of the world that islands need to be considered on a global scale. Each is of special interest and none is like another. For each one, measures of protection have to be designed to preserve what is essential. Some of them should be reserved for scientific studies, and thus enjoy the status of strict natural reserves, under the control of the international community (Nicholson and Douglas, 1970). The International Biological Programme has been much concerned with this matter and we would certainly give unqualified support to the opinions expressed on the subject. It is to be hoped that the International Convention prepared by IUCN and approved, in 1971, by the participants in a symposium organized by the South Pacific Commission at Noumea, and also by the participants in the Twelfth Pacific Science Congress, held at Canberra, will be agreed to and adopted by all States concerned at the earliest possible date. All countries whose territories include important islands, ought to be ready to establish this common fund, with its quite exceptional scientific interest, of "Islands for Science" and give them specific protection against all future disturbance.

This does not mean of course that all other islands, in particular those which are inhabited, do not need any measures to be taken to give protection. Overall plans, providing for legitimate human interests but including efficient protective measures for the different island ecosystems, ought to be put in hand and implemented everywhere. It is the only way in which we can succeed in preserving what are, at present, the most threatened pieces of emerged land on our planet.

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SESSION IX / PAPER 24

PARKS AND RESERVES IN POLAR AND SUBPOLAR REGIONS

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The question of development with respect to national parks was virtually irrelevant to polar and subpolar regions at the time of the First World Conference on National Parks held in Seattle in 1962. In the past decade, however, there has been a burgeoning of commercial and industrial activity in the far north without corresponding attention being paid to the need to set aside significant areas in the form of national parks and other reserves. In this paper, examples of recent developments in northern regions are reviewed, the location of northern parks and reserves is noted, and suggestions are made for filling the obvious gaps that exist.

Definition of area

The first problem in dealing with northern parks and reserves is one of defining the area to be included in the survey. This is not a simple problem as Blüthgen (1970) demonstrated. Polar regions can be delimited on the basis of, among other things, temperature regime, mean position of arctic air masses, vegetation cover, or merely by an arbitrary geographical feature such as the Arctic Circle. All of these have their proponents and their specific advantages and disadvantages which do not need to concern us here. From the viewpoint of conservation, several characteristics assume special importance and one of these leads to the definition proposed here.

Polar regions and, to a lesser extent, subpolar regions are predominantly young regions ecologically (Dunbar, 1968), primarily as a result of extensive glaciation during Pleistocene time. Plant and animal communities are, therefore, mostly immature. It is a moot question to what extent the depauperate nature of the fauna and flora is due to immaturity as opposed to the severity of environmental conditions. Perhaps both play a part. In any event, northern food webs are less complex than those of most southern ecosystems, and instability is one of the generally accepted consequences of such simplification. Short summers, lack of soil development and slow rates of return of nutrients through decomposition severely limit annual productivity, although daily productivity at the peak of the growing season may be moderately high (Bliss, 1970a). All of these characteristics tend to limit the potential of northern ecosystems to recover from man-induced disturbance.

There is one other uniquely northern phenomenon that has a direct bearing on the susceptibility of northern ecosystems to disturbance by human activity. Large areas of the northern hemisphere are underlain by a substratum that remains frozen during at least some summers. This frozen terrain, or permafrost, may be continuously distributed or found in the form of larger or smaller islands (Brown, 1970) in soil otherwise subjected only to seasonal frost.

Whether or not permafrost presents a problem depends upon the nature of the frozen substrate. In the case of bedrock or coarse granular materials, an increased input of thermal energy causes a relatively insignificant change in volume. Fine materials, however, frequently contain a large admixture of ice. When such materials thaw there may be more water than is required to saturate the soil and this excess water either stands on the surface in pools, runs off with attendant lateral erosion, or evaporates. In any case, the volume of the remaining soil is less than that of the soil ice mixture by an amount equal to the volume of the water lost (Mackay, 1970). The result is subsidence of the upper layers of permafrost and overlying active layer (fig. 1). Fine-grained soils may also contain massive amounts of nearly pure ice in the form of wedges and lenses (fig. 2). There is an abundant literature on the method of accumulation of these features (for examples, see Mackay, 1971). The details need not concern us here. Suffice it to say that, if enough thermal energy is transferred to the ice to cause it to melt, overlying layers of soil may collapse into the water-filled cavity in a process called "thermokarst."

In tundra regions, the presence of ice wedges is often revealed on the surface by characteristic polygonal patterns, but there appears to be no general way to detect the presence

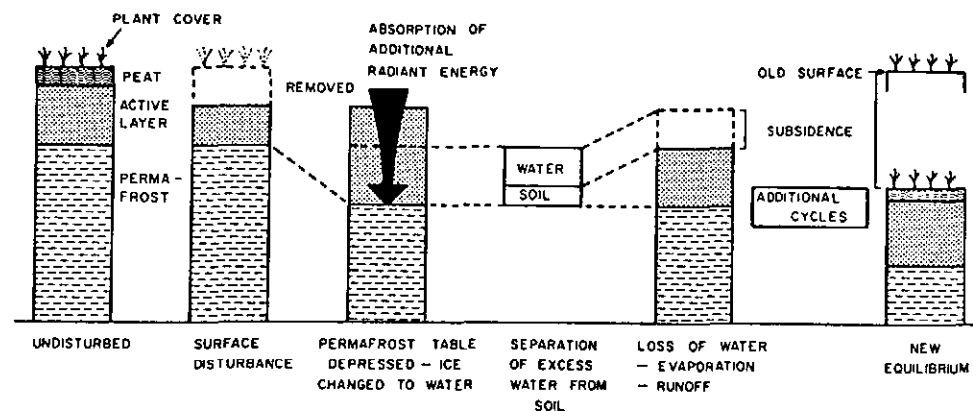


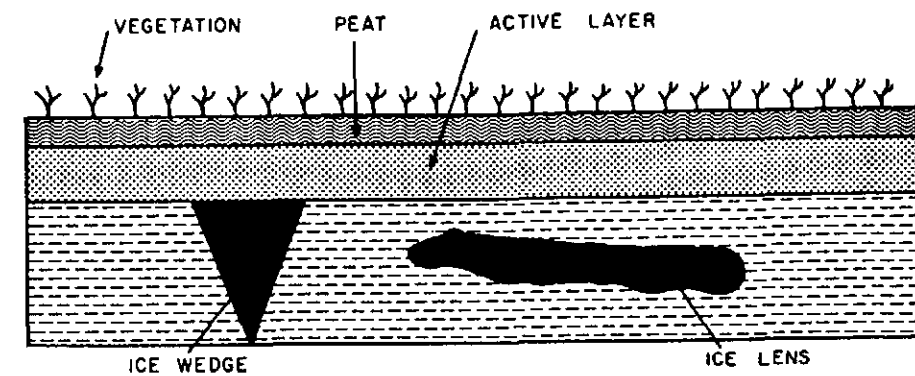
Figure 1. Effect of removing insulating plant and peat cover in a high ice-content permafrost region. As thermal energy penetrates to a greater depth, ice in the upper levels of permafrost thaws. The resultant water more than saturates the soil and is lost by evaporation or runoff. After several cycles, a new thermal equilibrium may be reached, but considerable subsidence has occurred.

of high ice-content soils or massive ice lenses except by drilling. In special situations, the presence, or former presence, of an ice lens may be revealed by actual exposure or by slumping (Mackay, 1971). In forested regions there may be no surface manifestation of high ice-content soils or massive ice. The presence of ice is revealed only after the forest cover is removed, by fire or clearing, and thawing commences (Mackay, 1970).

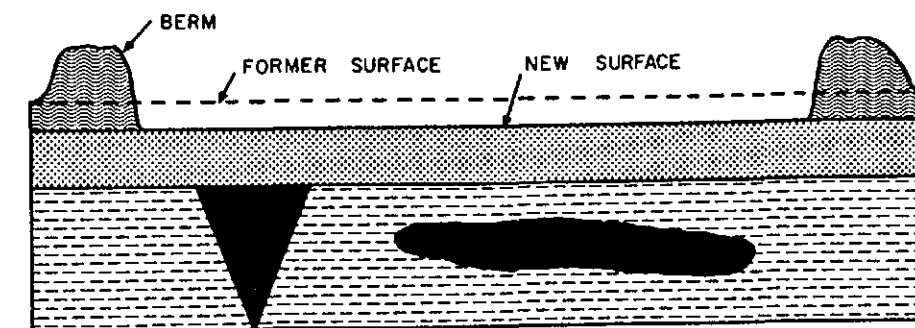
In the undisturbed condition, there seems to be a rather delicate thermal balance that preserves the integrity of permafrost. Input of thermal energy in summer is limited by the high albedo of lichens and mosses and by the insulating effect of even the thin plant cover. By the time winter comes, however, the plants have died back or are wet and frozen so that their coefficient of thermal conductivity is greatly increased. This, combined with a thin, hard snow cover in tundra regions, allows heat to escape from the relatively warm earth to the atmosphere all winter. In tundra areas, depending on the nature of the soil, the active layer of seasonally thawed ground may be only a few tens of centimeters thick, whereas in forested regions with several strata of vegetation and deeper, less compacted winter snows, the active layer may be 2 to 3 meters thick.

Naturally occurring thermokarst features are widespread in the north. Along the north coast of North America massive ice lenses become exposed from erosion or wave action. As the exposed ice melts, large-scale slumps occur (fig. 3). Meandering streams may also trigger thawing of permafrost. The result is a characteristically "beaded" stream. The shores of lakes, too, may be affected by ice-push and wave action. Exposure and subsequent thawing of high ice-content soils leads to drainage or amalgamation of lakes.

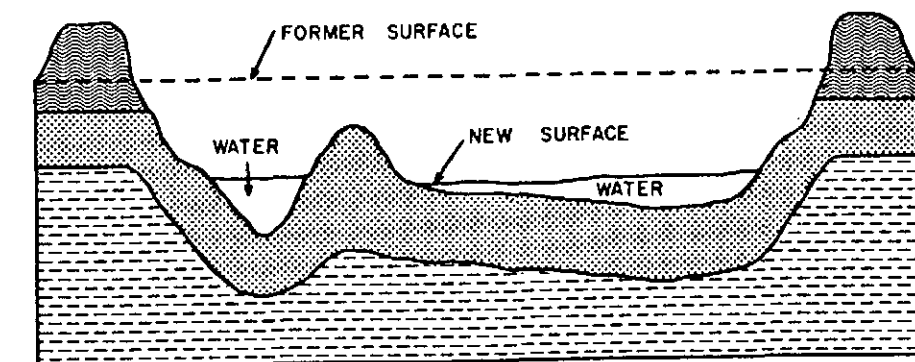
The integrity of the far northern landscape therefore depends to a unique degree on the integrity of the underlying permafrost. All of man's activities in the north, whether as developer, scientist, or tourist must be undertaken with this fact firmly in mind. Because of the special importance of permafrost, I propose to define polar and subpolar regions for the purposes of this paper as those areas of the northern hemisphere underlain by continuous or discontinuous permafrost respectively.



a) UNDISTURBED.



b) REMOVAL OF PLANTS AND PEAT → INCREASED THERMAL INPUT.



c) NEW SURFACE RESULTING FROM THERMOKARST — MELTING OF ICE & LOSS OF WATER.

Figure 2. Effect of disturbance on permafrost terrain containing ice wedges and ice lenses. In (b) a bulldozer has removed a thin surface layer and pushed it aside to form a peaty berm. Increased penetration of thermal energy melts the ice and gives rise to an irregular, depressed surface, probably with standing water.

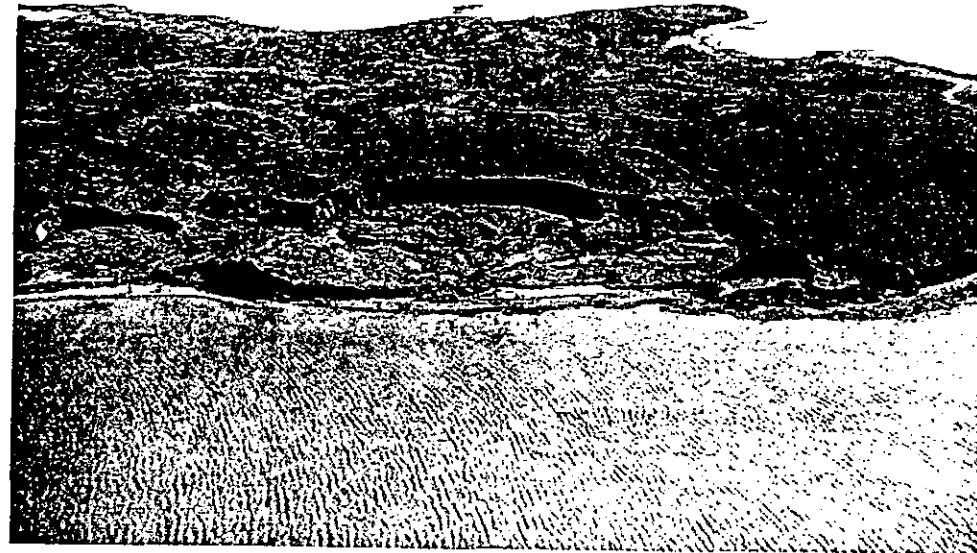


Figure 3. Naturally occurring thermokarst feature on the Tuktoyaktuk Peninsula. A massive vein of ground ice occurs at the base of the steep cut. As the ice melts, slumping occurs. Note the small amount of soil remaining in the area of the slump. The remainder of the volume was ice, which on melting, ran off into the Beaufort Sea (foreground).

Trends in use and exploitation

Hunting and fishing. Man's occupancy of northern regions appears to go back several thousand years. As a natural component of northern ecosystems, however, his numbers were rather severely limited, and he never progressed beyond the hunter-gatherer cultural stage. A few small communities managed to persist essentially at that stage until after World War II. As late as 1960, Eskimos in northwestern Alaska were still obtaining 80 percent of their food from hunting (Foote and Williamson, 1966) and Usher (1971) showed that the small Banksland community of Sachs Harbor had almost escaped European impact until 1967.

Introduction of the fur trade late in the 17th century, of course, brought some changes. Firearms and steel traps increased the efficiency of the hunters and sometimes led to local diminution or extirpation of resources. The relatively brief, but intensive, period of arctic whaling from about 1850 to 1914 brought about reductions in the stocks of large whales from which the North American Arctic is just beginning to recover (Gambell and Brown, 1971). Introduction of commercial fishing on the west coast of Alaska and, more recently, on Great Slave Lake also brought opportunities to supplement "country food" by means of a cash income.

The most recent trend in hunting and fishing is toward catering to sportsmen from southern regions. Guided hunts for trophy game mammals have been a feature of Yukon and Alaska since early in the present century. Sport-fishing lodges, however, are a feature of

the quarter century since World War II. Where a guide has the legal right to exclusive use of his guiding area, as in the Yukon Territory, he has an incentive to manage his game and prevent overexploitation by his clients. Where there is no such legal right, concern for the long-term future of the resource is correspondingly less.

Two relatively new developments in sport hunting affect important members of the arctic ecosystem. Polar bears have for some years been hunted by means of aircraft on the sea ice off Alaska, often in international waters, which leads to difficulty in enforcement of restrictive regulations. More recently, a small, carefully regulated hunt for musk-oxen was initiated in parts of the Canadian Arctic. Quotas are assigned to Eskimo communities and they, in turn, may either harvest the animals themselves or sell their rights, and their services as guides, to sportsmen from the south.

Hunting, trapping, and fishing have direct effects on animal populations. However, those effects can be regulated by law to insure the preservation of any species. Hunting and fishing are activities that, by their nature, are widely dispersed over the landscape and thus seldom lead to destructive changes.

Forestry. Commercially valuable forests occupy only limited areas of the North American north, although they are more widespread in Eurasia. Some forestry is practiced in Alaska, mainly south of the permafrost boundary, and along major rivers in northwestern Canada in the zone of continuous permafrost. Extensive thermokarsting has not occurred in the latter region, probably because the commercial species is white spruce, *Picea glauca*, which grows in moderately well-drained sites, whereas the islands of permafrost occur predominantly under peatlands that either have no trees or support stands of black spruce, *Picea mariana*. Most of the harvest of northern forests is currently used as lumber, but should the pulp and paper industry become interested in the area, permitting the harvesting of smaller trees, forestry would undoubtedly move north and problems with thermokarst and thermal erosion may be expected to follow and perhaps create serious impediments to reforestation. Land so abused would have little value as a national park. Pulp mills also bring in their wake serious problems of air and water pollution that could render large areas unsuitable as parks and reserves. The Soviet Government has recently faced up to this problem in the vicinity of Lake Baikal.

In the Canadian North, forestry is actually being practiced under lease in Wood Buffalo National Park. It will be of considerable interest to conservationists to see whether the provisional master plan for that park calls for the eventual phasing out of forestry operations.

Mining. At least part of the ancient granitic shield of each northern continent lies within our area of interest. Subpolar regions also have important mountainous areas. Both shield areas and mountains may be highly mineralized, yet both may also contain landscapes of outstanding beauty or interest. Mineral occurrences are difficult to predict and locate. Herein lies the first difficulty. Mining interests can point to economically viable mines in regions where nothing was discovered by primitive prospecting methods. They argue that advancing technology may lead to discovery of mineral deposits in areas now considered barren and so resist restrictions on their right of entry, such as a national park would entail, even in areas that have been thoroughly prospected by currently available techniques.

In North America, occasional discoveries of very rich deposits, such as the gold of the Klondike, have given rise to the myth that all hope for the future of the north lies in mineral development. This has made it extremely difficult for conservationists to induce governments to set aside land for parks and reserves. Even Mount McKinley National Park was established subject to safeguarding the rights of miners to continue to work existing claims. Newly established Kluane National Park in Yukon Territory is nearly 2,000 square miles (5,200 km²) smaller than recommended because of claims pressed by mining interests. Part of the area deleted from the original plan contains the major caribou range and another deleted portion constitutes some of the best Dall sheep range. Although I have no first-hand information from other northern countries, I expect that similar constraints apply in Scandinavia and the U.S.S.R.

The negative effects of mining do not end with resolution of land-use conflicts. In northern Canada at least, prospectors have virtually unrestricted right of entry, even onto private lands. Prospecting in the 1970's often means indiscriminate travel with heavy crawler tractors, which leaves a scarred and desecrated landscape whose wounds will require decades to heal.

Producing mines have also been major contributors to air and water pollution. At Yellowknife, Northwest Territory, for example, both arsenic and cyanide from processing gold ores escaped into waterways, partly because of the inadequacy of tailings ponds. Noxious fumes have prevented reestablishment of lichens on areas denuded by fire (mostly set by prospectors in the 1930's) for a radius of as much as 15 miles (24 km) around the settlement (Beschel, pers. comm.).

In short, the search for and development of mineral resources, at least as practiced in Canada, is totally at odds with principles of conservation. Yet, because of the economic importance of extractive industries, the miners continued to wield a very big stick.

Hydroelectric developments. Resource developments must have a source of energy, hence the impetus to develop potential hydro sites. There is an immediate and inevitable conflict between energy and esthetics, since falling water has been an inspiration to man, apparently, from time immemorial. Ecological changes, too, are almost certain, but it is important to differentiate between ecology and esthetics. On both counts, of course, hydro developments conflict with national parks ideals.

A hydro station exists in Stora Sjöfallet Park in northern Sweden and is so regulated that an illusion of the original waterfall is created during the tourist season (Harroy, 1967). High-tension lines introduce a jarring note into Abisko Park (Harroy, op. cit.). Wood Buffalo National Park lies some 600 miles (965 km) downstream from the W. A. C. Bennett Dam on the Peace River, but regulation of that river has greatly reduced the magnitude and frequency of flooding in its delta which lies within the park. This in turn, has had serious consequences for the vegetation, fish, fur-bearing mammals, waterfowl, and large ungulates in a area of about 2,000 square miles (5,200 km²) (Reinelt *et al.*, 1971).

A national park has been proposed in an area lying astride the forest tundra transition from the east arm of Great Slave Lake to Artillery Lake, NWT. One of the counter arguments is the power potential of Parry Falls on the Lockhart River within the proposed park. Other large-scale power developments are under consideration in other

parts of northern North America and constitute one of the constraints on establishment of new parks in those regions. It is encouraging to report that earlier this year the Canadian Government set aside some 1,800 square miles (4,700 km²) of the Nahanni watershed in the Mackenzie Mountains as a national park. This area contains the spectacular 316-foot-high (96 m) Virginia Falls which have been surveyed for their hydro potential but now seem to be saved from that fate.

Several small hydro developments have been built in northern Canada. The value of timber on lands to be flooded does not justify clearing on economic grounds, so that creation of a reservoir results in an unsightly and dangerous lake, useless for recreational purposes. Because trees are only rooted in the thin active layer, and because the relatively warm water of the reservoir causes thawing of the underlying permafrost, there is a tendency for trees to float to the surface rather rapidly when reservoirs are formed in permafrost regions. This process could constitute an ecological disaster in a large-scale project such as the Ramparts Dam proposed in about 1960 for the Yukon River in Alaska.

Water diversions. Large-scale diversions have direct effects on areas to be flooded and those to be dewatered. They also have indirect effects locally and at a distance. Local weather patterns may be altered and, in the case of large rivers running into the Arctic Ocean, there may be important effects on the ocean itself. Both the Yukon and Mackenzie Rivers are involved in one plan (North American Water and Power Alliance) to send arctic water as far south as Mexico. Loss of the input of heat and nutrients to the Beaufort Sea as a result of reversing the Mackenzie River would have far-reaching effects on its physical and biological characteristics. It would also be catastrophic for the highly productive Mackenzie delta (Gill, 1971).

Another large-scale diversion scheme is being actively considered for the system of rivers running into the east side of James Bay. Among a myriad of ecological effects, this scheme could have a bearing on negotiations between the governments of Quebec and Canada for a new national park in western Quebec.

One other example of a massive diversion will suffice. In the European part of the U.S.S.R., consideration is being given to diversion of the Pechora River southward into the Volga system. A catalog of undesirable effects of this scheme has been drawn up (Brattsev *et al.*, 1967), but among those effects there is no mention of destruction of wildlife values, recreational potential, or a large portion of Pechora-Ilychski "National Park" (*Zapovednik*).

Thermonuclear projects. To date only one scheme to use thermonuclear energy as a construction tool in the Arctic is known to me. The aim of Project Chariot of the U.S. Atomic Energy Commission was to construct a harbor near Cape Thompson in north-western Alaska. The background environmental study for this scheme, which was cancelled, has been published (Wilimovsky and Wolfe, 1966). Other similar proposals may occur in the future.

Testing of thermonuclear devices at high latitudes has produced high fallout levels which have a special importance in ecosystems in which lichens play an important role. Lichens take up nutrients from the atmosphere and thus incorporate radionuclides into their tissues from where they become available to caribou and then to man (Hanson *et al.*,

1966; Watson *et al.*, 1966). This constitutes another example, on a grand scale, of how an attempt to preserve nature by means of a national park in one region may be adversely influenced by events thousands of miles away.

Petroleum. Much has been written about petroleum in the north since 1968 when the first oil was discovered at Prudhoe Bay, Alaska (Bliss, 1970b; Pruitt, 1970; Hare, 1970; Weeden and Klein, 1971). I have summarized elsewhere (Fuller, 1970) some ecological and esthetic effects to be expected from the search for hydrocarbons and their production and subsequent transportation to markets. It is here that permafrost assumes paramount importance, from disposal of camp wastes for the initial geological survey crews to transporting hot oil through a pipeline (Lachenbruch, 1970). One representative of the oil industry in Canada estimated that 150,000 miles (241,400 km) of seismic lines would be required to delineate arctic oil fields in Canada (Hemstock, 1969). Carelessly run seismic lines and tote roads upset the thermal balance and result in subsidence and thermokarst (fig. 4 and Klein, 1970). The potential for esthetic despoliation of an enormous area through seismic exploration is truly horrendous. Areas so destroyed would have minimal appeal as national parks for decades or even centuries. Fortunately, techniques are known for minimizing disturbance (fig. 5). The specter of massive oil spills from either a 48-inch (1.22 m) pipeline or supertankers operating in the ice-choked Northwest Passage has also been repeatedly raised.



Figure 4. A portion of a seismic line on the Tuktoyaktuk Peninsula from which surface material was removed by a bulldozer (cf. fig. 2). A portion of one berm is just visible at the lower left. The other berm runs across the center of the picture. Note standing water in the center foreground, cotton sedge and grasses in the depression, and shrubby tundra on the undisturbed ground. As much as 5 feet of subsidence has occurred along this line in 5 years.

In comparison, little attention has been paid to the effects of a producing oilfield, whether on land or on shore. Hemstock (*op. cit.*) estimated that only 0.3 percent of the Arctic would need to be devoted to producing wells. It should be possible, therefore, to locate large national parks in areas that would be unaffected by that particular phase of petroleum development.

Transportation. Economic developments are sometimes spurred by improvements in transportation and sometimes bring such improvements in their wake. Once again, permafrost is a key element in designing all forms of surface transportation. Roads, railways, and airports can only be built over permafrost if precautions are taken against thawing. The generally accepted procedure is to lay a thick (up to 6 feet or 1.82 m) pad of gravel over the undisturbed surface vegetation. This requires an enormous amount of gravel which may, in turn, trigger esthetic and ecological damage. When roads and airstrips are given a black surface, absorption of thermal energy, even in the Arctic, is increased and the thickness of the insulating pad must be increased accordingly.

The history of road and railway construction in the Canadian North has not been a happy one. The "bulldozer mentality" is nowhere more rampant than among those who build roads. Both the Alaska and Mackenzie Highways disclose countless examples of needless destruction and complete unconcern for esthetic values.

The indirect effects of improved transportation may eventually prove to be more important



Figure 5. A seismic line runs from foreground to horizon just to right of center in this picture. It was run 8 years before the picture was taken and is already nearly indistinguishable on the ground. No surface material was removed to form a berm, and no subsidence or thermokarst has resulted. This terrain is less sensitive than that shown in figure 4, but good technique is the major factor in the different results.

than the direct effects that accompany their construction. People will travel wherever there are roads. This will increase opportunities for tourism and the pressures on landscape, faunas, and floras that tourism brings in its wake.

Tourism and wilderness travel. The North American rubber-tired society is eager to penetrate the most remote regions. One-quarter century ago the Alaska Highway was the challenge that drew the adventurer in spite of restrictions placed on travel by Canadian authorities and primitive accommodations and services. The trickle of tourists that began after World War II is today a small river. The Mackenzie Highway now extends to Fort Simpson and may reach Inuvik in this decade. A main branch goes to Yellowknife and may eventually reach Coppermine. The Dempster Highway is proceeding at full blast to link Inuvik in the Mackenzie delta to Dawson City, Yukon. When it is completed in a year or two, tourists will be able to drive almost to the Arctic Ocean.

Other tourist opportunities involve more traditional means of travel. Backpacking is the only mode in the Arctic Wildlife Range of northeast Alaska. Pack and saddle horses are still used extensively in Alaska and Yukon, whereas the NWT is laced with wilderness canoe routes. To this list must be added arrival at, and departure from, a wilderness destination by small, nonscheduled aircraft for hunting, fishing, or just a wilderness experience.

During a sabbatical year spent in Finland, I observed hordes of tourists descending on Lapland, first to enjoy "ruska"—the season when the alpine flora and the subalpine birch forests are in full color—and later to experience the midnight sun. I thus understood what Kalliola (1970) had in mind when he wrote (p. 306) "... it has been said sarcastically that the worst that can happen to the nature of an area is for that area to be declared a National Park"; and similarly cynical is the consolation put forth, that the advantage of a National Park is that destruction of nature caused by tourism can be concentrated on certain places, while nature elsewhere is "saved".

Before tourism is counted an unmitigated blessing in the north, we must determine the carrying capacity of permafrost areas for booted feet.

Scientific activities. Scientists have been drawn to high latitudes for a very long time, and scientific activities are mushrooming in connection with industrial developments. In many cases, scientists have been as heedless as others of the fragility of some arctic landscapes. Disposal of camp wastes is as much a problem for a group of scientists as for a group of prospectors. Scientists are tempted to save steps by using tracked vehicles and thus induce scarring (Kevan, 1971). Certain kinds of even biological research require destructive sampling, and recovery may be long delayed. Mackay (1970) documented subsidence and later erosion along a short trail connecting his camp to a nearby lake shore, although the trail was only used by a small party on foot. Even more remarkable, perhaps, is the subsidence that occurred in an area where a dog had been tethered to a post for only 10 days. A circular area with a radius equal to the length of the tether was affected.

When national parks are established in northern areas, the question of their suitability as ecological research areas will have to be given careful consideration. It cannot be taken for granted that research activities are compatible with landscape preservation in permafrost areas.

National parks in polar and subpolar regions

National parks are thinly distributed in polar and subpolar regions, as those regions are defined here (fig. 6). An exception to this rule is the Fennoscandian countries which, compared with other northern regions, have done a remarkable job of setting aside land for recreational and scientific uses. Northern Fennoscandian parks and reserves are mapped in detail by Kalliola (1970) to whom the reader is referred for additional information.

The most striking feature of the distribution of *zapovedniki* in northern U.S.S.R. is that they are nearly all seen to be peripheral. Apparently Soviet authorities are considering the addition of new reserves across the tundras of Asia to match those on the Kola

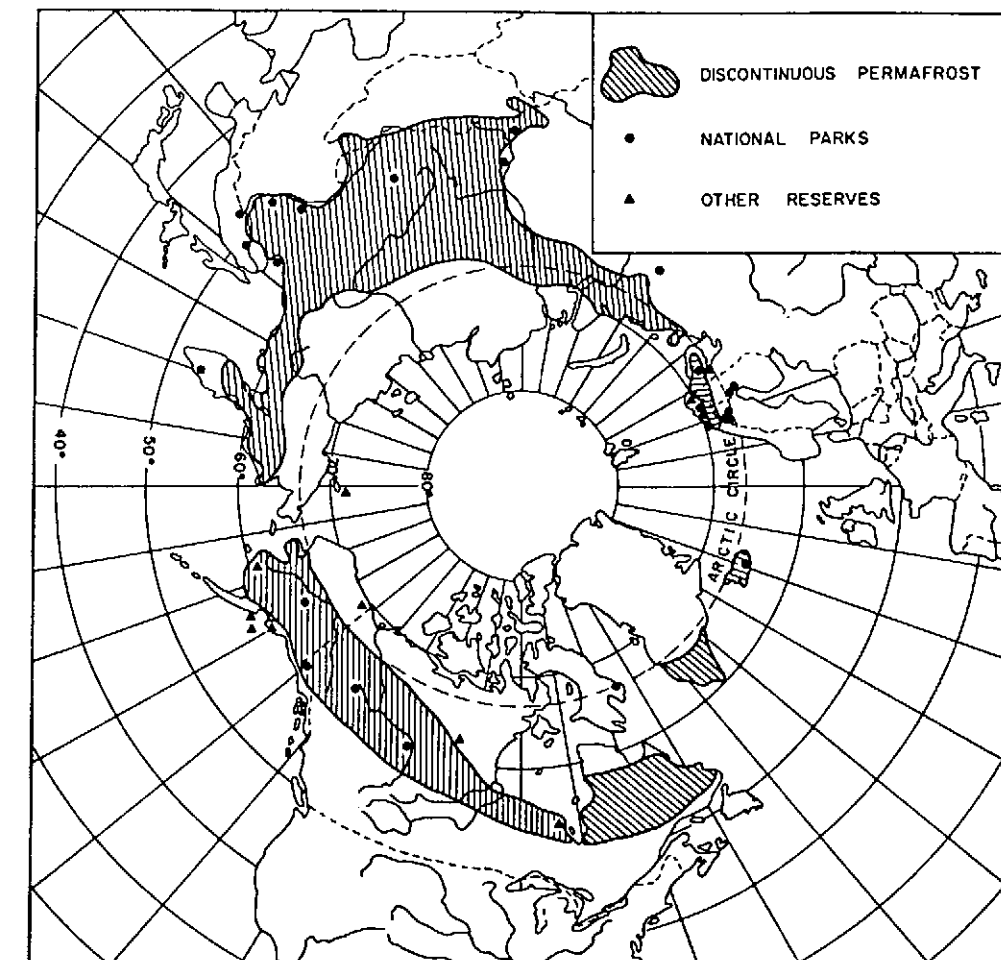


Figure 6. Location of major national parks and special reserves with respect to the distribution of permafrost. To the north of the discontinuous (hatched) zone is continuous permafrost. Occurrence of permafrost in Iceland is uncertain.

Peninsula (Uspenskii, 1970). Hopefully, they will also consider large *zapovedniki* in the Siberian taiga, perhaps near the Ob, Yenisey, and Lena Rivers, which would add immeasurably to the total system. The Urals and the large mountain massive in the Far East are also presently unrepresented in the Soviet system of reserves, although photographs published in the scientific literature suggest that there are many areas worthy of preservation in those mountain systems (for example, Portenko *et al.*, 1963).

Turning to North America, it is evident that, even with the inclusion of several parks lying just south of the permafrost limit, national parks are sparsely distributed (fig. 7). One year ago, only Mount McKinley in Alaska and Wood Buffalo in northern Alberta and southern Mackenzie qualified under the heading of national park. Within the past year, the Canadian Government established three new parks in our area of interest and two of them are very large (more than 8,000 square miles or 20,000 km²). All three are in mountainous areas with outstanding scenery. The great belt of lowland northern coniferous forest, however, is still underrepresented and the low arctic shrubby tundra west of

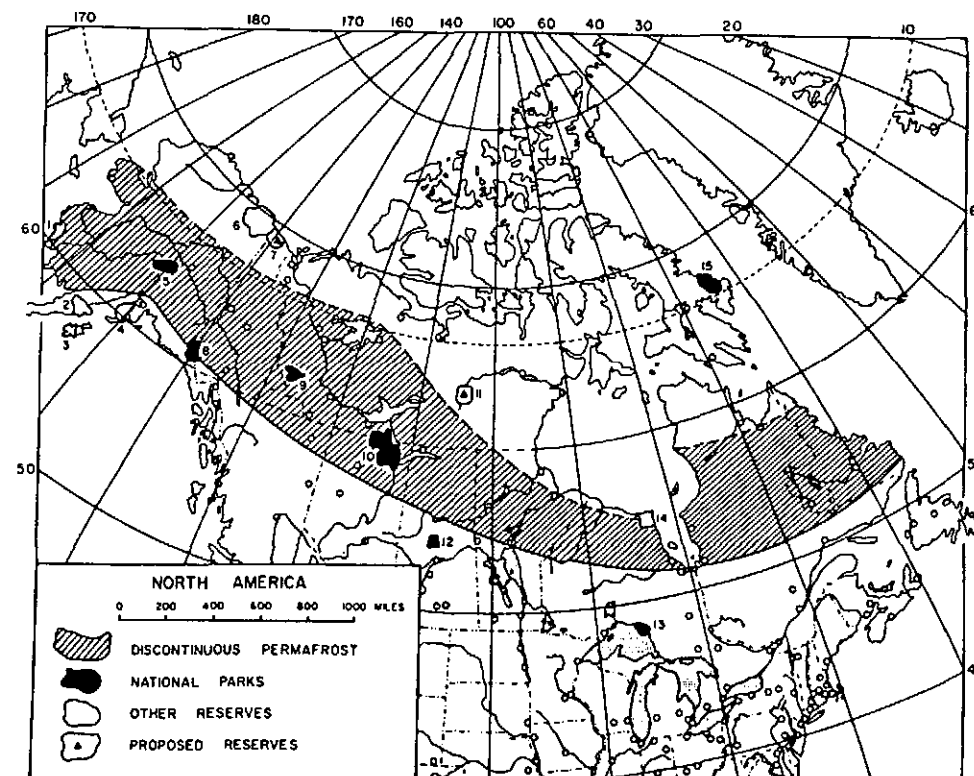


Figure 7. National parks, major reserves, and some proposed reserved areas in polar and subpolar North America. (1) Clarence Rhode National Wildlife Refuge; (2) Katmai National Monument; (3) Kodiak National Wildlife Refuge; (4) Kenai National Moose Range; (5) Mount McKinley National Park; (6) Arctic National Wildlife Refuge; (7) Proposed Canadian extension to (6); (8) Kluane National Park; (9) Nahanni National Park; (10) Wood Buffalo National Park; (11) Thelon Game Sanctuary; (12) Prince Albert National Park; (13) Pukaskwa National Park; (14) Polar Bear Provincial Park; and (15) Baffin Island National Park.

Hudson Bay and in Ungava is not included in the park system. There is no U.S. national park in the unglaciated northern coastal plain although this is an area of immense biogeographical interest.

Baffin Island National Park is the first national park in the Arctic Archipelago, and as such is a major advance. However, for historic, climatic, and physiographic reasons, biotic communities in the archipelago are varied and one park on the extreme eastern flank comes nowhere near representing the total range of variation.

McClure Strait and Lancaster Sound divide the islands into a northern (Queen Elizabeth group) and southern tier. Paradoxical as it may seem, it is the Queen Elizabeth group that is in greatest danger at the moment. Most of the islands in that group lie in or around the Sverdrup Basin that is now one of the "hottest" places in the world in the search for hydrocarbons. Several discoveries of natural gas and one of liquid hydrocarbons have been reported. The latter discovery was made on Fosheim Peninsula of Ellesmere Island—one of the last strongholds of musk-oxen (Tener, 1965).

Other reserves

In addition to national parks there are some other important nature reserves in polar and subpolar regions. Limitations of space prevent dealing with them in detail.

Svalbard has two plant reserves and a special reserve for polar bears (Norderhaug, 1970). In 1971 the Norwegian Government took steps to control the impact of increased human activity on Svalbard, and in 1972 they established a nature reserve on a 3-year provisional basis on Kong Karls Land.

In the U.S.S.R., Wrangel Island was made a game reserve in 1960. It became a "republican" reserve (*zakaznik*) in 1968 and may eventually become a national reserve or *zapovednik*. This reserve gives protection to polar bears, snow geese, walrus, and colonial sea birds (Uspenskii, 1970).

In Alaska, Arctic National Wildlife Range has special significance. Not only does it give protection to the flora, fauna, and wilderness character of a part of the Brooks Range and Arctic Coastal Plain, but it stands in the way of a possible pipeline from the oil and gas fields of Prudhoe Bay up the Mackenzie Valley to markets in the U.S. Midwest. It has also stimulated consideration of a matching reserve in northwestern Yukon to make an international sanctuary. This proposal has been laid before the appropriate Minister of the Canadian Government, but although it is supported by industry as well as by scientists and a broad cross section of the public, the Minister has, at the time of writing, failed to act on it.

In the low arctic tundra of Canada, the Thelon sanctuary has played a special role in preserving the mainland population of musk-oxen. It is interesting biologically because it contains a mixture of tundra and taiga species.

Finally, the Ontario government's huge (10,000 square miles or 26,000 km²) Polar Bear Park was established, in part, to protect an important denning and summer feeding area for the world's southernmost population of polar bears.

Conclusions

This brief survey of parks and reserves in polar and subpolar regions has revealed many gaps in the distribution of reserves. Major biotic communities, or important variants, are unprotected, although increasing attention is being paid to nature conservation in the far north by governments in all circumpolar countries. During the past decade, however, the pace of industrial development has increased in many northern regions. These developments have been spearheaded by the petroleum industry in North America, the North Sea, and Svalbard. Because polar and subpolar regions are underlain by permafrost, which is uniquely susceptible to disturbance by human activities, there is real urgency to establish additional inviolate areas before the landscape is seriously and widely scarred. The race is on, but the outcome is by no means clear.

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DISCUSSION

Although Chairman McMichael followed the procedure adopted for the closely linked Session VII, in dividing the time available as equally as possible between the three subheadings to be considered, there were inevitably some overlaps and alternations of subject matter in the comments of panel members and the interventions from the floor. For the purpose of the record, therefore, and in order to facilitate reference, the contributions have been regrouped, regardless of the chronological order in which they were presented, under the three topics covered by the background papers.

A. Marine environments

Dr. Tsuyoshi Tamura (Panel Member): On the basis of many years' interest in the establishment of marine parks in Japan, I will try to identify some of the principles to be followed. These mainly revolve around location, size, and management. Basically, a marine park should be divided into two parts, a nature reserve area of between 10 and 100 hectares kept strictly for research, although it may be possible to allow limited abalone, shrimp, or other fishing; and a recreation area of which up to half could be taken up by visitor facilities—glass-bottomed boats, a marina, an aquarium, an undersea observatory at a depth of 5 or 6 meters approached by a pier, and, on the adjacent land, accommodations and restaurants. A location too close to a river mouth, which may pollute the ocean, is not recommended. The vicinity of a deep inlet with an island offshore, barrier reefs and islands, and archipelagoes in clear water are preferable. If the park's base camp is on a small island, drinking water is often a problem, and if collection of rainwater is unreliable, it may even be necessary to ship supplies. The recreation

area should not include water deeper than about 10 fathoms, a gradually shelving sea floor to this depth in a distance of 500 to 1000 meters being ideal; a rocky sea bottom is better than a sandy one and adjacent rocky shores with tidal pools add greatly to visitor enjoyment. We have found that the cost of providing facilities at a particular site ranges from Y2-5 million and that if they are to pay their way at least 200,000 visitors a year are needed. Marine park research stations are essential, since research into underwater ecosystems and the management of these areas—to ensure also that they can serve as education centers for the marine environment—still lags far behind the research that has been put into exploitation activities such as fisheries and oil mining. We have one such center in Japan and another under construction and several more exist or are planned in other countries.

Dr. Hans A. M. de Kruijf (Panel Member): It is very important in reef parks to focus tourist pressure, which can be done, as Dr. Tamura suggests, by the construction of an undersea observatory, though great care must be taken with this as shallow areas are often very limited in extent. Only in this way can other areas be preserved from excessive disturbance. I would consider that the depth of 10 fathoms (60 feet) mentioned is too little, since 200-250 feet is easily within the range of "diver-tourists." The number of these whose aim is spearfishing and shell collecting represents one of the greatest dangers to marine parks, and it is essential that marine park authorities should have control of the water up to at least 200 feet, in order to exclude their activities, if the park is to be effectively managed.

Prof. Mohamed Hyder (Panel Member): As Kenya has led the way in East Africa in establishing marine parks, thanks to much assistance and encouragement from the author of Paper 22, it is worth mentioning that we are very keen on getting the university more interested in the scientific and technical problems involved. In general, the marine environment, and also the great lakes have received much less attention than they deserve.

Hunter Han-Ting Eu (Republic of China): The guidelines in Paper 22, particularly as to the essential differences between marine and terrestrial parks, will be of particular value in my country, where conservation of coastal areas is just beginning to receive attention.

Harry Lionel French (Canada): The "commons" aspect of marine ecosystems stressed in Paper 22 points to international regional management as the eventual requisite. The dilemma is the timelag in the achievement of this, during which what Hardin has referred to as the self-eliminating aspects of conscience may become operative. The main reason for establishing marine parks, therefore, would be to set the necessary environmental education mechanisms in train, and the criteria for selection and inclusion of marine parks need therefore be more clearly developed.

Robert G. Stanton (U.S.A./Virgin Is.): In supporting the last speaker on the need for a regional and international approach, I would mention the work on visitor use of marine resources at Buck Island Reef National Monument now being instituted, with the appointment of a full-time biologist; this includes the establishment of a first "snorkelling" nature trail.

Stan B. Brown (Fiji): Two points which tend very much to affect marine park areas, or potential areas, are the maintenance of coastal mangrove belts and the problems from siltation due to drainage or poor land use in areas adjacent to the coast.

Dr. G. Carleton Ray (Author of Paper 22): This may be an appropriate moment to emphasize two of my points; first, the essentially three-dimensional, "unfenceable" nature of marine ecosystems, and, second, their dependence on adjacent coastal mangrove swamps and the food they supply in the form of detritus.

Harold J. Coolidge and Mona Björklund (IUCN): IUCN has been doing a considerable amount of work on identifying and analyzing protected marine areas. Full descriptions are being prepared for eventual inclusion in the loose-leaf World Directory of National Parks and Other Protected Areas. As such details have not been previously published, it is hoped that they will stimulate the establishment of further marine parks. The creation of a Task Force on Marine Conservation, under the auspices of the Commission on Ecology and composed of specialists from the countries most closely concerned, should also help to strengthen this initiative.

Peter Dohrn (Italy): It is worth recording that a proposal due to be approved shortly in Italy for the reservation of 25 miles of coastline in the Castellabate area just south of Paestum, to a distance of 3 miles offshore, as a marine park and repopulation zone was due to a unanimous request on the part of the local fishermen. It was specifically linked to the total ban on spearfishing, and it shows that support for a conservation measure can be obtained from those whose livelihood depends on a sea in which overkill, pollution, and lack of proper protection are characteristic.

Derek Bryceson (Tanzania): The discussions in this section suggest that the time has come to plan a conference devoted specifically to marine conservation. It is clear that the situation in regard to such conservation and to marine parks is quite different from that of terrestrial parks, though land conservation is important for the marine areas. On this basis, Tanzania, which is about to develop a marine park system, proposes to apply conservation measures to the adjacent coastline and not simply to the water areas alone.

Dr. Peter Kramer (Panel Member): Perhaps it is worth adding to that remark that land areas and particularly islands do, of course, also depend on the sea; conservation of seabirds, for example, is only possible through appropriate management of marine resources.

B. Island environments

Dr. Peter Kramer (Panel Member) acting on behalf of the author of Paper 23: This paper, which is restricted to emerged lands of relatively small size (excluding the "continental" islands), covers the following topics: characteristics of islands and, particularly, their value for science; fragility of island ecosystems, with special reference to introduced species and other forms of disturbance; necessity for conservation measures to take full account of island diversity and therefore to be applied to the largest possible sample of island environment; universality of islands and, hence, the need for a global approach, such as that of the International Convention proposed by IUCN and endorsed in 1971 by the South Pacific Commission meeting at Noumea and by the 12th Pacific Science Congress.

Dr. Hans A. M. de Kruijf (Panel Member): Curaçao is an example of one of the numerous

islands into which biologically unwanted animals and plants were introduced with disastrous results. A new ecosystem with very poor fauna and flora, dominated by goats and man, became established. Obviously the original ecosystem cannot be restored where many indigenous animals and plants have been exterminated. But would it be possible to remove at least one of the dominant factors, namely the goat, which, by preventing the growth of trees and other plants, is one of the main causes of erosion? Two essential points need to be taken into account in answering this question: first, the goats are the only source of protein for a large part of the population; second, there is the political implication of the fact that goats are an investment and no politician would risk touching the sole possession of a voter. These considerations apply in many parts of the Caribbean, but, nevertheless, I remain convinced that, in the long run, elimination of goats would promote greater diversity of fauna and flora and benefit the people. In Curaçao we hope to prove this in an experimental area, and I suggest that other countries with similar problems should do the same in their national parks, so that results can be compared.

Dr. Edward L. Towle (Panel Member): The turning point has now arrived in the conservation of islands as well as marine environments. This is for a number of reasons, including the facts that many islands will soon cease to be managed by continental countries and that the development pressure on islands has been grossly underestimated. There is no doubt that the creation of local reserves will be easier to "sell" to people than the "island for science" concept.

Mrs. Georgina Lundy Douglas (IBP): To those not familiar with the project to which reference has just been made, it should be explained that the idea of the proposed Convention on Islands for Science is to give protection to undisturbed oceanic islands and safeguard research in these islands in much the same way as the Antarctic Treaty operates in the South Polar environment. Up to now about 50 islands of the Pacific have been nominated as candidates for "island for science" status, on the basis that they are still quite undisturbed—indeed one of the difficulties has been to gather enough data about them to support their candidature, because of their extreme isolation. The intention is to extend the exercise to the Indian Ocean, for which a first tentative list of possible islands is due to be published, and ultimately to the Atlantic; all recommendations are gratefully received and should be channelled through IUCN.

Harold J. Coolidge (IUCN): I would like to call for support and encouragement of the people of the Palau Islands in Micronesia in enlarging the Ngerukewid (70 Islands) reserve, established in 1956, and bringing it up to full national park status. The area is notable for endemic species of palms and other plants and, also, animals, and for its recreational attraction, and could well set an example for other communities of Micronesia. Details can be found in articles by Stephen P. Johnson in the *National Parks and Conservation Magazine*, vol. 46, nos. 4, 7, and 8 of 1972.

Mrs. Doris F. Leonard (U.S.A.): Also in the Pacific, we have a problem on Farallon Island, where a bird observatory organization is under contract with the U.S. Fish and Wildlife Service to set up a research station, now that the lighthouse, manned for about a century, is being changed over to an automatic system. Also, for about 100 years the island has had a rabbit population (the animal was introduced for food for the lighthouse

keepers), which we in the observatory proposed to exterminate; but we had pleas from scientists, who considered that a rabbit population isolated for so long was of great interest and should be preserved for study. In the end, we have compromised by agreeing to leave the rabbits alone for a 3-year period, after which an attempt will be made to eliminate them and restore the natural state of the island as far as possible.

Dr. Dieter Mueller-Dombois (Panel Member): This raises the important question of what precisely is a "natural" state or environment. To solve the problems of exotic species and introductions, we need some clarification of the concept of a natural environment, which often seems to be regarded as an environment moving toward a climax containing only its original elements. But how does one interpret the word, "original?" As a rule, attempts at eradication should only be made where introduced species are having an obviously adverse effect in their competition with indigenous species.

Robert G. Stanton (U.S.A./Virgin Islands): It is worth mentioning in this connection, the presence and use of the donkey in the U.S. Virgin Islands, which has a very long history of considerable scientific and social interest that definitely needs to be taken into account in the management of the island's resources.

Dr. Peter Kramer (Panel Member): A brief review of the current situation of the Galapagos, where the Charles Darwin Foundation has, for 13 years, been making every effort to halt and reverse the destruction of natural ecosystems, seems pertinent at this point. There have been some significant developments recently as the result of the Ecuadorian Government's initiative, in cooperation with the Foundation and its research station, in establishing a Galapagos National Park Service as the Executive Conservation Agency. Goats have been exterminated on two islands, control is proceeding on another three, and pig and rat control is also under way; progress has been made with the breeding in captivity and reintroduction of giant tortoise subspecies; boundaries between settlement and national park areas are being enforced; and the immense importance of education has been recognized. The resources of the Galapagos are mainly scientific and their values are hard to appreciate without a rather specific scientific education. But there is no way around this: if people living near a national park, particularly an island one, do not get to know and understand what it is all about, there is no hope.

José R. Torres (Ecuador): There is still, despite the progress reported, a great deal to be done in the Galapagos islands, including research, surveys, zoning, better financing, and administration. With reference to the last mentioned, it would be interesting to have an assessment of priorities if conservation in the sense of rational use of the Galapagos resources is to be successfully established.

Dr. Peter Kramer (Panel Member): I would put the priorities as (1) specific kinds of research, e.g., into the vanishing species and subspecies and methods of controlling exotics; and (2) strong, long-term efforts to put the scientific, educational, and scenic resources at the disposal of not only foreigners, but of the Ecuadorian people.

Georges Ramanantsoavina (Malagasy Republic): Although continental islands are excluded from consideration in Paper 23, I would point out that where, as in the case of Madagascar, a continental island has been isolated for a very long time, it shares the characteristics of smaller islands as described Professor Dorst. Thus, we have an ex-

ceptional number of ecosystems, high endemism of species, many of which are of great antiquity, and rapid speciation in the numerous available ecological niches. We are much concerned with the factors bringing about the disturbance or disappearance of ecosystems; for example, account needs to be taken of the natural laterization of soils in humid lowland forest and the consequent difficulty of reestablishing original populations, which often forces us to introduce species better adapted to the new ecological conditions. However, we are sure that the main factors in the disappearance of ecosystems lie in archaic agricultural methods, such as shifting cultivation and burning, and we believe that the best way of saving what remains is to be found in the modernization of agriculture and more intensive kinds of animal husbandry.

Hunter Han-Ting Eu (Republic of China): Taiwan probably rates as another continental island and, like Madagascar, we have important relic plant species which are threatened. It would be helpful to our new initiatives for establishing reserves if the "island for science" program could be extended to cover specific sectors or ecosystems of large islands.

P. H. C. Lucas (New Zealand): There are five subantarctic islands or island groups in New Zealand territory representing an important natural resource, though some of the larger ones such as Auckland and Campbell have been modified by human occupation. All are now strict nature reserves, with access controlled by a multidisciplinary scientific committee, of which I am chairman. The committee is now taking positive initiatives to guide research to areas where there are gaps in knowledge; for example, a joint American, Australian, and New Zealand expedition will be visiting the Auckland group in February 1973. One of its objectives will be to study possible elimination of exotic species. All these islands have a great potential as managed reserves. Campbell, for instance, has been modified by feral sheep, and our committee's plans for eliminating these had to be reconciled with the argument that they may have improved the habitat for albatross and that they, the sheep, are worth a special study in themselves. It was decided to build a sheep-proof fence across the island, eliminating sheep in the northern half, so that the resulting changes can be scientifically monitored. Reservation of remote islands is only a first step, and their supervision presents quite a problem, in which, in our case, we have sought assistance from the New Zealand Air Force and commercial fishermen.

C. Polar and subpolar environments

Prof. W. A. Fuller (Author of Paper 24): There are several points arising from my paper, which I would like to make. First, it is noteworthy that at the First World Conference on National Parks, only 10 years ago, there was no mention of polar regions; the pace of development in these regions during the decade, especially the last half of it, has been almost unbelievable. Second, my paper is, of course, restricted to the north polar terrestrial systems, and their chief physical feature is neither cold nor snow but permafrost. Because of its vulnerability to disturbance, permafrost creates unique problems. My discussion of human activities is, therefore, looked at from this angle: any of the ten I deal with can trigger subsidence or thermokarst, so temperate zone techniques cannot be used for the management of landscape in permafrost regions. Finally, it is concluded that

national parks and other reserves are underrepresented in northern polar regions, where many areas are threatened by industrial developments and may be severely damaged, unless immediate steps can be taken to reserve additional samples.

Dr. Ricardo Luti (Panel Member): Although permafrost is not a factor, the Antarctic ecosystems are also very unstable. Their rather simple structure, due to their relatively recent origin, makes them very susceptible to any impact, even that of the very presence and movements of man, the alterations caused being sometimes irreversible. Much of the region is in a quasi-pristine state, but its recent history offers examples of total or partial devastation of appreciable fractions of its ecosystems, basically comprising some of its rich fauna: there has been a "no man's land" destructive approach to exploitation of seals, whales, penguins, and other species for their skin, meat, oil, use as fertiliser, and even, in the case of penguins, their eggs, although the exploitation of the latter can easily be organized on conservation lines. Contamination by pollution is still localized, but DDT and radioactive concentrations seem to show an alarming increase.

In these circumstances, the need for integrated ecological studies and full protection of representative areas which are only slightly disturbed, and of endangered species, is obvious. In Argentina, we now have 13 national parks (the earliest dating back to 1903, and 4 more are under consideration), but in spite of some investigations no parks or equivalent reserves are sited in polar or subpolar zones. What is needed, however, is an international approach, since there is no continent which is better suited to this. Bilateral or even multilateral agreements are not enough, since the character of the agreed protection seldom extends integrally to the whole ecosystem; similarly, conservation measures based on authorizing the capture of a specific percentage of a particular species usually operate in the interests of the country possessing the best fishing fleet. Consequently, the challenge of mutual cooperation, possibly involving the establishment of a coordinated chain of protected natural areas by countries claiming rights in Antarctica, is one which certainly should be accepted.

Dr. Christian Vibe (Panel Member): One of the most serious technical impacts on the Arctic ecosystem may prove to be water diversion. Man tends to forget that this ecosystem is the youngest and most unstable in the world; since the Tertiary, it has been subject to short- and long-term climatic fluctuations, which still affect nature and life in all the countries bordering the region. In Greenland, such fluctuations have caused the extinction of several cultures during the past 5,000 years, and the same may well have applied to the populations of musk-ox, caribou, and wolf, which, like man, may have migrated to Greenland from Canada during favorable periods. Thus, it is very important to protect the migration routes, and Greenland National Park, due to be established this year, would cover an area more than 100,000 square kilometers from the Canadian border to Scoresby Sound in East Greenland. Even this is not enough. To preserve the arctic fauna means protecting its place of origin, which is the high pressure area of Central Asia, from which it has and will spread eastward and westward. We should give every support to conservation efforts in this region. If we look further into the future, the Bering strait area is the ideal place for establishing an international park comprising sea, islands, and coasts, for that area may again become the great migration bridge between Asia and North America/Greenland.

Mrs. Dorothy Varian (U.S.A.): There has been a deliberate program of introducing exotic grass, of a Siberian species, into the Prudhoe Bay area of Alaska, as a method of repairing damage to the tundra caused by oil exploration. It would be interesting to know if this has been successful.

George C. Halazon (U.S.A.): When visiting the Arctic this year, I was told that the grass planting program was not successful. Viable growth was not sustained.

Dr. Ricardo Luti (Panel Member): Several mentions have been made of international park possibilities, including one of which I had not previously heard and which would cover the whole Antarctic continent. A proposal of this sort was made many years ago by Argentina at one of the Antarctic Treaty meetings, but the countries concerned were not ready to accept the idea of international parks that would stretch across undetermined frontiers. Perhaps more would result from a definite recommendation by this Conference.

SESSION X

USES AND INTERPRETATION

Monday, September 25, 9 a.m. to noon

PROBLEMS INVOLVED IN COMMUNICATING PARK VALUES TO VISITORS

Chairman: Dr. Paulo Nogueira-Neto, Brazil
Rapporteur: Dr. Grant W. Sharpe, U.S.A.
Authors: Paper 25: Don Aldridge, U.K. (Scotland)
Paper 26: Prof. Donald J. Kuenen, Netherlands
Panelists: Dr. Pekka Borg, Finland
Herbert Sydney Curtis, Australia
William C. Everhart, U.S.A.
Mrs. Carol A. Martin, U.S.A.
José Lagrifa Mendes, Portugal
M. K. Ranjitsinh, India
Ponsiana Ssemwezi, Uganda

RAPPORTEUR'S SUMMARY

The session brought forth clearly the wide variation in the meaning of the word, "interpretation." Many of the speakers, in fact, addressed themselves to this problem of semantics. Take the word, "vamoose," for example: one contributor to the discussion, who had heard the word used several times since his arrival, was under the impression that it pertained to the "vanishing moose."

Leading the panel members' comments, William C. Everhart took the view that there have been no radical changes in interpretation during the past 50 years, but that we continue to make improvements. He suggested that it should not be limited to within the park boundary. Other speakers agreed and argued that interpretation should begin as environmental education for the young, who will then approach park visits with heightened awareness. Among the other points made by the panelists were the use of interpretation as a management tool in distributing park visitors to sectors able to withstand heavy impact; the fact that the cultural background of each visitor, as well as his individual expectations of what he will see or learn, will influence his reactions to an interpretive program; the different reasons for the establishment of park systems in different countries, which means that the method of interpretation in one country may not work in another; and the need for the program to be based on a management plan, which will lay down the specific purpose for which a particular park was established.

Of the 16 interventions from the floor for which time was available (the points made in another two are summarized at the end of the record), the majority elicited responses from the authors or one or other member of the panel in a wide-ranging debate. Dr. Frank

Wadsworth was one of the few who referred specifically to "uses," warning that there is a danger in assuming that national parks automatically provide ecosystems for ecological research, since scientific use may conflict with the preservation of those systems; geographical replication of treatments will in any case be necessary and attention to areas outside the parks will be needed for that purpose. Other points made were concerned with the targets of interpretive programs, of which the most important were variously held to be the press and political leaders; visitors, and especially the younger generation before they even arrive at a park; and tour operators. One or two speakers suggested that there is a danger of interpretation becoming a primary rather than a secondary function, and that it should be almost looked on as a luxury compared with the research necessary to make it effective. It was also suggested that one of the major failures of interpretation has been the lack of studies to determine the precise impact that it has made on visitors. To sum up, the emphasis was on the very broad spectrum of interest within the ranks of park visitors, who range from scientists and experts, demanding interpretation of a particular aspect in depth, to those who never venture from their automobiles. In the middle ground are those who know there are visitor centers, publications, self-guided trails, and conducted tours available if they choose to seek them out. There seems to be so much to be learned about interpretation that an entire conference could be devoted to the subject, covering such topics as interpretive master planning, criteria for media selection, exhibits, self-guided activities, audio devices, sky interpretation, interpretive training, and, certainly, interpretive research.

SESSION X / PAPER 25

UPGRADING PARK INTERPRETATION
AND COMMUNICATION WITH THE PUBLIC

by DON ALDRIDGE

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Education, Countryside Commission for Scotland,
Battleby, Redgorton, Perth, Scotland

Our parks today are threatened by increasing demands for greater use. This escalation of demand must not be allowed to endanger those values which were the *raison d'être* for the designation of the parks. In our search for solutions, we must reject the easy platitudes—"parks are for people" is a meaningless slogan, and "all parks are for all people" is an attack on the national park philosophy. However, it is easier to write a prescription such as: "visitor use must be appropriate to the park values," than to

translate it into practical action. But we must find a way of doing this if parks are not to be destroyed by the people who come to see them. Usage must be appropriate to the parks in two ways—in terms of character of use and also of level of usage. This is another way of saying that there is a need for zoning of park use, except that it goes beyond this in implying that the practical application of theory should be worked out by joint programs designed by specialists in interpretation and resource management.

Local plans

In translating this theory into practice at the local level, we should explore the concept of optimum capacity, or the level of usage which will leave park values unimpaired. The theory and the practical techniques of investigating capacity draw upon the physical factors (climatic, edaphic, and biotic), but they must also consider human perception and the nature of a visitor's park experiences. For example, in a national park visitors can only begin to appreciate park values when the level of crowding is not allowed to impair their park experience. If they find their "personal space" so limited that this quality experience is lost, then the hard-wearing capabilities of the terrain matter very little, for the national park has already been degraded, though hopefully only temporarily.

The interpreter's role is to make face-to-face contacts with park visitors and to explain park values. If values are not explained, visitors may come to expect a type of park experience which is inappropriate to the park, and eventually all parks will be degraded. The danger then is that a new generation of visitors will accept these lower standards as the norm, and will be unaware that they have been deprived of the quality experiences which ought to have been their birthright and part of their heritage. The erosion which is our present concern is, therefore, more than the sum of destructive physical processes; it takes account of the ethical need to conserve the quality of all parks and reserves, of whatever type and wherever they are sited, as an essential provision which will secure an important element in the quality of life for future generations. In more specific and practical terms, the local problems are twofold: those concerning capacity and those that deal with ignorance of park values. The approach of the park planning team is to identify the hypersensitive areas where there should be no disturbance, the zones for motorists and pedestrians, and the areas where there should be no interpretation at all, and, in some cases, to introduce time zoning and even the closure of certain zones. The interpreters begin with an inventory of park features and from this select those which are of the greatest significance in general terms and for which the park was set aside. With the choice of a theme and possibly of subthemes, the stage is reached when these have to be communicated by allocating them to some suitable medium. Some media are better than others in certain situations. Consider, for example, the following list and think of different situations in which some would be better than others: signs, wayside exhibits, museum exhibits, graphics and photographic prints, audiovisual programs given "live" or taped, personal guided trails, demonstrations, historical reenactments, and souvenir publications and discs. This is just a selection of the great variety of media available for application in indoor and outdoor situations. The interpretive

planner considers how suitable they are in each particular case by considering visitors, the site, and park service needs. Since the latter will include some financial ceiling and since the three needs often have very definite requirements, there are very considerable constraints put upon the freedom of choice. Table 1 augments the list of points which might be included in a type of questionnaire designed to help upgrade some interpretive provisions.

Table 1. Media selection

Ten examples of outdoor media and 10 examples of the kind of criteria which may be used for selection purposes. The scores are of course completely subjective and are indicated:

	X favorable	
	? variable	
	O unfavorable	
A: Personal guided service	F: Overlook message repeater	
B: Self-guiding booklet	G: Listening posts	
C: Graphic signboards	H: Shortwave car radio message	
D: Pedestrian's soundboards	I: Wayside signs and museum cases	
E: Motorist's soundguide	J: Demonstrations	
	A..B..C..D..E..F..G..H..I..J	
1. Establishes rapport	X..O..O..O..O..O..O..O..O..X	
2. Attractive, no esthetic intrusion	X..X..?..X..X..O..?..X..O..X	
3. Reliability, vandalproof	X..X..?..X..X..?..?..X..?..X	
4. Taken at visitor's pace	X..X..X..X..X..X..X..?..X..X	
5. No annoyance to other visitors	X..X..X..X..X..O..X..X..X..X	
6. Concern for visitor safety	X..?..?..?..?..?..?..?..?..X	
7. Easily terminated, changed	X..O..?..?..?..?..?..?..X..?..X	
8. Easy to use, train staff, maintain	O..X..X..X..X..X..X..X..X..O	
9. Answers visitor's questions	X..O..O..O..O..O..O..O..O..X	
10. Low capital cost	O..X..O..O..O..O..O..O..O..O	

When the allocation of theme and subthemes to media has been made, and not before, it will be possible to say whether a building is required, or whether all interpretation can be in the park which visitors come to see. Even where shortages of staff exist it has been found possible to use self-guiding devices with success and the new ideas developed recently by the U.S. National Park Service, such as listening posts, radio transmission to cars, and cassettes for motorists, point the way to upgrading of standards and the elimination of the visitor center syndrome of the 1960's.

Without the application of resource management techniques, the park would suffer from erosion in the physical sense; without interpretation it would suffer from erosion in that other sense which destroys the atmosphere or special character of a place.

Regional problems of interpretation

If the main problems of the local area are those of capacity, when we widen our viewpoint to look at several adjacent rural parks—in what we may loosely term a “region”—we find that, in addition to the local problems of each park, there are new problems of the region which can only be seen at this level. These are the problems of the potential waste of resources through duplication, overprovision in some fields and underprovision in others.

No park need be too small if it is part of a network of regional provisions. In this way we can extend the zoning principle and provide all types of visitors with all types of park experience in the parks which are most fitted to particular uses. Such regional zoning can contribute significantly to the effectiveness of the interpreter and the upgrading of standards which are under siege. The regional network enables visitors to enter the region at any point and gain an insight into the natural and historic significance of the whole without experiencing repetition of the stories. Thus, such a network can avoid duplication of financial outlay and visitor experience.

The body which coordinates this regional network does not have to own parks or reserves. Its essential role is to ensure that cooperation takes place; and this it can do by heading a team to give advice, draw up plans, contribute to the design of provisions, and give financial aid to the schemes.

National priorities

Benefits accrue from looking at our problems on a national and, even, an international scale. The ideal would be for a country to assess the characteristic qualities of its landscapes in order to locate the treasures of its heritage sites and also to diagnose as rapidly as possible its environmental health. Further surveys in the future would identify changes for better and for worse.

Park values may be graded into a hierarchy according to their rarity and also according to their accessibility to the population of the country. In the resultant spectrum, there will be an inverse relationship between rural values at one end and urban values at the other. For example, we should find that in developed countries the so-called pristine wilderness is rare and also remote and inaccessible to large numbers of people. Any attempts to make it more accessible are urban ideas which would degrade it, though they may not erode it physically. If we examine the national park concept we find that parks should have inalienable and specific qualities because they are landscapes which cannot be re-created by man once their park values have been impaired.

At the other end of the hierarchy or spectrum of landscape types, there is the urban situation where man is capable, through landscape architecture and management, of improving municipal parks and city environments or even of bringing land which has been lost as useful land, by thoughtless development, back into it. In this rather limited sense, man can indeed create and recreate.

This philosophy has relevance for the interpreter since it points to the existence of two types of interpretive work which will merge one into the other. One is interpretation of

natural and historic sites, which, in the main, requires thematic or story treatment, though room should be left for experiment; the other is general environmental interpretation which will include much emphasis on conservation education for school children. For adults, it is likely to take the form of programs followed by discussion, debate, and voluntary conservation work or other forms of involvement.

The more specific and easily defined the park values and the more highly they are regarded in the national hierarchy of sites, the more important it is to tell a thematic story of park values and park significance.

A national framework

A national framework on the lines of the regional interpretive plan is not easy to construct and, in early stages, may be no more than the sum of the regional interpretive plans. Gradually however it will be seen that the problem of overlap between regions can be avoided. It is a matter of rarity and national significance or of the definition of regions. Rarity has a meaning in terms of both space and time. Thus the distribution of a phenomenon can be mapped spatially and its rarity or localization seen at a glance. Alternatively, the phenomenon may be ubiquitous but of fleeting appearance in a moment of time, or may be representative of a single and very limited period from the past, and rare in this sense. On the national scale, the concept of rarity and the park values which interpreters communicate to the public is the rarity of the whole story, not the rarity of its parts. This is another advantage of taking a national look at interpretation, for it not only highlights rarity, but also draws a distinction between the general qualities which are rare and should be demonstrated and the single rare species which should not be shown. All of which argues for a certain minimum size for national park-type areas and reserves open to the public.

Interpretation reconsidered

We have implied already that upgrading park interpretation does not necessarily mean thinking of some new medium of communication, or providing a visitor center because a restroom is required or because the climate is wet. In most parks, visitors now arrive in some vehicle, which usually protects them from the elements, and, if they can be tempted to leave it, the park service might be better advised to allow them to have some first-hand experience which is not seen through a glass darkly—windshield of a car, binoculars, lens of still or cine cameras or projectors, overlook window, glass case of a museum, television screen—always through a glass! A visitor center serves the valuable functions of concentrating visitors at a point and of making certain techniques available; what one should ask is whether the plan calls for either.

If interpretation is not about building visitor centers, then what is it exactly? It is best defined by its objectives rather than by its techniques or methods. In the most general terms, we might reconsider the nature of interpretation and attempt a working definition which encompasses the types of interpretation discussed without differentiating between them: interpretation is the art of explaining the place of man in his environment, to

increase visitor or public awareness of the importance of this relationship, and to awaken a desire to contribute to environmental conservation. Now why should we deliberately choose the word "art" instead of some less precious term like craft, technique, or science? Because if interpretation could be reduced to a system which could be handled by a technical manual, or even a computer, so that input of resource management problems and data produced instant interpretive plans or programs, these "solutions" would lack the most essential qualities of good interpretation. These are the inspirational elements of a visitor's park experience which are often the most memorable. Visitors are not so likely to remember for long all the cold-blooded facts picked up on a nature trail, even when led by a good interpreter; what they will probably remember longest are the associations of ideas, or the feelings—that it was a pleasant walk, that it was an interesting place, that the guide made it "special" for them, that they hadn't realized how important the place was until it was explained to them, and that they had come to realize that we all destroy places just by entering them.

But why should interpreters always want to demonstrate the place of man in his environment? Won't this lead to stereotyping of provisions? This objection assumes that man and environment would always be the starting point. There is no need for this, for an infinite number of starting points exist, and what is important is a visitor's experience and therefore the end product. Freeman Tilden in his standard work on the subject insists that interpretation must be made relevant to visitor experience. Now suppose we were to listen to a talk about the penguins of Antarctica which made no mention of man and his environment, this could still be interpretation if it demonstrated such facts as the disappearance of wilderness values, or the discovery of DDT in penguins. Thus would a point be made of relevance to everyone in the audience.

This still doesn't explain why we can't have "fun interpretation." Why must interpretation awaken a desire in "everyman" to contribute toward environmental conservation, according to this definition?

Many countries have recently mounted large public communications campaigns to this end, and in Europe we had, in 1970, European Conservation Year. In Scotland, we chose the theme of "interpretation in the countryside," because we feared that, if the campaign succeeded in Europe, it would lead to an exodus into the countryside. Without any interpretation, this would merely have added to the pressures and problems which already exist in our countryside.

There is a curious and naive belief that taking parties of children from schools into the countryside is educationally beneficial regardless of what they do there, and that to take them up mountains is even better for it automatically strengthens their character and at the same time help to conserve nature from the top downward! Unless these visits are part of a conservation program, it is difficult to see how they will solve more problems than they create.

There are deeper and even more serious reasons for wanting to increase public awareness. We have so far stressed only the need to conserve parks and have said nothing of the global view which sees the whole world as a park, sees the total environment under the same threats of escalation of demands and overuse, the same desire to sell park values, the same coupling of growth with the word "progress," and sees that the social costs

remain unpaid and passed on as debts for generations not yet born. Still more simply, the root cause of all environmental problems is the frightening danger of overpopulation and, more frightening still, our refusal to see it as a problem—a problem of unwanted and wanted children. Like Mr. Micawber, we hope that technology will come with something at the last minute.

Types of interpretation

We have seen at several points in the foregoing argument that a distinction can usefully be made between natural and historic site interpretation on the one hand, and environmental interpretation of a more general type on the other, and we put forward the suggestion that the first type might benefit more than the latter from thematic plans. If we are to upgrade interpretation, there may be a temptation to reject the thematic story form because it has been much used. Certainly it should be challenged, but we must also appreciate the reasons for its past success. The average park visitor is going to finish up with a memory of very blurred impressions of visitor centers and nature trails and journeys between parks all hopelessly mixed up if the interpretation does not select the park values in each area, and, just as important, communicate them to him simply and efficiently, and in a logical, interesting and well-organized fashion so that it can make an impression. This is what thematic form means. It makes the use of the captive audience for a very limited period.

What of general environmental interpretation where the work is "off-site," or the site is not in the front rank for its natural and historic values? Education work with young people is an obvious priority here and while we have in the past 10 years worked out many new and useful techniques in fieldwork starting in the schoolyard, what seems to be lacking is complete coordination of work programs enabling them to cross artificial subject barriers and allowing not only followup and preparation of field visits, but the integration of all this into the syllabus.

We have been experimenting in the past decade with many techniques of general environmental interpretation, aimed at the adult urban public. What is more interesting is the work which has been done to encourage public participation, not only in the decision-making processes, fraught with pitfalls though this is, but in the action-taking processes, too. We have established in Scotland a national clearinghouse for requests from volunteer workers and for those hoping to find conservation workers. In this field, much remains to be done, and, despite the surfeit of environment conferences, there is plenty of scope for those who want a man-sized job in educating governments and administrators. The cynical administrator who sees conservation as something which must everywhere be balanced against development does not understand conservation and does not want to. Any such cancelling-out device in plans which already include development proposals will make conservation futile and ineffectual. When development is attracted to countries or areas because the standards of environmental protection are less stringent than elsewhere, the time has come to look closely at the benefits which such development is supposed to bring.

There are then different types of interpretation, and different approaches are not only

possible, they are desirable. Table 2 attempts to summarize the position outlined in this paper and define some of the salient differences as they are understood by the author.

Table 2. Definitions of types of interpretation

	<i>What?</i>	<i>Who, where, when?</i>	<i>How?</i>	<i>Why?</i>
Historic site	The art of explaining the past in relation to environmental and social conditions.	To casual visitors in the field often with preparation and followup in a visitor center.	By bringing it to life dynamically, usually in thematic or story form.	To increase visitor awareness of the significance of the site visited and the desire to conserve it.
Natural site	The art of explaining or revealing the character of an area through the interrelationships, between rocks, soils, plants or animals, and man.	To casual visitors in the field with preparation and followup in a visitor center.	Usually in thematic or story form.	As above.
Environmental	The art of explaining the relationship of man and his environment.	To the general public in the field or in indoor situations related to field experiences.	As a prelude to a site visit or discussion meeting.	To increase public awareness of the importance of this relationship and to awaken a desire to contribute to environmental conservation.

Conser- vation educa- tion	The art of teaching, or devising learning situa- tions about the environment, through the disciplines of the Earth, life and social sciences, and the arts.	To students and course members with preparation and followup in classroom, work- shop, or laboratory.	In depth by heuristic or discovery methods.	To increase understanding and, as far as possible, awareness of the problems of environ- mental conservation.
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Upgrading

If we are to upgrade all types of interpretation, we must review and evaluate all our existing provisions. Suppose, therefore, that there were a general consensus of world experts on where one could find the highest standards of interpretation in parks throughout the world. And further suppose that we were to measure the interpretive provisions in all parks against these standards. We should, of course, find that some parks had no provisions at all and that the standards of many others fell far below the archetypal examples. But for what reasons?

An investigation would probably list some of the following:

1. lack of staff expertise and difficulties in releasing staff from general duties to develop interpretive skills;
2. lack of cooperation between resource management and interpretive staff because of staff shortage generally;
3. lack of research into the effectiveness of interpretive provisions or feedback of the results to new policymaking stages;
4. low priority given to interpretation in park services, planning, and governmental agencies;
5. lack of understanding of the philosophy of conservation and interpretation at decision-making levels and by drafters of new legislation;
6. insufficient funds to provide even the most minimal forms of interpretation.

This list is not exhaustive and doubtless will remind the reader of other shortcomings, but the basic root causes of all the others are likely to be the last three. If we now relax our rather idealistic assumption about the general consensus of world experts, what further reasons for the low scores might we find, in the absence of any world referees? The most obvious one is that some evaluators would object if their own work were not valued highly! In this situation, evaluation tells us more about the evaluators than about what is being evaluated. How can we overcome this problem of upgrading in countries which have only recently become engaged in such work and where the blind may be leading the blind, or where the blind do not know they are blind?

This paper has attempted to list some of the steps which can be regrouped now to attempt a concise answer:

1. examine carefully the working definitions of interpretation;
2. examine critically the aims of interpretation and its philosophy;
3. appraise your interpretive needs at national level, and ensure that they are updated to meet changing public attitudes to the environment;
4. decide national priorities for site and environmental interpretation and conservation education for schools in relations to rarity of park values and population distribution;
5. ensure that sufficient national funds and staff are available to effect these priorities as park and school program;
6. ensure that national priority is given to building a national framework (national planners working to decide major policy objectives and goals, supporting regional and local planners with advice, research facilities, and grant aid: case work at local level is not delegated "upward" and back to national level);
7. make the whole system workable by training interpreters at national and international training centers with courses in the philosophy and practice of interpretation and resource management for all park staff and particularly for administrators.

We have found then that the evaluation and upgrading of onsite interpretation and environmental interpretation are inseparable from the philosophy and principles of interpretation. Is it possible to design an evaluation sheet which will cover not only museum exhibits, nature trails, campfire talks, and audiovisual programs, but also those elements that never seem to be evaluated—the interpretive plans? Table 3 is an attempt to produce a checklist of points which could spawn a whole family of evaluation sheets for all the above-mentioned media. In paragraphs 5 and 6, the more important and general points are introduced regarding interpretive planning. Paragraph 5c introduces what we have called "net gain" which can be assessed by posing the question: Do you consider that the creative idea has been communicated by a medium which adds something of intrinsic value to it? If this is not the case, then the medium is perhaps an unnecessary "gimmick."

Table 3. Evaluation of interpretive provisions

1. Initial contact

- a. *Briefing* or orientation by signs, directions, or clear instructions to visitors; awakening of interest of visitors, arousing curiosity of children; rapport, establishment of mood; initial statement of aims and objectives.
- b. *Attractiveness and quality* of architecture, graphics and artwork, photography and sound recording, artifacts, or general design standards. Staff appearance and manner.

2. Management and performance

- a. *Preparation and maintenance*, equipment checked and in working order, clean, efficient, no signs of damage, erosion.

b. *Management for comfort and safety*, hazards avoided, alternative plans made for bad weather; physical pace (walking, viewing, listening) speed and stops, rests and seating comfort; room temperature, ventilation; media audible, visible, or legible, including voice pitch, level, and accent; management of visitor "flow," including parties of visitors and capacity considerations.

3. *Content and performance*

- a. *Duration* of whole and parts, punctuality of start and finish, amount of copy, length of trail in relation to length of visit.
- b. *Level*, mental pace not too fast or labored, not too academic; vocabulary clear, not verbose, no jargon; delivery fluent, articulate, and intelligible.
- c. *Accuracy*, facts correct, authentic, no spelling or pronunciation errors, facts up to date, no sentimentalism, and no anthropomorphism.
- d. *Use of aids* efficient and professional.
- e. *Flexibility*, use of unforeseen opportunities for interpretation in the field, material adapted for seasonal changes.
- f. *Progression*, from the known to the unknown (for children), from the particular to the general (for children), logical sequence or story well organized.

4. *Style, attitude, and performance*

- a. *Authoritative* or confident, not diffident or obtuse.
- b. *Personal attributes* of staff, courteous, helpful, sincere, and convincing, not austere or gushing.

5. *Planning of content and performance*

- a. *Aims*, related to park values and the significance of the site.
- b. *Total interpretive experience* planned, parts complementary encourage movement of visitors from center to trails.
- c. *Techniques, media, and selection*, story or thematic treatment for natural and historic sites, interrelationships traced in the local environment; allocation of media or aids appropriate to the function, medium used gives a "net gain" to the interpretation (otherwise it is a gimmick); related to visitor experience, involves visitors, often with use of senses in addition to sight and sound.

6. *Effectiveness*

- a. *Overall effectiveness* is exciting or inspirational, evocative, or provocative, does not preach; history brought to life, ecological relationships revealed dynamically or dramatically, often with suspense (for children).
- b. *Message, summary, or conclusion*, conservation message related to the site or general environmental conservation, achievement of aims demonstrated by followup behavior of visitors in questions, discussions, audience reaction, volunteer offers of help, and purchase of relevant publications.

Mass media

With the success of European Conservation Year still fresh in many minds, it is tempting to suggest a mass-media propaganda campaign on a global scale. But the message does not always justify the medium, however important the message seems to us, the propagandists. Certainly we have an urgent communications job to do and we need to upgrade standards in our mass media, but this is not in itself sufficient justification for the use of television for propaganda.

Television has a place in the community and it should strive to communicate the truth; if we use it for well-intentioned propaganda, we shall discover our own lack of integrity and will degrade the medium. These overworked words—integrity, truth, and community—are the keys to public communication, and they make it impossible for an official organization to inject a propaganda package into the network, however true the facts, however honest the scriptwriters, for this is not the purpose of the medium in a free society.

Community and communications

There is a great deal that we can do to encourage genuine discussion and debate, and we must concentrate on this aspect of our work in the cities. We must explain man's predicament truthfully and without sensation, as if to a member of our group huddled round the fire like the 1872 legend, and we must explain that we now have the best technological tools for solving our problems; we now have the means to recycle many resources; we have the means and the world wealth to prevent many famines; we have the scientific knowledge to increase life expectation and to reduce pain and misery as never before. We have the example of recent history to warn us of our present course of action, for we are set on a course where demands are irreversible and escalating, and our supplies are dwindling and more finite than we once thought. We have computers now and can program any theoretical system we are capable of devising; we have the means as never before of controlling our numbers if we wish to do so; we have the benefits of new global communications systems circling over us to help us base our decisions on global appraisals, or even global participation and we have the means to improve immeasurably the quality of life for millions of people. What then do we lack? We lack what we have always lacked—the will to work together as communities, and the will to face the truth, which is harsh, difficult, and against short-term political and commercial interest.

*"When the Stranger says 'What is the meaning of this city?
Do you huddle close together because you love each other?'
What will you answer? 'We all dwell together
To make money from each other'? or 'This is a community'?"*

T. S. Eliot: "Choruses from 'The Rock'."¹

¹ Collected Poems 1909–1962. Harcourt Brace Jovanovich Inc., New York.

CREATIVE PARK USE FOR SCIENCE, EDUCATION, AND PUBLIC BETTERMENT

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In the intricate pattern of all life forms on earth a few major features stand out. The increase in diversity as evolution progressed, the exploitation by animals of all sources of organic matter, the stabilizing factors in the control of numbers within each species, and the energy flow and material cycles are among the main themes which form the background of biological processes which have led to the biosphere as it presents itself to us today.

Mankind has evolved in this complex situation at a very recent time, and in the beginning he was just one more rather large omnivore, eating and being eaten and producing discarded substances and dead bodies. His part in the structure and processes of the biocoenosis was a minor one and his impact on the environment modest.

But gradually his cultural evolution began to increase at a significantly greater rate than his biological evolution. Man no longer was dependent upon the environment as he found it, but began to change the world around him to fit his requirements. He widened the range of his habitation and found ways to delay death. Thus the increase in numbers commenced, and continues uninterruptedly until the present day.

Man's activities have given him the unique characteristic of no longer being fully a part of the biological complex. Instead, he has become a force opposing nature and natural situations. By learning the use of fire, by inventing tools, in particular those which could be used to kill large animals, and by his exceptional capacity for communication, he succeeded in outwitting his prey and reducing the impact of large predators. His earlier evolution had been adapted to his environment, but now the situation was reversed and he began to adapt his environment to his needs.

As his numbers grew, so did the importance of man's aptitude for organizing himself into communities; the function of the settlement became more and more dominant in his life. Life in the closed group, which grew from village to town, became more attractive because it was safer and gave increasing possibilities to those who were prepared to specialize in certain skills. The specialists began to dominate the communities. They depended upon others, however, to do the less specialized work for them. The better intellects could profit more efficiently from the possibilities offered in the towns. The town became the center for organization, for cultural activities, and of power.

This process has not progressed at the same rate in all parts of the world and has not been continuous everywhere. But the sum total is in this one direction. The results today are obvious.

One major consequence has been the increasing gap between the government and the processes taking place on the land outside the towns. With state affairs being decided in the city council chamber, the effect of the decisions upon the environment outside the towns was not heeded.

Today's environmental problems have been caused by the failure of decision makers to take into account the needs and limitations imposed by the natural environment.

Nature has remained something to fight against long after it has lost its menace. Technological systems and gadgets are applied to replace as many natural processes as possible, without previous full consideration of the necessity of such replacement or of their consequences. The application of modern technology is, in fact, becoming a negation of life.

Of course, not everybody has always been thinking along the same lines. The diversity within the species of man is enormous. Even at an early stage of European culture, there were people who realized that something was amiss. Horace's second ode written nearly 2,000 years ago, tells of the happiness of he, who, away from all the hubbub of modern life, freely tills the soil of his fathers.

As the impact of expanding destruction of soils and life itself increased, so did the counterforces. But they were insufficient. We are now in a situation where the final stand must be made before it is too late. The establishment and conservation of parks and equivalent reserves is one of the ways in which we can strive to obtain the betterment which we are seeking.

Parks can be used for scientific purposes. Biology is first among the sciences to need them. One of the specific characteristics of biology is that it deals with highly complex systems. The subject matter of physics and chemistry are relatively simple in comparison with biology. All the problems of these sciences reappear in a multiplied form in the study of organisms, their parts, and their interrelations.

The biologist is well aware of the difficulties this implies. He knows that he can never fully master his subject and that he will always be working with approximations, probabilities, and stochastic processes, and that, in fact, each situation is unique. We can express this state of affairs by saying that there are innumerable rules in biology but hardly any laws.

It is vital for the understanding of the living world around us that we maintain places where the full complexity of natural communities is preserved. Because of the large variety of species, climatic zones, altitudes, soils, and meteorological phenomena, we need an enormous diversity of such reserves. We cannot aim at completeness, because that would be claiming the whole globe. But there should be a fair sample.

These natural areas are the working place of the field ecologist. The significance of field studies has long been underrated. Biologists themselves are, to some extent, to blame for this unsatisfactory situation. The stone-built laboratory was the place where scientific advances were made; in the field, either observation was too difficult or the circumstances were too complex and variable to draw valid conclusions.

The development of biochemistry has given further support to this attitude. The wonderful new field of research has caught the imagination of a great number of people and quite rightly so. We now know a great deal more about the function of organisms, about the

chemical bases of heredity, how poisons work, how viruses multiply and what changes occur under stress, whether from physical or chemical causes, and how organisms can recover from lesions.

But biochemistry does not tell us how to preserve the environment in which all those organisms function. It is the development of ecology which has shown us the limits within which an organism can live and within which a species can continue to exist. These limits are often unexpectedly narrow, and study of them has often been able to explain why certain species disappear under what may seem only a slight impact, resulting from changes we have made in the environment, and also why other species react successfully to such changes.

For such studies, we need areas where animals and plants live under natural conditions. Only then can we observe them in all stages of development, in all their different activities, and what is quite as important, under different and varying concentrations.

Ecological studies in natural areas can have a variety of aims. They may be purely scientific or anything between that and the solving of the problem of how to manage a particular species of animal or plant. Those who like classifications (whatever the subject to be classified) would no doubt prefer to distinguish precisely between pure and applied research. But there is no clear distinction between the two, although there is certainly a difference in emphasis. One scientist may wish to establish a principle, and another to solve a practical problem. There will always be those who dig deep and those who range widely. The process of research in the natural sciences is an alternation between finding facts and formulating ideas. Theoretically, the process begins with the acquisition of data. These provoke an idea and one then tries out this idea in an experiment. The experimental results lead to new ideas and to the next experiment and so on. The pure scientist stops when he has reached an idea which satisfies his inquisitiveness, if only temporarily. The applied scientist stops when he has reached a stage where he can do something. But the roads along which the work proceeds are identical.

Parks are places where all kinds of workers can join in a concerted effort whatever their starting point and whatever their final goal.

Scientific study as an occupation is an essential part of civilization. The way in which the data that come out of these studies are used is a measure of the ethical level of the community as a whole.

Ecologists are on fairly safe ground here. There is little danger that they themselves will make improper use of their results. There is also little danger of others doing so. On the contrary, many of us are convinced that it is because too little use has been made of already existing knowledge that we are in our present environmental difficulties, and that it is because too little research has been done that the biologist must so often refrain from answering pertinent questions.

The future of the world will depend, among other things, upon the application of ecological knowledge to problems of environmental management. Such knowledge as already exists is not fully used and a great deal more must be acquired. Parks and other natural areas are necessary for that acquisition and are therefore equally necessary for the future of mankind. Only in such areas do we find the complicated ecosystems which will show

us the complexity of real biocoenoses, the significance of diversity, and the feedback mechanisms which we have impaired or destroyed in so many places.

Great emphasis has been laid in recent times upon the necessity of monitoring environmental changes. Pollution is a great threat, and to fight against it we must know the extent to which it is threatening life. In general, physical and chemical techniques are being used to measure the parameters which are considered to be significant in regard to human health. Plants also are often kept under observation, particularly because gases from factory chimneys can do great harm to natural vegetation and agricultural crops. But faunal changes are much less studied and their study is certainly a great deal more difficult. The assessment of numbers of animals is frequently far from easy and, besides, the states of health of an animal usually cannot be observed in the same way as we can see injuries in plants. Study of the stability of animal populations is a prerequisite for such monitoring, and protected areas, where interference from man can be regulated, are the only places where such studies can be made for a sufficient time and over sufficiently large areas.

Monitoring of toxic chemicals in animals has been undertaken in a few places. For purposes of comparison, it is always essential to have other areas which are as near zero value of contamination as possible. The latter must be kept intact permanently so as to be able to continue research for as long as it is needed.

The use of natural reserves is no less essential in the teaching of younger generations. Only by comparing different situations can any specific case be understood. No applied entomologist can really know what he is doing unless he has a clear idea of the differences between an agricultural field and a natural ecosystem.

We know that insects often attack agricultural crops, and it is common practice to apply insecticides to stop them. But we also know that this is not really the right way to go about it and that we are just trying to cure symptoms. In striving to increase the yield of crops, all sorts of methods have been used—selection, weed control, soil improvement, a complex of measures which has so changed the environment that most animals can no longer live there. But there are always a few who thrive. These are the pests, and we then apply the poisons. But since we know that resistance to insecticides develops in many cases, and poisons reach many nontarget organisms, including ourselves, and often accumulate there, the use of pesticides has to be reduced and replaced by other methods.

It is necessary to know why explosions of species occur in agricultural crops and yet are so rare a phenomenon under more natural circumstances. It is easy to say that it is because of the diversity in natural biocoenoses and its complex system of negative feedbacks. But this is not an explanation. It is more a description of what we observe. How the complexity works to stabilize animal numbers is not at all clear. We must study natural areas to find out, because only then will we know whether we can use any of these mechanisms in agriculture. Biological control has been applied in many cases with success. But many more insect pests survive, which we will soon have to depend upon biological methods to bring under control.

It is an obvious fact that national parks must be carefully managed. However wild an area, however natural a situation, man has had, and will continue to have, an impact on every part of the globe. We must, therefore, know exactly what the impact is, find its

exact source, estimate its effect, and plan to minimize any destructive influences. The biologist, himself, is aware of the fact that even he, by his mere presence for scientific reasons, does influence a biotic community. He may wish to keep others away as much as possible. But he is also quite aware of the fact that he must not unduly exclude others from the enjoyment of contact with nature. Indeed, he knows that only by showing others the wonders of nature can he expect their help in preserving them. Only where irreversible damage may be inflicted will he demand exclusion of all forms of interference, including tourism and recreation.

This means that we must know what interference a biocoenoses can suffer without destruction. It will be one of the major problems for the future management of national parks to estimate the extent of recreation that can be allowed in them. It will be difficult to strike the balance between care and indulgence. The biologist will tend to be careful because he fears irreparable damage. It must again be stressed that we cannot allow any unique category of wild area to be lost for whatever other useful purpose, unless all alternatives have been carefully weighed.

The educational value of parks may be considered as generally accepted. The word, "education," has a complex significance in this context. It can, indeed, mean different things. There is the education of the biologist who has to be shown how to study the functioning of complicated biological systems. We must also educate park wardens to show them how to manage the park and watch for signs of deterioration. We must educate young people in order to instill in them a perception of the beauty of life. We must most certainly educate our political leaders on whom we depend for the decisions which will shape our future.

Decisions should always be taken by those who can carefully weigh different values. We know now that ecological arguments have either been absent or have been undervalued in the decision-making process. To give them their proper weight, the decision makers and those who support them politically must have first-hand experience of what is going on outside the "board room." They should, therefore, participate in an appreciable amount of scientific tourism, because only that can give them the experience. This may mean that there will be heavy pressure on natural areas, but ways to regulate this pressure will have to be organized and it will be well worthwhile. It will save a great deal in the end.

All of us—administrators, voters, and elected—should be aware of the actual severity of the environmental crisis. Natural areas can show us what the world looked like before man interfered. They may be used as a yardstick for our actions, and help to shape our future actions.

All these considerations are by no means necessarily confined to large-scale and world-famous parks. Much can also be achieved by their application on a minor scale, so that careful attention should be given, for example, to urban parks.

We are often forgetful of the extremely artificial life most of us lead. This point need not be elaborated here, but the fact that more and more people are suffering from "cultural diseases," and that there is general deterioration of the physical condition of too many individuals in the technological society, is a symptom too well known to be ignored.

By planning parks in the neighborhood of cities, a certain amount of compensatory action can be taken. By careful planning and use of the natural structure of the area, a relatively

small piece of land can not only accommodate many people but can also show them the intricacies and interdependence of soil, vegetation, and fauna. In a rather bigger area, the zoning principle can be applied, to provide integrated use for recreation and nature study, which more people need than perhaps they themselves realize. The need for such areas will increase with the growth of urban populations.

Unless we succeed in showing mankind as a whole how he is dependent upon a complex system of natural chemical cycles and use of solar energy for his food and much else, there may be no future ahead of us after a few more decades. Parks are an integral factor in improving awareness of the serious situation to which we have come.

Too many people are still unaware of our dependence upon other forms of life; too long have we believed in the omnipotence of technology. But we are beginning to realize the ultimate consequences of our way of living.

We are learning what are the essential things we are losing. We must now steer another course where continued economic development is not the goal, but wise use of what is still left of the resources of nature is our primary concern. We must preserve now what will be needed in the future.

Large parts of the world are still fortunate enough to have natural areas. But there is also pressure to use them for agriculture, spoil them through industrialization, and abuse them for excessive touristic exploitation.

The need for the wise use of the soil for growing populations is evident. But we must not only look at the near future but also further ahead. What is destroyed today may be urgently needed in a few years from now. The betterment of the standard of living in developing countries is one of the most urgent needs of the present time. But it should not be achieved at the expense of values which will be needed even more urgently for the very same countries in the future. Nor is this a vague consideration which lies far ahead. In many places we can already see how badly our limited space has been used. We must learn in time from the mistakes which have already been made.

National Parks are under pressure from population increases, pollution, and technological degradation. This applies to all parts of the globe, although the emphasis is different in different regions. But we must be aware of the fact that, quite apart from the various ways in which each of us hopes to attain a better future for mankind, quite apart from the political systems which we strive to establish, quite apart from the population level which this globe can support and the level of wellbeing which can be attained, we shall always need areas where life in its full complexity can continue to exist.

This can only be achieved by preserving national parks and using them to the full for scientific study, for education, and for the creation of that peace of mind which, sooner or later, we all need.

DISCUSSION

Dr. Paulo Nogueira-Neto (Chairman): To give as much time as possible for interventions, I propose simply to call on the two authors to introduce their papers and our six panelists to add their comments before the general discussion.

Don Aldridge (Author of Paper 25): Just as Britain and America are "divided" by a common language, so we must not forget our different attitudes and beliefs at these international forums. Because of this, my paper proposes some definitions as an aid to communication, and its Table 2 sets out the differences between site interpretation and conservation. But I also wrote "the two will merge into one another" and I should now like to elaborate on this. Let us begin with the "what?" and "who for?" questions. Interpretation explains parks to visitors, while conservation education devises learning situations for students of all ages. Both demand the establishment of a rapport to captivate interest. Both move from the known to the unknown or from the person's experience to a new awareness. We can move from interpretation for visitors to the relatively greater depth of education, but, if we do so, we should not put interpretation in one corner of the visitor center and conservation education in another as if they were completely unrelated. They are not.

Now let us take the question, "where?" Interpretation is most easily effected in a park and conservation education in the home area or school, but again it is obvious that they are closely related. Schools making visits to parks should first go through a curriculum of classwork and field studies to prepare them for their visits. Likewise, park interpreters can relate the apparently special values of, say, Grand Teton's superlative scenery to the human condition and apparently ordinary scenery back home. In both cases the "where" is less important than the opening of people's minds to a new appreciation of a place, wherever that place is.

Now let us look at the "how?" Interpretation is selective in revealing park values, often in story or thematic form because of the lack of time. Conservation education uses discovery methods which take longer; this is a group social-learning technique in which shared experience leads to effective discussion. Thus the two are blurred and we use the technique we have time for. Finally, "why?" Interpretation increases visitor awareness of the significance of a place and the desire to conserve it, while conservation education increases understanding of global environmental problems. It is easier to change people's knowledge than their attitudes and beliefs, but both our communication methods attempt to change attitudes by applying factual and sensory stimuli. The end product should be community action, the opportunities, means, and nature of which are outlined at the end of my paper and in the quotation from T. S. Eliot which closes it.

Prof. Donald J. Kuenen (Author of Paper 26): The essence of the biosphere is its complexity, so we must conserve places where it can be studied. Ecology, which is often misunderstood, helps to fill the gaps in the understanding of the layman as much of the scientist. Thus it is important for the agriculturist to be made aware of the simplicity of the ecology of the area with which he is most closely concerned, compared with that of the natural world. For this purpose all areas, including national parks, need to be managed, since they are relevant to the education of everyone, agriculturist as well as decision maker. It is always more essential in this management exercise to look at the future rather than at the past.

William C. Everhart (Panel Member): While there is constant refinement of interpretation, there is seldom anything entirely new, and few radical changes have been introduced in the past 50 years. However, Paper 25 throws helpful new light on the philosophy of inter-

pretation, though I am not sure that its definition of that activity as "the art of explaining the place of man in his environment" has anything very directly to do with our specific interpretive task in the national parks. The interpreter is essentially an articulator of policy, although it must be a policy which extends beyond park boundaries.

Ponsiana Ssemwezi (Panel Member): From my experience of park interpretation in a developing country, I would say that the most difficult problems are the intrinsic difficulty all teachers have of imparting personal perceptions to others; the lack of sufficient educational background in many of our visitors and the extreme lack of uniformity between them both in age and interest; the extent of visitors' habitual relationship to nature (for example, those whose subsistence is most closely derived from nature are often the most difficult to win over because of the destructive, temporary, or selfish values they attach to nature); the shortage of trained interpreters, with the result that those we have are exhausted by having to deal with too many people; and the lack of interpretive materials, for although a gifted interpreter can make do with a piece of rock, the ordinary one has to depend on visitor centers, exhibits, etc. The location of interpretive material is important and it has most impact at the park entrance or in the camps and lodges where people stay, though the notice board along a trail has its uses. But, above, all, interpretation in any form must never be overdone.

Mrs. Carol A. Martin (Panel Member): I would agree with Paper 25 that interpretive programs must have broader and more profound objectives than simply explaining what can be seen or done in a particular park. Since no area can be all things to all people, a well-thought-out choice of objectives allows the interpreter to use the most suitable media within the resources available. The criterion for selecting the method is: does visitor response show that it works? If a program is being ignored or misunderstood, another must be tried and the manager's approach must be completely flexible. We must recognize that each visitor carries with him the invisible baggage of his own cultural background, as well as his own expectations of what he will see and learn, which will influence his reaction to the interpretative program. To be successful, therefore, this program must persuade visitors to set down their "invisible baggage," take a fresh view, develop a new way of thinking, and leave the area with a new awareness. This brings me to my final point which is that children have less "baggage" to discard than their parents, so that programs that reach them through the educational system or within the parks will have a better chance of making an impact than the costly and sophisticated programs aimed specifically at adults.

Dr. Pekka Borg (Panel Member): I have only two small points to add: In the communication of values, the zoning principle is important and also the Scandinavian principle of everyman's right of access to, and activity in, the countryside. Second, representative samples of natural areas must be reserved, but mostly for ecosystem conservation rather than interpretation; children should be encouraged to find the latter for themselves or be provided with it in the nearest patch of forest to their home or school.

José Lagrifa Mendes (Panel Member): The Portuguese idea of national parks envisages a pre-park zone where tourist infrastructures are situated, and the park proper in which motorized vehicles are prohibited and access is by foot and horseback only. We are now aiming to establish visitor centers and train the personnel who can interpret the main

features of interest, linking fauna, flora, geology, and landscape with history, since one should never forget man's role in the past and how he should behave today in restoring the rapport between man and nature in these wonderful park regions.

M. K. Ranjitsinh (Panel Member): The point I wish to emphasize is the great differences between parks and their objectives even in one country, which means that interpretation has to be equally varied. Some areas are best kept for research, as Paper 26 has shown, others may be too fragile, or too specifically designed for the protection of particular rare species, to be subjected to visitor pressure; all, with their animals and plants are dynamic, never static, so that there simply cannot be any single formula or norm which applies to all park interpretation. Nevertheless, there are certain park principles which can and should be put across, and, for the rest, interpretation should be based on a management plan that needs to be constantly reviewed.

Herbert Sydney Curtis (Panel Member): The two papers which have been presented for discussion are complementary, Paper 26 putting national parks into proper perspective for the age in which we live and for creative use of them for human betterment; Paper 25 providing the guidelines through which that creative use can be made possible, while at the same time tactfully drawing attention to the possibility that some of our interpretive services may be less than ideal. Where my home State of Queensland is concerned, I recognize familiar frustrations among the probable reasons for substandard services in the list given in the section of Paper 25 which is headed "Upgrading." The paper goes a long way to show how the situation can be improved and, in the light of Queensland's modest budget, I was interested in Don Aldridge's questioning of the need for visitor centers, unless this form of service is clearly called for by the management plan.

Both authors stress the importance of national parks for environmental education and research, and I feel that for the rest of this century, at least, their most vital role will be in this direction. A strong program of environmental education in the uses and interpretation of national parks of all countries is the key to our survival, and we have so little time.

Dr. Frank H. Wadsworth (U.S.A./Puerto Rico): While we seem to be in agreement on the need for research into primary ecosystems as banks for germ plasm or as the means to management of an equilibrium between animals and plants and the use of an area for man, we should remember that scientific research might ultimately pose as great a threat to the integrity of parks as some of the present commodity-orientated and much less defensible pressures. The reason is that scientific use may conflict with the preservation of primary systems. Research is only purely observational in the first phase, and for real progress must pass on to comparisons, A versus B, stable versus feral conditions; such comparisons of treatments require geographical and often temporal replication, involving large or discontinuous areas, and an area so used may no longer be primary for park purposes or even typical for further research. We must, therefore, clarify what we mean by ecological research in national parks; major experimental areas, both primary and secondary, must be provided for outside the parks.

Prof. Donald J. Kuenen (Author of Paper 26): What the previous speaker is really saying is that one must use national parks for research in a sensible way, in which destructiveness is minimal or temporary.

Dr. José Candido de Melo Carvalho (Brazil): Improvement of interpretive services should be a top priority in developing countries and aimed primarily at political leaders and the press, since it is through them alone that proper staffing, funding, and facilities for park systems can be assured.

James William Keenan (Canada): Table 1 of Paper 25 presents criteria for media selection and an evaluation of the various media, which are essentially subjective. It seems to me that this points to one of the major failures of interpretation, namely the failure to study its impact objectively. I would add that the mere counting of heads is not an adequate measure of the success of a particular mode of interpretation.

Don Aldridge (Author of Paper 25): I would agree with the previous speaker only to the extent, and with the proviso, that entirely new techniques of research and evaluation, not just the filling in of questionnaires, can and must be worked out. If you feed rubbish into a computer, rubbish will come out of it.

Albert L. D. Mongi (Tanzania): Interpretation has much to do with personal experience and background references; for example, in Africa, the not uncommon belief that the cry of an owl is a bad omen or that the yelp of a jackal spells tragedy. I believe there is much to be said for what might be called "silent interpretation," that is simply giving the facts and leaving people to interpret them for themselves.

Mrs. Carol A. Martin (Panel Member): Yes, but the kind of park or area must be taken into consideration. Thus, in a small archaeologically orientated site, such as the one I am responsible for in Arizona, a slab of stone means nothing unless the theories about its use can be explained.

Mrs. Margaret E. Murie (U.S.A.): I recall that Paper 14 of Session VI spoke of ease of access being the greatest point of contention in park planning, and it is, in fact, the key to what may happen to the wilderness areas in which the Society I represent is chiefly interested. Given all the stresses and pressures which have been mentioned in this conference to date, my strong feeling is that the administrator of any park must hold steadfastly to the ideal that national parks are not like any other piece of land: they are not ordinary and cannot be protected by ordinary thinking. So we cannot begin to estimate how important these reserves of natural country may be, for man, for nature itself, in years to come. As was remarked toward the end of Paper 13, also in Session VI, which incidentally had a good deal to say about interpretation . . . "the ultimate benefits of national parks involve the mystical as well as the practical."

Robert James MacLachlan (New Zealand): The existence of only one education authority in New Zealand has greatly simplified the process of getting ecology and conservation included in the school curriculum. In one of our parks, through voluntary public effort, a lodge has been built especially for exposing children to the park experience. It can take two classes totaling 72 children at a time and has a resident Department of Education teacher and a National Park Board ranger-interpreter on its staff. Formal classroom teaching is combined with planned exploration of nearby areas of the park, and children in the 14-17 age group usually spend 1 week at the lodge in each of 2 successive years.

The weekends are available for youth groups, and, in both cases, forward bookings are heavy. By taking the classroom to the park in this way, we hope that adults will be bred who know something about their environment and can appreciate the place and importance of their national parks.

Tufuga S. Atoa (Western Samoa): The importance of having the interpretation of a park presented in several different languages should not be overlooked.

Don Aldridge (Author of Paper 25): The word, "interpretation," is being interpreted in many ways in this discussion, but I believe the definition proposed in my paper provides a good working basis. It means, in effect, that interpretation is education, although the two differ in many respects.

Avraham Yoffe (Israel): I would still insist that the primary responsibility of national parks is to display plants and animals to the public, and I must admit that I find the parks we have visited in the course of this conference disappointing in this context: I have almost come to believe that the word "vamoose" is derived from "vanishing moose." As for interpretation, as opposed to display of wildlife, I am inclined to advocate the system we have in Israel of a dozen study centers which are not connected with national parks, but an integral part of the school system.

William C. Everhart (Panel Member): I can only reply that in fact the animals are there in our North American parks but you cannot see them through glass! Interpretation is really no more than an approach to the identification of significant park values.

George Bagnall (Ireland): It is a problem for a country with a long historic, cultural, and folk background to define the limits of park interpretation. The danger is that such interpretation could become the primary, not the secondary, function of the park. For example, in Ireland, before the National Park Service was given a separate identity, a license was granted to a local committee to establish a folk museum and crafts center in one of our parks. Now that the level of visitors to that park has become high, at least at peak periods, we are becoming doubtful about the appropriateness of locating such a museum and center inside rather than outside the park.

Dr. Leonard H. Smith (Australia): More emphasis needs to be put on the importance of starting with the children, preparing them in advance for their visits to national parks and, eventually, for full participation even in the most sophisticated and elaborate forms of interpretation.

Dr. Pekka Borg (Panel Member): There is a tendency in interpretation to concentrate too much on the peculiar phenomena rather than the everyday functioning of the ecosystem, which is what is really important.

Prof. Michel Maldague (Canada): Only about one mention has so far been made of what I regard as the very important topic of research into the evaluation of the effects of various methods of park interpretation. In Laval University's experimental forest, which is part of the Laurentides Park of Quebec, we have this year opened an ecology center for visitors, in which the method adopted for measuring visitor reaction is the questionnaire one, covering the classification (age, educational level, occupation, etc.) of the visitors themselves, their feelings about their visit and what has struck them most or what gaps have been found, and their suggestions or individual contributions to the running of the area. It may be objected that this method is one-sided since it does not

cover the illiterate. But I would regard interpretations as a secondary or "luxury" activity which should only supplement general or conservation education. Incidentally, I would prefer, at least in French, the term, "*observation raisonnée*" (rational comment), to "interpretation."

Herbert Sydney Curtis (Panel Member): For me, at least, the park experience is greatly enhanced by such very simple things as having the plants and animals named for me. It seems possible that the filling in of complex questionnaires gives biased results, although I do not dispute that they are still quite useful.

Prof. John Stewart Turner (Australia): I would enter a plea for more material on plant ecology in the parks' interpretive publications. Few of the Yellowstone booklets or rangers have discussed the factors concerned with the existence or location of grassland and sagebrush enclaves in the forest; in the Grand Teton much must be known about plant or forest ecology in glaciated valleys (avalanche succession, etc.), but, again, little is included in the interpretive literature, except for one "naturalist" article. During the past few weeks in nine different parks in the region, I have seen only four elk, one moose, three coyote, one black bear, six mule deer, and dozens of chipmunks, but a great variety and number of trees and plants; yet nearly all the interpretation is devoted to large animals. Elementary plant identification and ecology deserves much more attention.

Richard D. Piesse (Australia): Park authorities should also direct their attention to the growing phenomenon of "special-interest group tourism," as a means of communicating park values most effectively to the public. These groups are composed of many types of intelligent people with a shared common interest. More could well be done to collaborate with the agencies concerned in the development of special-interest group travel to national parks based on special handling and interpretive services.

Ponsiana Ssemwezi (Panel Member): In Uganda and East Africa generally, this type of travel and these services are already very well established and part of the regular park use. It is worth stressing that unless national parks serve such a land-use function, they are eventually bound to be wiped out.

Dr. Frank H. Wadsworth (U.S.A./Puerto Rico): A brief comment on one aspect of the conservation films which now play such an important part in interpretation and, incidentally, are often very costly to make. Although most of these films are sensitive and imaginative, the "audio" element which enters the ears during the film is often out of harmony, tending to keep my mind on the urban environment, which I am trying to forget, or trying to decide for me what my mood should be, like the absurd frivolous music which often accompanies a deer bounding across a plain. Emphasis in film soundtracks should be on the natural sounds of the scenes portrayed—and otherwise the least possible extraneous noise is desirable.

K. O'Donovan (Canada): William H. Eddy, Jr., talking about his film, "Earthbound," said that parks should remind us of our link with the soil, how very dependent we are on it. Panel Member Ssemwezi, in his comments, mentioned that people who are closest to nature are often the least receptive to ideas about the value of conservation. Perhaps it is simply that the latter already feel their connection with the earth and do not need it interpreted to them.

William H. Eddy, Jr. (U.S.A.): I would doubt very much whether people living close to

nature are in less need of interpretation and have more understanding than those in this room. Interpretation is essentially a process of selection.

Jerry Shimoda (U.S.A./Hawaii): Another way of saying this would be to say that interpretation is a point of view, a way of looking at things objectively, but that would mean that one was not immersed in the scene, part of the scene, like the owl that hoots, the flower that is plucked. The "discovery" method of interpretation is fine, but the aim should be to make oneself a part of the scenery as well as to recognize that the flower is a part. This is the real challenge of interpretation.

Prof. Ronald G. Seale (Canada): I would certainly disagree with the view that national parks should aim to display plants and animals—that is the function of zoos or game farms. Part of the attraction of visiting a national park is the very uncertainty of sighting animal life, but at the same time the greater probability of doing so the more one's knowledge increases. The stimulation of this heightened awareness should be the aim of national parks, not the herding of various species past a viewing stand; a glimpse of the back end of a moose met by chance on a lone walk is likely to leave a much more lasting impression. Yellowstone is to be congratulated on abandoning its bison-viewing paddock, and any moves back in that direction should be vigorously opposed.

Dr. Leonard H. Smith (Australia): Interpretation has a deeper significance than audiovisual programs might suggest. People will never learn to understand the viewpoints of others if they do not have a starting point in their own country. It is essential to instill in the minds and hearts of children, as Panel Member Martin stressed, a love of the simple things of nature, if they are to become worthy future leaders. Too many adults today are still afraid of nature. Children of all ages need to learn the joy of smelling the flowers and trees of the bush, hearing and understanding the songs of birds and other creatures, and they need to see the stars move around the heavens at night and to hear the owl hoot. Given such a starting point, they might eventually graduate to an appreciation of the higher forms of education about which we have been mostly talking this morning.

SESSION XI

STAFF DEVELOPMENT AND TRAINING

Monday, September 25, 9 a.m. to noon

CURRENT INTERNATIONAL TRAINING OPPORTUNITIES AND SUGGESTED IDEAS FOR IMPROVING THESE OPPORTUNITIES

Chairman: Dr. Simon Max Franky, Colombia
Rapporteur: Dr. Leslie M. Reid, U.S.A.
Author: Paper 27: Dr. Kenton R. Miller, FAO
Panelists: Andrew Allo Allo, Cameroun
J. C. Stormonth Darling, U.K. (Scotland)
Lemuel A. Garrison, U.S.A.
Dr. Donald Hunsaker, U.S.A.
A. J. Mence, Tanzania
Dr. S. Ross Tocher, U.S.A.

RAPPORTEUR'S SUMMARY

Opening the session, Chairman Franky emphasized the importance of specialized training of personnel for management of national parks and explained the need for the international training opportunities, which was the particular subject down for discussion. After calling on Dr. Miller to review some of the principal points presented in his paper, in which Dr. Miller emphasized the critical importance of the management function (establishment of policies, ordering of priorities, etc.) and the fact that the level of requisite skills required for this is positively correlated with the expertise of the individual agency, the Chairman asked for the comments of the panel members. As he said, by way of introduction, they represented a cross section of the organizations involved: Andrew Allo and A. J. Mence, the two African colleges of wildlife management, at Garoua, Cameroun, for French-speaking personnel, and at Mweka, Tanzania, for English-speaking; Dr. Tocher, the Michigan University annual International Seminars on Administration of National Parks and Equivalent Reserves; Dr. Hunsaker, the joint U.S. Peace Corps/Smithsonian Institution program; and Lon Garrison and J. C. Stormonth Darling, the activities in this field of the U.S. National Park Service and the National Trust for Scotland, respectively.

In the discussion which followed the panelists' comments, the majority of the interventions gave an account of the even wider range of training facilities existing in many parts of the world—Latin America, the United States, Australia, New Zealand, India, France, and Italy being among the regions and countries mentioned. Several speakers commented on the various problems involved in their training programs, including that of

having guaranteed job opportunities for graduates; the danger of relying too much on international cooperation to take the place of development of training facilities within individual countries; and against this, the fact that smaller countries, with relatively few job openings, may not be able to afford specialized institutes.

As time for discussion was limited, many participants who had submitted written comments and questions could not be heard, but the main points they had planned to make are included in the discussion section of this session. Taken as a whole, the comments reiterated the value of, and need for, expanded training programs. One point which was stressed was the role of universities in providing training assistance. In this regard, and based partly on off-the-record comments made after the session, it is worth adding that there are quite a number of universities with highly qualified staffs capable of providing for advanced study by suitable individuals, which are interested in responding to requests for short-term (e.g. 1 year) diploma or certificate courses in park and wildlife management.

SESSION XI / PAPER 27

DEVELOPMENT AND TRAINING OF PERSONNEL— THE FOUNDATION OF NATIONAL PARK PROGRAMS IN THE FUTURE

by Dr. KENTON R. MILLER
FAO Forestry Officer, Regional Office for Latin America,
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During the past 10 years since the First World Conference on National Parks (Seattle, 1962), park programs around the world have grown in number and scope. One hundred and thirty-six countries of the world now manage some 2,000 sites as national parks and equivalent reserves. Within this system some of the greatest natural, educational, scientific, cultural, and recreational resources of the world are being managed for today's and tomorrow's generations. Additional recognition has been given to the many services being produced in national parks other than those traditionally cited, such as high-quality, ever-flowing water; soil stability in up-stream areas; the conservation of genetic materials; research on environmental phenomena; ecological benchmark studies; and environmental balance.

National parks have become more complicated. Whereas formerly the problem consisted of protecting wild areas and providing services for extensive forms of recreation, it is now obvious that mass recreation, research, land-use competition, and environmental pollution influence park management. Many variables must now be related, skills learned, and questions asked.

As in the case with all land-management activities, decisions must be made today which will guide resource use on into the future. Unlike most land-management activities, however, parks contain resources which are generally unique and irreplaceable. More than ever, there is need to formulate clear objectives for park programs, to rigorously analyze and plan the management and development for park areas, and to form national strategies and policies for park programs as intimate parts of regional and national planning and development exercises.

Methods, skills, and a learning process are required, since these tasks for today's and tomorrow's park programs depend upon the people employed by park agencies and related national, regional, and international organizations. There is a wealth of experience available throughout the world, and it is urgent that methods be developed to permit learning from experience.

This paper reviews the major skills required for the management of national parks. Some recent staff training and development opportunities are presented to indicate the current state of the problem. While it is difficult to predict future numerical requirements for personnel, some general indications are offered. Several common, as well as recently tested, methods for staff training and development are discussed, and emphasis is placed on the paucity of teaching materials. The author presents a series of proposals directed to park agencies, universities, foundations, and regional and international organizations which are intended to initiate and strengthen the training and development of staffs for tomorrow's park programs.

While this paper attempts to cover and generalize about problems and issues throughout the world, special emphasis is given to the developing countries of the Third World. Based upon the author's experience, most examples are drawn from the Latin American region. Special acknowledgement is due to colleagues in the national park programs, regional and international organizations, and the Forestry Department of FAO for sharing their ideas and wealth of experience (Duarte de Barros and Strang, 1970; FAO, 1971; Miller, 1968; and Sutton, 1971).

Skills required

The trends are clear that future park programs will be far more complex than those in the past. It has often been considered sufficient to physically protect animals, plants, and other resources of the parks, and to provide minimal recreation facilities. However, experience in Argentina, East and South Africa, Europe, the United States, Venezuela, western Canada, and elsewhere, indicates that problems of increasing demands for park services and pressures for alternative uses of resources are requiring serious treatment. Park programs are already beginning to include many aspects of management other than purely biological considerations, yet these latter, when related to total ecological environments, are becoming ever more important to the survival of the parks. Moreover social sciences, planning disciplines, arts and communications fields, and subject-matter areas dealing with land tenure, law, and policy are skills which are now required on the park-management team.

Another major change from the past is the increased difficulty for individuals to adequately

handle the multitude of tasks associated with planning and managing parks. The mere number of variables and skills required in today's and tomorrow's park programs are rapidly passing beyond the reach and possibility of an individual's intellect. We must now think in terms of teams of park specialists. Moreover, the team must be able to maintain the ability to generalize as well as to specify. It must be able to grasp the whole view and appreciate the regional implications of different management alternatives, and, at the same time, treat the details of the planning problem. It must be able to integrate, analyze, and synthesize.

In order to visualize the skills required for park programs, it is useful to first review the functions which must be performed (see table 1):

Table 1. Functions related to national park programs

1. Decisionmaking functions	Direct and guide the necessary steps to achieve the objectives of the park.
2. Major program functions	<ul style="list-style-type: none"> a. Protect park resources and park visitors. b. Design and construct park facilities. c. Interpret park resources to park visitors. d. Maintain installations within the park. e. Administer park programs.
3. Key associate functions	<ul style="list-style-type: none"> a. Understand the resource(s) of the park. b. Understand the people who visit, or in some way make use of, the park. c. Understand the allocation of the resource(s) in relation to the users and the objectives of the park. d. Understand specific aspects of the resource(s), the people, and their relationship. e. Guide legislative and policy matters. f. Analyze land tenure, and guide the acquisition of lands. g. Project the image of the program outside the parks to the legislature, national and local leaders, and the public at large. h. Open and maintain clear communications within the park service, and among related public agencies, private institutions, and the public (nomenclature, terminology, documentation, lines of communication).
4. Planning functions	Plan the management, development, operation, organization, and control aspects of park programs (including the integration of all the above).

(1) **Decisionmaking functions.** Decisions must be made concerning activities to be carried out, individuals to whom they must be assigned, budget to be allocated, and control of the various activities in terms of their compliance with overall policy standards and the achievement of the goals of the program.

(2) **Major program functions.** Five major groups can be described, which together encompass the major activities of park programs and represent the execution of park management and development plans. These functions include protection of visitors and resources, development of facilities for public enjoyment and other services of the park, educational activities for public enlightenment, maintenance of facilities and installations, and administration of all management and development activities.

(3) **Key associate functions.** These functions are closely associated with the eight associate functions which form the pillars of the program. These more specific functions deal with the roots of the work to be carried out, such as understanding the resources of the park. The program requires legislative and policy guidance and analysis of land tenure and acquisition problems. The image of the park organization and its various projects must be presented clearly and accurately to the public, as well as to those levels of decision-making which affect the park program. As organizations grow in size and complexity, it becomes apparent that the many aspects of communications among all levels must be given specific attention.

(4) **Planning functions.** To coordinate the above-mentioned functions and assure an efficient route to the objectives of the program, alternative courses of action must be formulated and studied. This requires a planning function which presents to the decision-making function feasible paths to follow in search of the goal. The planning function is closely related to problems within the park area as well as the entire surrounding region, nation, and the international sphere in which the park is found.

Each of the functions has a specific role to fulfill in the overall operation of park programs (see table 2); all are interrelated and interdependent and form elements of the team effort which ultimately plans the management and development of the park.

Each function must be implemented by a trained staff which can be schematically presented in an organization diagram of a park program (see table 3). In four of the major program functions, there are more than one level of staff category including advanced level, requiring university degree training or an equivalent wealth of experience, a medium level, requiring technical preparation, and a basic level, requiring little or no previous training.

The skills required to successfully perform each function can be divided into general introductory skills which are required by all levels of personnel (see Table 4), and specific skills which are required by the particular types of functions at the different levels (see Tables 5 and 6). It should be appreciated that the various classes of skills are generalized and do not pretend to explicitly mention each detailed activity related to park programs.

Table 2. Roles of the individual functions related to national park programs

1. Management	The manager is the director of a given park unit or project: he is leader of the team made up of staff members of the park and must integrate, coordinate, and stimulate them to achieve the objectives for which he is responsible. He must deal with agency directors as well as local leaders, and must present and defend the image and program of the park.
2. Protection	The park ranger (guard) is responsible for the protection of park resources and park visitors. He deals directly with the visiting public, introducing them to the park and guiding them to enjoy their activities in ways compatible with overall park policy. He spends a great deal of his time in the interior of the park where he represents both law enforcement as well as the key source of information to visitors.
3. Landscape architecture, architecture, and civil engineering	The park landscape architect, architect, and engineer are responsible for the design and construction of park facilities and infrastructure. They must work directly in the field and produce installations compatible with the environment.
4. Interpretation, art, exhibits, and museum technique	The park interpreter (naturalist or guide) and closely related specialists in art, design, and construction of exhibits, and in museum technique are responsible for the educational aspects of the park program. They "interpret" the values and features of the park and present them to visitors in language and manner which can be understood and appreciated at all levels.
5. Maintenance	The maintenance specialist (maintenance engineer) is responsible for the proper functioning and upkeep of the various buildings, grounds, roads, trails, and other installations and facilities of the entire park.
6. Administration and accounting	The park administrator (administrative officer) and the specialists in accounting are responsible for the overall operational aspects of the park management and development plan. They work closely under the manager and report to him on the progress of the projects being operated, and the overall financial, personnel, and budgetary aspects of the program.
7. Ecology	The park ecologist is responsible for investigations related to management problems and the park interpretation program. He represents the natural resources found in the

8. Sociology and psychology

9. Economics

10. Botany, zoology, geology, anthropology, archeology, history, marine biology, oceanography, etc.

11. Law and resource policy

12. Land tenure and acquisition

park and guides the management program in relation to the adequate treatment of the park's natural values. He spends a great deal of time in the field analyzing resource problems, consulting other members of the staff, and in advising the manager on aspects related to overall resource management.

The park sociologist and psychologist (recreation specialists) are responsible for the investigations related to the users of the park. They represent the recreationists and other users, and guide the management program in relation to the treatment of park users. They must spend a great deal of their time in the field analyzing park users, consulting other members of the staff on recreation and user problems, and in advising the manager on aspects related to overall user management.

The park economist is responsible for investigations related to the allocation and utilization of the park's resources by various types of park users. He represents the aspects of resource allocation and guides the management program in relation to the adequate understanding of resource and user management. He spends most of his time gathering and analyzing information on park resources, user behavior and preferences, and ecological constraints and budgets, and guides the manager on alternative plans of action to meet the goals of the park. The park botanist, zoologist, geologist, anthropologist, archeologist, historian, marine biologist, oceanographer, or experts in other specialized fields related to the specific resources of a given park are responsible for the investigation of particular aspects of the park which are required for support of the park management and interpretation programs. They spend the majority of their time in the field working directly on the problem(s) to be studied, and guide the major program functions and the manager on aspects related to park management and development.

The park lawyer and resource policy specialists are responsible for the investigation and support of these aspects of the park management and development program. They guide the major program functions and the manager in the legal and policy aspects of park planning, and work directly on controversial issues related to the overall park program.

The land tenure and acquisition specialist is responsible for the study and analysis of land use within and around

13. Public relations

14. Communications

15. Planning

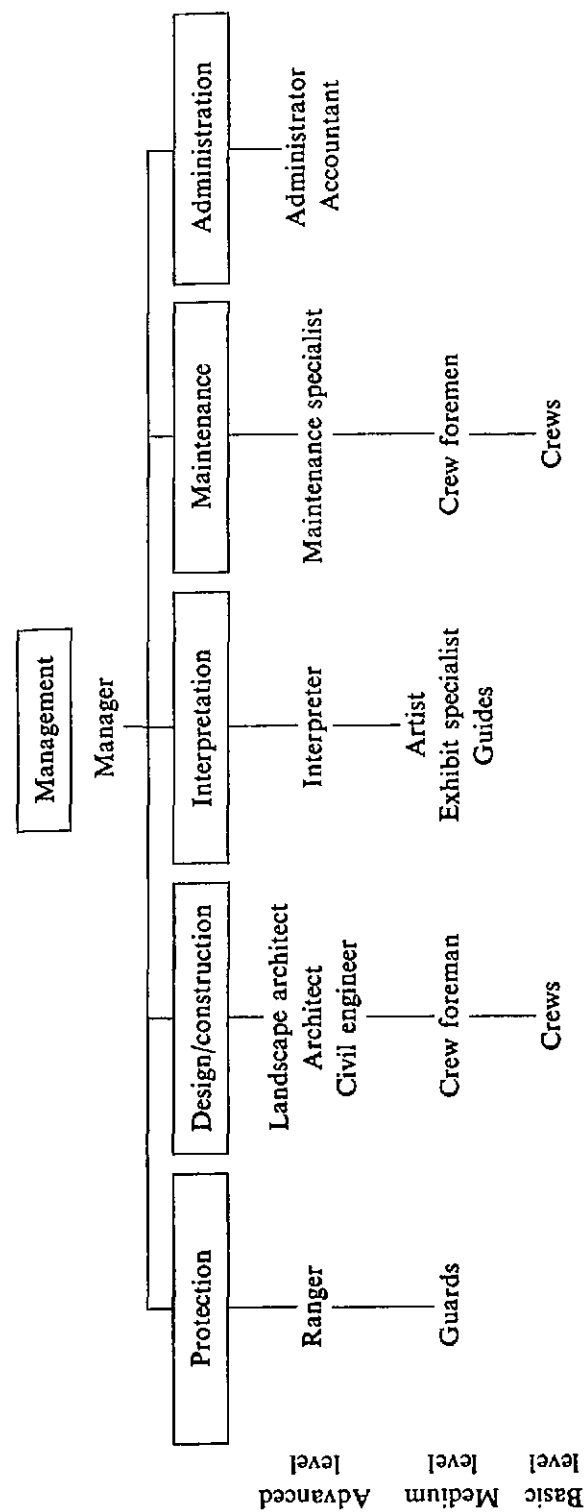
park boundaries. He works in connection with the establishment of new parks and with the annexation of park areas, and guides the manager and major program functions on the feasibility and methodology for acquiring lands for the park program.

The public relation specialist is responsible for drafting and issuing information to the public, primarily outside the parks, on the overall park program. He prepares materials for publications for general distribution, and aids in the design of speeches and materials which project the image of the park and the park program to other agencies, the media, and the public.

The communication specialist is responsible for the overall aspects of communications between and among all levels of the park organization. He works specifically on communication problems within the park and between the park staff and the public, with very close working relations to the interpretation function. He studies the effectiveness of park educational programs, of the image projection of the park program, and of the efficiency at which ideas and innovations are made within the park's organization.

The park planner is responsible for the planning of park management and development projects and programs. He supports the manager with methods and techniques for planning all aspects of the program, assists in coordinating the major program functions, aids in drafting projects and budgets, and generally assists the specific planning efforts in the field. He must work with all other members of the staff and maintain a day-to-day relationship with all facets of the park program. (While he is not directly responsible for making planning decisions, he designs and presents planning alternatives for the development of the park in line with the objectives laid down by the manager.)

Table 3. Schematic diagram of staff required to implement the functions of an individual national park program



Staff assigned to the individual park unit, to regional or national offices, or on loan from universities or other institutions as necessary, according to the site and the development phase of the programs

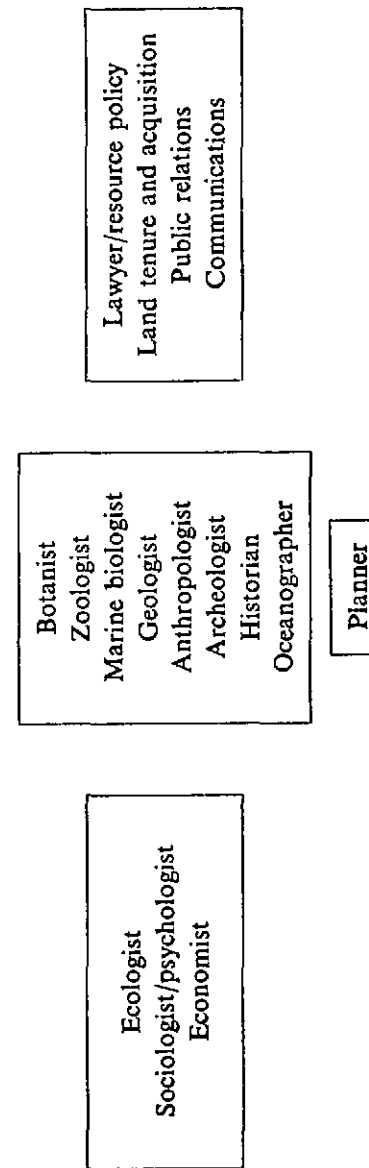


Table 4. General introductory skills required of all personnel in park management programs¹

Park history and philosophy
Public speaking and debate
Report writing
Management and decisionmaking
Policy, law, and regulations
Public relations
Planning and budgeting
Ecology
Principles of the management of park resources
Team planning methodology
Park service organization
Objectives and general program of the park service

According to the point of view presented here, all personnel, regardless of level, have required skills. All staff require a preliminary set of skills to carry out even the simplest tasks in a manner which is meaningful to the staff member and useful to the program. The skills become more sophisticated at the higher levels of responsibility and culminate at the management and planning functions. The staff of the major program functions are specialized according to the particular functions which they perform. They must possess the same fundamental skills, however, as the manager and planner in order to fully integrate the planning process and work as a team. The staff of the associate functions are even more specialized and need not normally be related to executive tasks, but they, too, must be prepared to integrate and influence the planning process and work as elements of the park planning team. The medium and basic levels offer experience to the team and integrate the planning process when their particular tasks are being treated or affected. The skills to be included in the program of national parks are, therefore, widely varied and include different levels of depth and sophistication. As can be appreciated from the tables, there is considerable overlap of skills among the functions. This avoids the creation of technical enclaves of individuals who alone can treat specific problems, and also supports a common language within the team. Most of these skills are already being requested by the more advanced park agencies, and, in some cases, have been utilized as individuals or on some form of planning teams for many years.

¹ Levels of proficiency variable according to the function and level of personnel.

Table 5. Categories of specific skills required by advanced level personnel in park management programs

	University degree or equivalent	Secondary or technical training	General introductory skills (see table 6)	Leadership	Advanced park planning	Advanced decisionmaking	Advanced budgetary methods	Advanced policy	Key related fields ¹	Intermediate/advanced resource management and economics	Intermediate sociology/psychology	Survival, rescue, emergency procedures	Law enforcement, regulations	Patrolling techniques/problems	Techniques of meeting & handling public	First aid	Standards/norms for park design, construction, and maintenance	Sensitivity to ecology and the landscape	Maintenance methods/problems	Principles of interpretation	Communications, audiovisual aids	Exhibit design & construction	Advanced applied techniques of interpretation	Park administration methods/problems
1. Management	x	x	x	x	x	x	x	x	x	x	x				x		x						x	
2. Protection	x	x	x	x					x			x	x	x	x	x								
3. Design/construction	x	x	x	x					x						x		x	x	x					
4. Interpretation	x	x	x	x					x	x					x					x	x	x	x	
5. Maintenance	x	x	x	x	x				x						x	x	x		x					
6. Administration	x	x	x	x	x		x		x						x									x
7. Ecology	x	x							x						x									
8. Sociology/psychology	x	x							x						x									
9. Economics	x	x							x						x									
10. Botany, etc. ²	x	x							x						x									
11. Law/policy	x	x							x						x									
12. Land tenure/acquisition	x	x							x						x									
13. Public relations	x	x	x						x						x				x	x	x			
14. Communications	x	x							x						x				x	x	x			
15. Planning	x	x	x	x	x	x	x	x	x	x	x	x			x		x							x

¹ Such specific fields as geology, marine biology, agrarian reform, and resource policy, which are fundamental to the assigned tasks, and vary from park to park and country to country.

² Zoology, marine biology, geology, anthropology, archeology, history, oceanography, etc.

Table 6. Categories of specific skills required by medium and basic-level personnel in park management programs

	Secondary or technical training	Primary school	Medium-level general introductory skills	Basic-level general introductory skills	Leadership	Survival, rescue, and emergency procedures	Intermediate law enforcement/regulations	Intermediate patrolling technique problems	Techniques of meeting and handling public	First aid	Standards/norms for park construction/maintenance	Principles of interpretation	Communications/audiovisual aids	Exhibit design/construction	Collection/classification/storage of specimens	Intermediate applied techniques of interpretation	Art/displays/murals
<i>Medium</i>																	
Park guard	X	X		X	X	X	X	X	X	X							
Construction crew foreman	X	X		X	X						X	X					
Artist	X	X											X	X		X	X
Exhibit specialist	X	X									X	X	X	X		X	
Museum technician	X	X										X	X		X	X	
Park guides	X	X		X	X	X	X	X	X	X		X	X				
Maintenance crew foreman	X	X		X							X	X					
Accountant	X	X		X							X	X					
<i>Basic</i>																	
Construction crew	X	X		X							X						
Maintenance crew	X	X		X							X						

Recent training and development opportunities

Opportunities for the training and development of staffs have been offered for more than one-half a century in those countries where national parks have a long tradition. In the majority of countries, however, training and development of personnel is a recent preoccupation.

Regional schools have been initiated to prepare personnel for work in wildlife and national parks. The College of African Wildlife Management, at Mweka, Tanzania, has been training English-speaking personnel since 1963 in the skills particularly related to East Africa. By July 1971, 329 individuals had studied at the college, coming from more than 12 countries including Latin America and Asia. The Wildlife School, at Garoua, Cameroun, has recently begun to train French-speaking personnel primarily in relation to West Africa.

Both efforts have dealt with a medium, ranger-level staff, to enable governments to protect and manage Africa's wild lands as quickly and as carefully as possible.

The Argentine Park Service has for several years been training medium-level personnel at their school in Bariloche, at Nahuel Huapi National Park. Supported by the recommendations of international and regional meetings, and in close collaboration with FAO, the Government of Argentina and the United Nations Development Programme are considering the amplification of the school to also serve Latin American neighboring countries of the subregion, and perhaps eventually of the entire region. It is expected that the amplified school will soon incorporate courses for different skills and levels, beginning with park guards and eventually including other levels of staff development which do not require direct contact with university facilities.

Several national efforts in Latin America have led to the creation of permanent and continuous training opportunities. In Ecuador, the National Forest Service and UNDP/FAO have installed a Ranger School in Conocoto, where medium-level personnel are prepared to work in forests and parks.

In Peru and Bolivia, the respective Forest and Park Services, in cooperation with the Forestry Faculty at La Molina, the World Wildlife Fund, UNESCO, and FAO, have offered special short courses for guards who work on the protection and management of the National Vicuña Reserve and the great Manu National Park. In Colombia, the Institute for the Development of Renewable Natural Resources (INDERENA), the National University Forestry Faculty at Medellín, and UNDP/FAO have begun a 2-year medium-level school for forestry technicians in Piedras Blancas. The first class will graduate in December 1972 with 18 individuals, with another 25 expected to terminate in 1973. The Park Services of Costa Rica and other countries of the Latin American region have held courses for both incoming and existing staff on basic aspects of work in national parks. Most of these courses are carried out according to the needs as new parks are manned, and as budgets allow for the employment of adequate personnel.

The universities in many countries of Latin America, have been offering opportunities to university students in forestry, agronomy, and natural sciences to study matters related to wildlife and park management. In Brazil (Viçosa), Chile (Valdivia), Peru (La Molina), Uruguay (Montevideo), and Venezuela (Merida), it is now possible to place emphasis on national parks and wildlife within the forestry-degree curriculum.

Special courses offered on a one-time or periodic basis have been presented throughout the region by national, regional, and international bodies:

1. The U.S. National Park Service, along with the Park Services of Canada and Mexico, the Universities of Michigan and Washington, and the Conservation Foundation, has been offering an annual "International Seminar on Administration of National Parks and Equivalent Reserves" since 1965 and has received 221 individuals from 70 countries throughout the world. The course of four weeks duration covers all major aspects of park management.

2. In addition, the U.S. National Park Service operates three training centers for the preparation and development of its own staff and for invited professionals from other countries. Some 75 courses, seminars, and workshops are offered which are specially geared to the continuous and progressive improvement of staff proficiency in such

aspects as leadership, ecology, operations, planning, administration, interpretation, communications, and the many phases of management (U.S. Department of the Interior).

3. The U.S. Forest Service at its Institute for Tropical Forestry in Puerto Rico has offered courses to more than 200 individuals from some 25 countries around the world since 1953. The participants have dealt primarily with general forestry matters, but major attention has also been placed upon conservation principles and integrated use of forest lands, including wildlife and wilderness management.

4. Since its establishment in 1965, the Latin American Committee on National Parks (CLAPN) has sponsored and carried out many different forms of staff training and development opportunities. Special courses in 1969 and 1971 treated problems related to the management of natural areas in relation to the development of tourism. Other opportunities such as the Working Sessions of the Committee in Medellin, Colombia, in 1971, have always included elements which serve as training experience to the participating personnel.

5. During the past two decades the Inter-American Institute of Agricultural Sciences, through its Forestry Sciences Department (Turrialba, Costa Rica), has offered special course work to postgraduate, masters-level students wishing further training in conservation. Through the postgraduate-thesis exercise, several Latin Americans have specialized in national park and reserve management (Baptista, 1967; and Boza, 1968). In addition, the staff of the Institute have offered short courses and seminars on conservation and wild-land management to universities and organizations throughout the region.

6. The Organization of American States (OAS) has given different types of courses in fields related to conservation. Several new programs in conjunction with the University of Michigan gave postgraduate training to Latin Americans in resource evaluation and management, which includes reference to parks, wildlife, and recreation.

7. In 1966, the Argentine Park Service offered an Inter-American Course on National Parks and Conservation and Protection of the Renewable Natural Resources of the Americas, which dealt with conceptual as well as practical matters throughout the Americas.

8. FAO, in conjunction with the Rockefeller Brothers Fund and nine of the forestry and agronomy faculties of Argentina, Brazil, Chile, Paraguay, and Uruguay, has initiated a series of training and development workshops for professors of wild-land management. The first workshop was realized during a 9-week period (January-March) in 1972 in Puyehue National Park, Chile. Professors from the different schools, together with professionals from neighboring national park agencies and consultant/experts, worked in the field and in an atmosphere of intensive dialogue on the subject of planning national park management and development. The program continues with support to the libraries, curricula, and research of the participating universities.

Special study tours have been arranged for individuals wishing to observe, compare, and study methods and techniques in other countries. Such tours, which now number into several hundred, have given park professionals the opportunity to visit and know park programs in Canada; the United States; East, West, and South Africa; Argentina; and Colombia.

From this brief summary, it can be noted that training and development opportunities have been under way for several years. In the Third World countries, particular emphasis has been given to the preparation of a medium-level staff, but university and postgraduate experience has also been realized. Clearly lacking are methods for in-service training of the existing staff of all disciplines and levels, as well as the broadening of the staff into the many functions which have yet to be instituted into park programs. In particular, the entire areas of interpretation (including art, exhibits, and museum technique), as well as the skills of management, protection, maintenance, and administration, have yet to be developed.

Future requirements for personnel

Having given consideration to the types of skills required for future park programs and to the kinds of opportunities available, it is necessary to contemplate the possible numbers of personnel which will be required in the future.

First, several assumptions must be considered: demands for tourism, recreation, and other services from park lands will continue to grow; pressures for more careful utilization of all natural resources will increase; pollution and contamination of the environment will augment and continue for some period; the landscape will continue to be altered at ever-increasing rates, giving rise to greater competition for unallocated wild lands; and there will also be increasing competition among public agencies for budgets and for top-quality personnel.

These types of pressures upon park programs make explicit that the procurement of lands and budgets, and the conservation of lands already managed as parks will require more carefully prepared and justified proposals and programs. Future projects will require analytical considerations in relation to regional and national development policies. Given that national park programs can make the transition into the 1970's and 1980's, through the training and development of staffs capable of fulfilling the tasks set out by the governments, and capable of influencing society regarding the importance of national parks and environmental conservation, we can look to the future with optimism.

It is difficult to predict the future requirements for staffs on a world, regional, or, even, a national basis due, in the first place, to the lack of country strategies which reflect their plans for future park activities. A national park strategy would program over future periods the new parks to be managed and developed, the increasing intensities of management to be given to each, the expansion of facilities, the research projects, and other aspects which require the allocation of budget and manpower. Such expectations could be quantified by fiscal years or other planning periods, and assist the park director in forecasting his needs in relation to the lead time he must allow for the training and development of a staff. Park managers, for example, may require a university degree plus additional training from the park agency. It is therefore necessary to anticipate the placement of a manager on the job by approximately 6 years.

Given national strategies for most countries of a particular region, it would then be possible to analyse regional requirements, and to program those phases of training and

development which require regional and international cooperation and assistance. Regional strategies could be developed and reviewed by such bodies as the National Parks and Wildlife Committee or Working Parties of the Regional Forestry Commissions of FAO, and by such regional committees as the Latin American National Parks Committee (CLAPN). A coordinated basis could be developed for the establishment and operation of regional schools, university curricula, study tours, and international workshops.

The first step in the development of strategies is already being taken by the park agencies of Costa Rica, Colombia, and Chile in cooperation with an FAO regional project; they are studying priorities and plans for their future national systems of parks and reserves. The study includes the analysis of budgetary and manpower requirements during future fiscal periods. The park system is to include sites which cover the major interests of the nation, including samples of the countries' ecological zones, historical areas, and scientific, cultural, and indigenous treasures.

If we were in possession of regional strategies which include the numbers of staffs required by subject-matter fields, and by time periods, it would be possible to reach conclusions and derive projections on world levels.

A priori, it is clear that most developing countries lack trained national staff in the fields of management, design, interpretation, and planning. Assuming one manager is needed per major park, approximately 1,000 managers will be required for the already existing parks of the approximately 100 Third World countries. Assuming that a minimum of two design specialists, two interpreters, and two planners are needed per park agency, about 200 of each are required. Most parks require a two- or three-fold increase in guards and interpretative guides, which would total into the thousands. Most park agencies require the support of specialists in key associated subjects, such as biology, geology, and archeology, who in early stages may be loaned from other institutions until the park agency has need of their full-time services and finds a sufficient budget. Increasing land-use pressures will require greater support in the fields of law, policy, land tenure, and acquisition. Adding needs for maintenance and construction crews, it can be estimated that a minimum of approximately 1,000 managers, 600 designers, interpreters, and planners, 800 support specialists in associated fields, 10,000 guards and guides, and 5,000 foremen, construction, and maintenance crewmen will be required during the next decade to treat the existing national parks of Third World nations. With some continued increase in the number of parks, as well as in the intensity at which existing parks will be managed in the future, it is perhaps within reason to double these estimative figures in order to have a realistic view of the training task which lies ahead in the next 25 to 30 years.

Methods for staff training and development

Several types of methods for staff training and development are in use and warrant further application and testing:

1. **University degree programs** are geared to (a) wild land, national park, recreation, and wildlife management, and deal directly with managerial, planning, and develop-

ment activities; or (b) architecture, landscape architecture, biology, geology, law, and engineering, among other related fields, which do not deal directly with problems of park management, planning, and development, but are intimately related to and required for the overall work of park programs. The employment of this method requires a great amount of leadtime and anticipation is often confined to traditional disciplines, but offers solid preparation in the fundamental materials.

2. **University special courses** are geared to (a) offering specialized training for land-management-oriented students; or (b) acquainting students from related fields on the work of national parks. These courses can be presented on either (a) the pregraduate level for students from land-management-oriented and related fields, for purposes of either specialization or generalization of focus, or (b) the postgraduate level for professionals from any field wishing to specialize in preparation for work in national parks. This method can be employed with intermediate leadtime requirements, is flexible, and gives solid fundamental preparation for a wide variety of staff specialists.

3. **Park agency courses** are geared to the specific needs of the program and can serve to (a) introduce new staffs to the park program and to the fundamental skills required to fulfill the functions assigned to them; or (b) improve the proficiency of the existing staff in the skills required for today's and tomorrow's park programs. In addition, such courses can serve to prepare staff members for transfer to other functions and to new sites. This method can be employed in response to extremely short, as well as long-run, needs, and can be geared to practical considerations deemed most relevant by the agency.

4. **Combined university/park agency/interagency courses** can deal with specific training needs related to such aspects as regional planning, tourism, rural development, and education. Such courses combine the expertise of the several agencies to focus upon common problems and at the same time attempt to transfer and multiply the skills of their individual staff members through contact with those of other related organizations. This method can be employed to deal with problems which the park agency alone cannot treat.

5. **International and regional courses** are geared to deal with problems of common interest to many countries. Normally these problems can best be treated by broad participation and can be more economically addressed on multinational rather than national bases. In such cases as the International Seminar on Administration of National Parks and Equivalent Reserves, multinational utilization of these facilities not only brings considerable economy to the nations by avoiding costly replications, but also increases benefits from the participants' association with a staff and an agency having long experience. This method is responsive to local time- and problem-oriented considerations, and avoids major investments when local resources or demands do not justify national courses.

6. **Study tours** are designed to carry staff and students to sites where activities and individuals of special interest can be found. Special attention is given to problems and activities which can best be observed and studied *in situ* with the experts in charge. International feedback can be obtained as well as the creative inputs from both the visitor and the visited. This method can be arranged on a flexible and individual basis to study items of specific interest which cannot be adequately treated locally.

7. **Workshops** are designed to offer the opportunity to give concentrated attention to a given set of problems to a carefully chosen group on a team basis without a highly structured format. Workshops differ from usual meetings, seminars, and courses in their informality, intensity, diversity, and depth. They normally constitute a profound group-living experience, contain few papers *per se*, and are noted for their lack of formalized hierarchy. This method can adapt to local time considerations, and is useful for multidisciplinary groups and all levels of staff, where intensive, in-depth dialogue as well as methodological experience on problems of local interest is required.

The training and development of the staff to fulfill the many functions of a park program will require most of these general methods. For most advanced functions, university-degree programs are required, but where such do not now exist it will be necessary to work with available, closely related faculties or other training opportunities, such as ranger and technical schools, in order to prepare the necessary personnel. Where such fields as landscape architecture, interpretation, and park management are not currently being taught, it will be necessary in some cases to send nationals on scholarship to other areas where such opportunities exist, or to organize international or regional courses, or workshops to reorient local personnel along the most practical lines possible.

In cases where courses by the park agency cannot as yet be adequately supported, it may be necessary to work at the subregional basis and pool both national and international resources. Where few or no examples of managed and developed parks exist, or where it is useful to compare management practices, it will be necessary to send employees abroad on study tours. This is also important when the park agency feels the need of feedback from other professionals. When the park agency staff wishes to share its experience, it, in turn, may find it useful to invite study tours to its parks.

Specific problems of interest to several nations can often stimulate productive subregional sessions such as the "First International Conference on the Conservation and Utilization of the Vicuña" (Peru/IUCN/WWF/FAO) held in Lima, Peru, in 1971. Other technical conferences on specific topics which receive in-depth treatment can be useful as problem-oriented areas of work become more defined, such as international-boundary-park management, savanna-habitat management, and the management of tourism and recreation in natural areas.

New techniques and methodology can be presented and tested in the field through workshops. Such programs as the FAO/University Project on Wildland Management was able to cover the fundamentals of park planning and help several hundred future professional land managers from five countries within a 1-year period.

In order to guarantee future and continuous formation of the staff at all levels for a growing national park program, it is important that the various enumerated methods give rise to the development of strong national institutions. While concepts of disciplines and academic fields are involved, the key principle is that of function. Different universities and countries utilize different nomenclature for given tasks and orientations. Stages in the development of parks and park institutions will dictate the organizational aspects of the program: in early stages, one individual will cover several functions, whereas later on, the individual staff member will concentrate and deepen his attention to one function or to elements of particular functions.

It is necessary that park agencies collaborate closely with universities, training schools, and other organizations which are related to the preparation of park staffs, to assure that the philosophy, criteria, and techniques being taught conform to the realities of park-management programs, and that the preparation of the staff relates to future requirements, in terms of function and time considerations. Naturally the reverse is true in that the university will wish to bring new and modern techniques to the attention of the park agency.

Materials for staff training and development

The outstanding dilemma for staff training programs in the developing countries is the lack of functioning of national parks which demonstrate according to internationally accepted criteria the rational use, benefits, costs, methods, and techniques associated with such areas. There is a general lack of models of excellence from which to draw personnel for use in new parks, and to which to send a new staff for in-service training. Therefore, the teaching materials derived from operating national parks which demonstrate all of the functions discussed above are only partially available.

Written materials on basic park management principles, techniques, criteria, and norms are only partially available in the languages of Third World countries, and even if the existing materials from developed areas were to be translated, they would serve only to the extent that they are adjusted to the problems and situations found in the developing areas.

Methods for the treatment of such aspects as the interpretation of park values, the inventory of new areas being considered for planning as future parks, and the criteria for selecting sites to form a national park system have not been formulated and tested in Third World countries. The importation of methods from other regions can again be valid only in terms of the adjustments made to fit local situations. While it may very well result that extensive testing will demonstrate the existence of generalized fundamentals and principles which are useful and relevant throughout the world, the only safe assumption at this stage would appear to be that the variation of local and regional factors is significant, and locally founded methodology should be sought.

While on the one hand it is necessary to respect local variation, it is important that all materials on national parks dealing with criteria, norms, policy, and legislation be translated and circulated (FAO, 1970; IUCN, 1971; and Kropp, 1971). Moreover, local variation should not imply divergence from the basic overall philosophy of parks which exists throughout the world as witnessed in the First World Conference on National Parks, and once again in Yellowstone 10 years later.

A university professor or a park agency officer in developing countries can only with difficulty, and often only by translating languages, inform himself of activities, research, and problems in other areas of the world. The publications of the IUCN along with reports of FAO and UNESCO, some regional bodies, and national journals are recently disseminating information to professionals in local languages. As a corollary to this, there is a great lack of writing on subjects related to national parks. Aside from general descriptive, philosophical, or policy-oriented articles, authors are only recently beginning to publish on

matters related to actual management and development problems (Hofmann and Ponce del Prado, 1971; Miller and von Borstel, 1968; and Pierret and Dourojeanni, 1967), and present textbook treatment of conservation subjects (Eichler, 1965-66).

Added to these problems is the normal lack of communication among staff members within and among park agencies. Individual park managers are seldom in contact with their colleagues in other corners of the country and the world. They cannot exchange ideas on management problems in different ecosystems as would so often be convenient. Park guards tend to be familiar only with their own districts. Many problems are considered unique, when, in fact, they are common throughout the country or the continent, and, conversely, many problems are considered normal when they are, in fact, unique to a given area or situation. In many cases, a carefully organized workshop among colleagues can lead to solutions without further study or major expenditures.

Materials which describe park programs and plans are seldom published either for lack of experience or for the high costs of publication. There is, therefore, a lack of teaching materials to be used within the agency and to inform other organizations and the public of their program.

Among international assistance projects in the study of park management, planning, and development, few opportunities are offered for the formulation of teaching materials based upon the experience gained. Most of this experience is only recorded in consultant reports or remains in the memories of the few individuals which were associated with the work.

Proposals

Based upon a broad interpretation of the kinds of services produced by national park programs, it is proposed that park agencies analyze the trends for the use of such services in terms of future time periods. From this information, future management requirements can be deduced, and the needs for future staffs forecasted. A document on "requirements for future staff training and development" can then be prepared, which can describe future park activities, the expected deficit in manpower, and the needs for each type of personnel by 5-year periods on into perhaps the next 30 years.

It is proposed that an organization of world scope prepare the model, format, and instructions for the above study in order to guarantee homogeneity of data and results. Following review by other agencies and sample countries, the materials can be distributed to each national park agency, and within some given period the study can be carried out and the results returned for analysis by regions. A final document can be prepared for presentation at a future meeting of park leaders. (It may be useful to coordinate the formulation of the model with the FAO Latin American Regional Project on "Park Systems Planning" to benefit from that experience.)

In order to train and develop advanced level personnel, it is proposed that the park agencies stimulate local university faculties of forestry, agronomy, and natural sciences, to create and strengthen professional curricula in fields related to park management, development, and planning. Specific curricula consisting of two or three pregraduate courses should be created to acquaint students of landscape architecture, civil engineering, archi-

itecture, biology, geology, law, and other associated fields with the philosophy and methods of national park management. In addition, postgraduate courses, seminars, and workshops should be created which can offer opportunities for park professionals to specialize, and for professionals from associated fields to broaden and deepen and "convert" their basic training for work in parks.

It is proposed that international and regional organizations and the banks and foundations in cooperation with national park agencies establish and support subregional and regional schools, where for reasons of economy and scarcity of a staff, national programs cannot be adequately supported. These schools should specialize in the preparation of a middle-level staff. By locating the schools in rural areas near actual field sites of a host park agency, practical training can be given about methods and problems which directly relate to the work being carried out by the agencies. Following a short period during which priority is given to the preparation of guards and guides, the staff of the regional school should devote some emphasis to the preparation of advanced-level individuals from each park agency as "training officers." These officers (the protection specialists to train guards, and the interpreter to train guides, etc.) should be prepared to train medium- and basic-level staffs within their respective countries on a dynamic and flexible basis according to the needs as they arise. The regional school should then begin shifting emphasis to the preparation of maintenance specialists, administrators, artists, and exhibit- and museum-technique specialists, and also to sponsor refresher and even more advanced courses for training officers and other mentioned fields.

Most park agencies face the problem of a heterogeneously oriented personnel which receives training in any number of institutions. It is proposed that park agencies, in combination with whatever cooperative program necessary, begin to offer training programs for all existing and incoming staffs. The "general introductory skills" presented in table 4 would give all staff members a general familiarization with methods and problems of handling resources and people, along with background on park history, philosophy, and objectives. Such a course would minimize the difference between levels of personnel. It would counter the tendency to create, on the one hand, an elite corps which has power of making decisions and control of planning, and, on the other, a basic group which, more often than not, does not understand nor have access to the objectives and methods of their own work.

It is proposed that park agencies and related university faculties and other organizations sponsor interagency cooperative courses, seminars, and workshops at the national level, to study, discuss, and review key problems related to the role of national parks and wild lands in regional planning and rural development. Emphasis should be given to inter-agency conflicts for use of the land, and to conflicts arising from the manner in which they utilize lands bordering each other. The result of such meetings could be to develop a group of key leaders from many agencies, all of whom have their focus upon problems of rational land use; this could begin a trend toward the formation of national criteria on environmental conservation.

Given the development of an interagency, multidisciplinary group of individuals concerned about rational land use and the environment, it is proposed that the park agencies foment the establishment of an interagency committee which will serve as a forum for dialogue

and the cooperative analysis and planning of rural land use. While such types of committees have been tried often with little realized success, these efforts were not normally based upon a preperiod of staff development, and did not later work on problem-oriented activities where conflicts would actually be resolved and action be taken according to their recommendations.

In conjunction with the formulation of national strategies and the development of various staff training and development programs, it is proposed that park agencies work toward the drafting of an agency policy on "staff training and career development." Such a policy should include guidelines for the formation of leaders and managers, for the preparation of personnel in major and key associate fields, and for the development of a flexible and dynamic hierarchy.

Given the paucity of materials on park policy, philosophy, and legislation available in the languages of the Third World countries, it is proposed that international organizations (governmental and nongovernmental) and foundations consider means by which a "translation and publication office" can be supported within some existing international or regional agency. These materials could be received from all over the world, translated into several key languages, published, and sent to all park agencies, universities, and related bodies. Some form of subscription should be required to help defray the costs of operations. If the system is found to be useful, future responsibilities could be expanded to include articles on technical managerial and planning topics.

It is proposed that consideration be given at some future world meeting, or at regional conferences, to the problem of distributing written materials from national agencies, universities, and professional individuals. Attention should be given to the selection, support, and strengthening (or establishment) of periodic journals which would publish articles in key languages on issues and methods related to park programs. The "office" cited above could serve to translate and pass articles on to journals in other language areas, for republication. In addition to articles, it is necessary to explore methods to financially assist park agencies and universities to publish greater numbers of copies of outstanding management plans for particular parks, of teaching manuals, and of general information about national park systems.

In order for the training and development effort to attain adequate support from national governments, it is proposed that park agencies and cooperating national organizations establish close contacts with ministries of education and related educational and scientific bodies. Coordination of plans for staff training, scholarship requirements, seminars, and all types of international meetings will offer benefits through the channeling of international scholarship and travel funds, and in the facilitation of study arrangements which require cabinet-level approval. Finally, staff training and development must form an intimate part of total national education and be considered by governments and planning boards to form a vital link in the rational use of natural resources and conservation of the environment.

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DISCUSSION

Dr. Simon Max Franky (Chairman): Destruction of natural resources is advancing all too rapidly, and nowhere more so than in the countries of the Third World. A grave responsibility rests on the park personnel in these countries and I feel honored to preside at a session where we shall mainly be discussing the training of that personnel and giving the opportunity to representatives of those countries to voice their problems and needs. Training is, of course, the key factor in the struggle to obtain support for conservation, and it is those who are being trained today who will be carrying the struggle forward to success when we, who are assembled here, are gone.

Dr. Kenton R. Miller (Author of Paper 27): The two points I would pick out for emphasis are, first, that the management function, which covers the establishment of policies and the ordering of priorities, is of critical importance; because the level of requisite skills is positively correlated with the expertise of the individual agency, the numerous existing training programs operational in various countries and continents, which are reviewed in my paper, still need to be extended to meet future needs. But secondly, we simply do not have sufficiently definitive manpower projections. One of the most immediate and pressing tasks, therefore, is for these to be elaborated, especially for the 100 or so countries of the Third World for which I have only been able to provide very rough estimates of future requirements.

Andrew Allo Allo (Panel Member): I would like to give a brief review of the establishment of the French-language College of Wildlife Management, the *Ecole pour la formation de*

spécialistes de la faune, or *Ecole de Faune* for short, established in 1970 with 18 students coming from 5 countries. It was first discussed at the IUCN General Assembly at Nairobi 1963, elaborated at meetings held at Lomé and Fort Lamy, and finally set in train by a project under the UNDP covering its construction at Garoua in Cameroun. Since 1971, it has expanded until, with the beginning of the third course on August 1 this year, it now comprises 35 students from 10 countries, 15 in the senior and 20 in the elementary course. Altogether, the school has now handled 75 students from 13 countries and its capacity has been increased to a maximum intake of 52 students per year. The curriculum now covers the principles of ecology, biology and natural history, wildlife and pasture management, use of firearms, and mechanical and civil engineering, and a general idea of the administration, economics, and public relations involved in wildlife management. Future aims include extending the training to the university level, so as to obtain the necessary qualified personnel to deal effectively with policy decisions and ecological research. Hopefully, this will also include giving opportunities for advanced students to undertake specialist studies on Third World problems in universities abroad.

A. J. Mence (Panel Member): It is implicit in Dr. Miller's paper that national parks should occupy an essential niche in the philosophies and planned activities of man in relation to his environment. We have still a long way to go and should recognize the limitations which in each local case are operating to hinder progress. The Mweka College of Wildlife Management, to which I belong, was conceived at the IUCN/CCTA-sponsored symposium held at Arusha (Tanzania) in 1961, and established by the Government in 1963, with the considerable and generous assistance of a great variety of national and international agencies. The national parks, whose field staff we are training, are mostly at the stage categorized in Paper 10 (Session V) as "early management" or, occasionally, in transition to more intensive development; but in all cases their finances are restricted. Against this background, the principles we recognize in our scheme of training are, first, to ensure that our students will be capable of establishing and maintaining an effective administrative infrastructure in their parks; for, as pointed out by Professor Harroy and Conrad Wirth in Session II, unless the parks can be seen to work efficiently, they are easy targets for competing demands for the lands they occupy. Second, in the lack of facilities, in most of the countries concerned, for establishing the ideal management teams described in Paper 27, the relevant functions will have to be performed by the available staff, probably consisting largely of our students. So the curriculum must contain a strong element of ecological understanding as well as exposure to a wide spectrum of the practical skills necessary for proper management and for conveying such understanding to their own staffs and the public both in and outside the parks.

To achieve these imperatives, we try to ensure that our instructors include a number who have themselves been practicing park managers and, also, that classroom training is, as far as possible, tried out practically in the field—by courtesy of the East African national park authorities and through activities whose relevance can be fully interpreted by the instructors. In recognition of these wider development requirements, we have an agreement with the University of Dar es Salaam that a first-grade diploma from Mweka rates as a university entrance qualification for a natural-science-degree course. We are also able to offer a limited number of specialist courses ourselves, including increasingly important

orientation courses for postgraduates entering the field of wildlife management from other natural science disciplines.

Dr. S. Ross Tocher (Panel Member): Paper 27 lists among the international training facilities the seminar on park administration based at the University of Michigan, which has developed from a short course based on the viewing of better examples of U.S. national park management programs, to the present formula of brief onsite case studies around which discussions are directed. The seminar is designed for those who occupy the top management positions in their country's park systems. As such, they have been representative of many professions: foresters, agronomists, wildlife biologists, historians, archeologists, engineers, and lawyers. The aim each year is also to select participants from every continent and culture and to expose them to a wide variety of the environmental situations encountered by park managers; thus a typical seminar circuit covers ocean-shoreline, alpine-forest, prairie-grasslands, and desert areas.

The five facets of management to which particular attention is paid are (1) general principles, with special reference to identifying those applicable to all countries; (2) sensitivity toward human needs, again with emphasis on sharing experience; (3) formal or systematic research, the value of which is often not appreciated by leadership-orientated park personnel; (4) tolerance and respect for the momentum and new ideas of the more creative, though often "difficult," minds in the park movement; and, (5) the planning process in which integrative capabilities come into play. There is no doubt that the participant/faculty interaction involved contributes to the growth of understanding, but perhaps the most significant outcome is that while every participant retains and strengthens his own national loyalties, he develops an insight into his own responsibility and the relevance of the parks under his jurisdiction to the whole of humanity.

Dr. Donald Hunsaker (Panel Member): A few remarks about the joint U.S. Peace Corps/Smithsonian Institution aid program developed in the past few years. I am attached as coordinator to the Colombian sector of this program, which backs up INDERENA, the Colombian agency for utilization and conservation of natural resources: we have 20 Peace Corps volunteers, of whom three-quarters work within the National Parks and Wildlife Division. The Costa Rican, Chilean, and some African and Asian sectors of the program are similarly staffed. In addition to regular volunteers, we get a great deal of support from graduate students who enlist for standard 2-year tours of duty and for whom such tasks as the preparation of park master plans, fauna and flora surveys or inventories, and other ecological studies provide excellent thesis projects. Close cooperation with the national and international agencies is, of course, essential, but, with proper planning, this type of aid represents an excellent resource for national parks throughout the world and opportunity for young volunteers in the countries concerned.

Lemuel A. Garrison (Panel Member): The major training centers of the U.S. National Park Service are those named, respectively, for Horace M. Albright, at Grand Canyon National Park, and for Stephen T. Mather, at Harper's Ferry National Historical Park in West Virginia. The former, of which I am Director, is primarily for training new park rangers, all of them graduates and most of them already holding advanced degrees in subjects ranging from wildlife and park management to psychology and behavioral science (which is our euphemism for law enforcement). The current class totals 53 and

will be brought up to 55, after this Conference, when it is joined by Bernardo Zentilli K. from Chile and Seri Vejaboosakorn from Thailand. After 10 weeks with us, the rangers have 4 weeks at a university and finally an 8-month assignment in an urban park (nearly all park visitors come from urban backgrounds and more than half the U.S. parks are urban or historical in character, so this seems appropriate). The training centers also offer short followup or refresher courses of 1 or 2 weeks, and, although we both concentrate on conceptual affairs, policy, leadership, and on-the-job skills, Mather also specializes in interpretation and communication. Up to now, about 1,800 U.S. National Park Service employees have had some training in one or other of the academies, and it is a matter of pride that 2 of the outstanding young park leaders chosen for awards by the Centennial Commission are Albright graduates, and several others have spent some time with us.

J. C. Stormonth Darling (Panel Member): The ranger/naturalist training program established in Scotland is a partnership between voluntary organizations and Government agencies, although the Countryside Commission for Scotland is now taking over the main responsibility from the National Trust for Scotland which initiated the program. The emphasis in our training is on land use and management, because only if rangers can explain this properly will visitors learn of the problems and become more sympathetic to competing demands on the land. Above all, a ranger service must be flexible and adaptable and our service is always particularly glad to welcome visitors from abroad who would like to evaluate the techniques established in Scotland at a variety of specially selected areas.

Dr. Maria Buchinger (Argentina): Michigan University took the lead in agreement with CLAPN, the Latin American Committee for National Parks, as far back as 1965, in providing training facilities for Latin American park personnel; it was from the success of this initiative that the seminars described by Dr. Tocher originated. It was also in 1965 that CLAPN, with FAO, the OAS, and other organizations, arranged the first course concerned with working out measures to protect the vicuña. Since those days, training facilities have continued to develop, with courses held in Puerto Rico, and, most recently, in the Province of Chubut, Argentina, in 1971. The Chubut Seminar, which this time hopes to attract participants internationally and therefore be conducted in three languages (Spanish, French, and English), is due to be repeated in 1973.

Dr. Donald F. McMichael (Australia): Training programs in Australia are organized on a State basis and vary considerably; however, in recent years Victoria and New South Wales have operated short annual courses for rangers, usually lasting 1-2 weeks, in which participation by other States is invited. In New South Wales we usually have an annual theme, but there are also orientation courses for new rangers, covering park philosophy and practice more generally. Training is now being taken up at university level and we also hope to attract more overseas participants (up till now these have usually been personnel from Colombo Plan countries, who spend periods of a few weeks to 6 or 9 months with us under individual arrangements which I am always very happy to discuss with anyone interested).

Sylvester K. Stevens (U.S.A.): One addition to the list of international facilities given in Paper 27 is the International Center for the Study of the Preservation and Restoration of Cultural Property, established in 1958 at Rome with UNESCO assistance and now supported by 53 nations. Its purposes are to collect, study, and circulate relevant documentation; organize meetings of specialists; advise, carry out missions, and make recommendations on specific problems; and generally work for an improvement of standards in the art of restoration. The center's training program could be a great benefit for park managers, especially those concerned with historical and archeological sites, museums, and certain engineering tasks.

Octavio Pico Estrada (Argentina): Nearly 40 years ago, when the national parks of Argentina were established, they were mostly sited in central government-owned areas with the simple notion of preserving flora and terrestrial fauna, and the staff was instructed accordingly. The parks mainly benefited only the small groups of people called tourists, so the "simplistic" conservation idea was unlikely to win support from public authorities, whose economies were linked to exploitation (forestry, hydro-electricity, etc.) of the parks, as well as tourism. In view of this situation, it was thought that the only way of putting things into order was to establish a Park Service at all levels, so as to undertake park planning, champion the park system on rational, not sentimental, grounds, and develop a proper infrastructure for large-scale tourism. A training school has been in operation for this purpose since 1968 and has trained about 50 people. A planning team also has been established and a UNDP project has been prepared for a center for staff training at all levels for the States and Provinces: management of forest areas; natural resources needed for tourism; rivers, lakes, and other key areas for hydrological resources; and teacher training and extension services, which would receive particular attention.

P. H. C. Lucas (New Zealand): Too few people have so far been involved in national park management in the South Pacific region to justify full-time training institutions, and in New Zealand we have relied on general and specialist courses, plus on-the-job training for recruits who have already acquired a basic skill and/or qualification before entering the Park Service and have joined it because of a genuine interest (hopefully extending to their wives). I think there is real value, in the infancy of park management, in the combination of on- and off-job training, especially where budgets are limited. We would, therefore, always be happy to make our facilities more broadly available, especially for personnel from South Pacific and Southeast Asian countries. We, ourselves, may well be interested in making use of some of the facilities available elsewhere, such as the U.S. National Park Service's "urban assignment" mentioned by Lemuel A. Garrison.

K. S. Sankhala (India): The attitude in India toward wildlife management training has considerably changed since the 1950's, when the only interest in wildlife was in its threat to forest regeneration. In the 1960's, such training was integrated with the Dehra Dun and Coimbatore forestry courses, and now there is a special 6-month in-service course available, which has already trained about 60 officers. Nevertheless, for "Project Tiger" of which I spoke in Session VIII, we shall need at least another 200. I should also like to mention that I, myself, was a participant in the Michigan short course referred to by Dr. Tocher

and got a lot from it, though in some ways the experience was only completed and capped for me by a subsequent visit to the East African parks: I only wish a combined experience of that kind could be made generally available.

Jacques-Henri Bujard (France): Two points based on experience in France: our national parks are public establishments, administered by the Administrative Council which lays down the policy and gives directives for staffing and functioning within the general objectives of the Government. The Council is composed of 30-40 members drawn from Government departments, local authorities, members of the scientific community, and sports organizations. They elect the Council's President and the Permanent Commission through which close liaison is maintained with local authorities and the Ministries in Paris. My second point is that recruitment policy is as important as training. In France, rangers are selected on the basis of an examination which takes into account physical qualities as well as theoretical knowledge and the ability to express oneself. The staff is recruited as far as possible locally, often among the sons of farmers, since this has the double advantage of providing a good career on which they are very keen and establishing a close link between the park, the surrounding population, and visitors from further afield.

Carlos F. Ponce del Prado (Peru): Although one would agree with Paper 27 that permanent training centers for the park's staff is the most convenient formula, it is not always a possible one in developing countries, mainly for economic reasons. On the whole, we have found that short courses provide an adequate solution and have the added advantage that they can be used to promote or strengthen new parks, where in-service training can be developed. They can also be readily fitted in to bilateral-aid programs and regional collaboration between countries with similar needs. Courses of 2-to-3-month duration can draw more easily on university-level specialist teachers and create less of a problem for the government concerned to find matching funds for the assistance and resources provided by international organizations.

Neville C. Gare (Papua New Guinea): We have heard a great deal about the training programs available for students from all countries, those of Australia and New Zealand being of obvious interest for countries of the South Pacific. Nevertheless, it might well be desirable for an international body such as IUCN to review the facilities and consider ways of extending them to cover what are really the rather highly specialized needs and requirements of our region.

Mario Andrés Boza (Costa Rica): Starting from the premise that publicity, propaganda, smart uniforms, and installations are of no value if visitors are not treated as they should be by the park's staff, the need for the proper training of that staff is obvious. In Costa Rica, the problem is at two levels: that of the existing senior staff, superintendents and rangers, for which we have been providing periodic short courses; this has involved difficulties both with finding teachers and also because of having to concentrate on dealing with all the staff, numbering at present 21, at the same time, while the parks remain inconveniently emptied of their senior personnel during the week's duration of the course. In these circumstances, action at the second level, namely, the establishment of a Latin American training school, with the assistance of FAO or other suitable international agency, is of importance. Perhaps it could be based on the existing Argentine institution referred to by Dr. Miller and Octavio Pico Estrada.

John Foster (UK/Scotland): While supporting Paper 27 and other speakers in their emphasis on international cooperation in training, which is aimed at improving standards and broadening objectives, I would point out that this approach takes time to develop, and, meanwhile, it is essential that the training facilities within individual countries, for which international initiatives are no substitute, should be built up as fast as possible. This has special reference to bringing university and other formal education interests to bear on the specialized interests of park management and organization. In Scotland, though we do not yet have a national park system, the establishment of one is under study by the Countryside Commission, as already mentioned by Panel Member J. C. Stormonth Darling, and the Commission is already setting up a training center in anticipation. We believe there is merit in having such a training organization functioning before parks are designated and come under the intensive use they will experience in our crowded island.

Alberto Bruzual (Venezuela): So far, the universities in Venezuela have not attached sufficient importance to training in the wildlife management field, and most of the initiative has been taken by the forest school.

Jaime A. Grimaldo (Venezuela): Nevertheless, it should be noted that the Forestry Faculty of the University of the Andes has now undertaken to organize medium- and top-level staff training to help improve the standard of administration of Venezuelan parks.

Peitsa Untama Mikola (Finland): As others have pointed out, the national parks of smaller countries and their small staff requirements do not justify special training facilities or even the inclusion of these in university curricula. One has to make the best use of the qualified manpower resources available, and, in Europe, most park managers probably have a forestry background, since forestry best covers the necessary skills, such as those listed in Paper 27—basic and applied ecology, land-use management, economics, and law. If this kind of background could be supplemented by wider use of such courses abroad as the ones that have been mentioned by Lemuel A. Garrison and others, it would be a most welcome development.

Dr. Peter Kramer (UNESCO): It is worth noting that graduates of the forestry school of Conocoto, Ecuador, have helped to organize courses for locally employed national park wardens in the Galapagos Islands and that this has had a very good effect in improving knowledge and understanding in the local community. Nevertheless, I fully support the need for a regional training center and would like to receive much more information about the Argentine facility to which reference has been made.

Louis F. Twardzik (USA): The difference between education and training should always be kept in mind; in the first we seek for reasons, in the second we learn about methods of organization. The first is more pertinent to park managers and administrators, who should be our primary concern, although training at the game-warden level is of course also important.

Mrs. Elizabeth C. Titus (USA): The Student Conservation Program provides another channel for international participation for work and training within the U.S. National Park System. This program has the twofold purpose of carrying out much-needed work that would not otherwise be done, as well as giving field experience to participants, who are high school and college students and young graduates drawn from the 50 states and now from 7 foreign countries. This summer, 400 such volunteers carried out work in 35 different

National Park and Forest Service areas. We are, in fact, swamped with applications and have also recently been asked to advise how to set up similar programs in other countries. Many of our 1,600 alumni are now working in park and forest services, in conservation agencies, and as teachers, and they all have a knowledge and retain a keen interest in national parks and their future.

Mrs. M. Janet Gates (U.S.A.): A point made by Dr. Miller, which deserves emphasis, is the necessity for early identification of specially suitable candidates for work in park services. It implies a responsibility on agencies whose programs expose 16-to-22-year-olds to "in-service" activities in parks at both the national and international level.

Andrew Allo Allo (Panel Member): Several references have been made in the discussion to language questions and it is worth noting that at the French-language Garoua Wildlife Management School, English is taught, so that students can make use of the wealth of publications in that language.

A. J. Mence (Panel Member): Language should, in fact, never be allowed to become a borderline or barrier, and, ideally, all management should be based on ecological regions.

Bernardo Zentilli K. (Chile): A possibility not yet mentioned, which would have the advantage of low cost and certainly improve the training solution, would be a combination of correspondence courses for park personnel and occasional practical exercises on the ground.

Percy de Alwis (Sri Lanka): Although there are four national parks with a total area of about 1000 square miles in Ceylon, no use has yet been made of the overseas training facilities reviewed in this session, and it is to be hoped that this will be rectified in the near future.

John Cripps (U.K.): The experience of the Countryside Commission for England and Wales suggests that long courses for professional education and training are best provided by institutes of higher education, in association with such professional organizations as our Royal Institute of Chartered Surveyors as well as park authorities. We see the role of our Commission as providing short introductory and refresher courses to supplement in-post training. A proposal by the Commission for setting up a training center for that purpose is under consideration, for which close cooperation with other organizations will be essential. It is essential that each country provides training of its own nationals, although we recognize the great value of exchanges and international seminars.

Ruhi Çinar (Turkey): Some method is needed by which help can be obtained from international organizations in ensuring the continuity of training programs. We had a resource planning department set up in the University of Istanbul for which a Fulbright-funded professor from the University of Michigan was appointed for 1 year. But after his departure, the university could not afford to maintain the department and it had to close.

Rocco Knobel (Republic of South Africa): I would like to put on record the valuable contribution of the Southern African Nature Foundation, an affiliate of the World Wildlife Fund, in providing training facilities. At one university, a chair for a postgraduate honors course in conservation management has been guaranteed for 10 years; at another university, a conservation course as an integrated part of a graduate course in forestry man-

agement is supported. We are now working on a project to set up a very much needed course at preuniversity level for game-guards.

Arthur T. Wilcox (U.S.A.): To expand the references to certain university level facilities listed in Paper 27, I would cite Colorado State University, which has been training park managers since 1936, about the same period as Michigan State University. Both have supplied managers at all levels and provided programs for graduates and undergraduates from many foreign countries, including Ghana, Germany, Pakistan, Thailand, Canada, India, and Mexico. Dr. Miller suggested that a philosophical base from which to work is necessary, and I believe that our philosophical approach to training should be that man and nature are inseparable elements in environment planning. Advance level training should include the basic sciences, or such well-defined disciplines as forestry where there is emphasis on scientific method; a manager may never expect to become proficient in all the areas he is called on to manipulate, but should learn the language of these disciplines, so as to be able to communicate knowledgeably with the experts. He should also learn about governmental and political processes because his success may well be more political than technical.

Hugo Francisco Morales Rojas (Guatemala): My country and, I believe, most of those of Central America, can be added to the list of those in which there is a shortage of qualified technical personnel for the administration of national parks. I hope that one of the results of this session will be to increase the flow of specific information as to how this shortage can best be overcome.

Lord Wemyss (U.K./Scotland): Training is another facet of a plea I made in Session IV for more consideration to be given in suitable countries, such as my own, to using lands in private ownership. It should be possible for people under training to undertake some part of their studies in lands outside the parks, and this would help the owners or occupiers who might, in many cases, be glad to contribute to the costs. Apart from the economies that would result, it would help to bring home some of the principles we have discussed, namely that parks are not independent ecosystems but closely connected with their surrounding areas, that it is the region and indeed the whole Earth, not just the small areas designated as "parks," which needs conservation, and that the interest and participation of people living near parks must be won.

André-Roger Dupuy (Senegal): Two brief points: the opportunity for service in the parks should be open to a much broader category of persons than the foresters, agronomists, and veterinarians whose qualifications have been stressed in these discussions; second, I would urge that "vocation" must remain a basic criterion in the recruitment of park personnel.

Christopher C. Maximea (Dominica): In view of some criticisms made of foresters in this and previous sessions, I would like to pay a special tribute to the conservation efforts and knowledge of foresters in Dominica, most of whom have had training in wildlife management and ecology and are by no means just interested in lumber production, as seems to be the experience in a few less fortunate countries. We owe to them the saving of more than 60 percent of the government-owned lands and probably more than 80 percent of the tropical rain forests of our island. In our plans for what should be a most interesting national park system, it will be the foresters who will establish and manage the protected areas.

SESSION XII

ENVIRONMENTAL INTERPRETATION

Monday, September 25, 2 to 2.30 p.m. and 4.30 to 5.30 p.m.

APPROACHES AND TECHNIQUES THAT CAN BE
USED TO STIMULATE ENVIRONMENTAL
AWARENESS AND MOTIVATE RESPECT
AND PROTECTION FOR THE NATURAL WORLD

Chairman: Dr. Jan Čeřovský, IUCN
Rapporteur: J.-P. Doets, Netherlands
Author: Paper 28: Vernon C. Gilbert, Jr., U.S.A.
Panelists: Luis Garcia Correa, Spain (Canary Islands)
Lars-Erik Esping, Sweden
William C. Everhart, U.S.A.
Prof. Michel Maldague, Canada
Christopher C. Maximea, Dominica
A. J. Mence, Tanzania

RAPPORTEUR'S SUMMARY

In opening the session, Chairman Čeřovský stressed that national parks and other protected areas are not essentially established for recreational purposes but for their scientific, cultural, and esthetic values. Understanding and appreciation of these values must be and are the basis and background of interpretive and educational services and programs. Equally basic is a knowledge and understanding of the psychology of visitors to the parks, which involves the use of the latest techniques of social sciences. Starting from these two premises, the approach to any comprehensive environmental education program has recently been recognized as comprising three interrelated stages—teaching from the environment, about the environment, and for the environment. The goal must be the promotion of a lasting awareness on the part of all present and future park visitors. The Chairman then invited Vernon Gilbert to present his background paper, before adjourning the session for 2 hours to enable the participants to disperse in groups to a series of outdoor workshops or practical field demonstrations led by U.S. National Park Service personnel in a variety of habitats within easy reach of the lodge. It was obvious that these had been very much enjoyed, despite rather chilly weather conditions, when the session was resumed.

The discussions were launched by the comments of the six panel members, which are summarized under their names in a later part of this report. They covered many topics; among them, the importance of comprehensive physical planning and the fact that

environmental education ought not and cannot be confined to national parks and equivalent reserves, but that local authorities should review their land resources to set aside suitable natural areas for that purpose; the specialized characteristics of education in this field; and the essential role of environmental awareness in ensuring the development of sound land use and of a critical attitude toward the acceptance or purchase of products which may be incompatible with long-term human interests.

Points made in the discussion included a reference to the overly common attitude of the ordinary citizen that the parks are not theirs, a *res nullius*: this is an attitude which can only be dislodged by education, and a number of examples were given where progress is being made in getting the message over that man is a part of the ecosystem. Several speakers emphasized the importance of primary, secondary, and, even, preschool education, aimed at raising a child's intellectual curiosity. And once again, the view was expressed that parks provide only the starting point, a minimum goal, for developing a universal interest in the conservation of the total human environment.

SESSION XII / PAPER 28

A WIDENING HORIZON—
THE ROLE OF PARKS AND RESERVES IN EDUCATION

by VERNON C. GILBERT, Jr.
Office of Environmental Interpretation,
National Park Service, Washington, D.C. 20240

The message and the hoped-for impact of all environmental conferences are much the same: "Man must come to terms with the limitations of his environment while there is still time."

Ecologists agree, and there is ample evidence that they are correct, that there must be tremendous change in attitude and action, especially by us, the technological society, if we are to avoid environmental disaster. If we wisely take the proper actions, the 1970's may someday be known as the period of great awakening to the realities of our relationships and responsibilities to the environment. Then, despite the grave problems of self-interest and greed, we will return to protect the soil, treasure scenic beauty, and legally ordain clean air and water. Within these parameters, we will find our identity as partners with each other and with a fascinating variety of other life forms.

Within the context of this great awakening, we will see our role in the web of life as free of ignorance and self-imposed abuse of our environment and, thus, ourselves. This dawn will come through the widespread practice of a new kind of education—an approach to

learning that gently, yet firmly, instills in us all a positive understanding, respect, and love for the earth, the rich and varied texture of life in all its marvelous diversity. We call this thrust "environmental education."

It would be naive to believe that education, per se, would cure all ills. Experience indicates that greed, selfishness, prejudice, laziness, and the like are not eradicated by education, unless that education is consciously applied to life as an ethic—and that ethic must be all pervasive. Broad programs of environmental education are directed toward producing a national environmental ethic as ingrained as self-preservation and as instinctive as self-defense.

All of us believe in the desirability of this—in the goal of an environmentally enlightened and environmentally adjusted citizenry. But how long will it be before something really effective is done to achieve it, and who will do it? Education is normally a slow process, but deterioration in the global environment dictates that education must produce results soon. So the question, "Who will do it?" becomes increasingly critical!

I suggest that those of us who have management responsibility for parks and reserves take a leading role in a cooperative effort. Of course, environmental education is not our job alone, nor is it the exclusive function of any one organization. Rather, it is dependent upon our ability to catalyze the efforts of groups such as schools, churches, communities, and all levels of government. As the protectors, administrators, and interpreters of parks and reserves, we hold this potential for stewardship of the land. I suggest this for the following reasons:

There are no greater resources for education and social changes in the world than national parks and reserves. More than physical and economic resources simply to be protected and enjoyed, they are exemplars of quality and instruments for implementing programs of social concern in environmental education, in love of our land, and in the fundamental values of life. Their proper management, and interpretation of the natural and cultural systems exemplified in these areas, can help man to understand his kinship with his environment, and, in turn, motivate him to build the kind of ethic necessary for his responsible action on issues of environmental quality. Their immediate purpose is derived from a desire to perpetuate a natural and historic heritage and is based on a realization that people and nations grow in strength, character, and pride with such resources. We know from actual experience that this can be accomplished, but we have not greatly increased nor facilitated this effort, for we have not, in the past, held park interpretation or education to be a high priority.

We have these resources where learning and motivation to an environmental ethic can take place. We also have, through experience with parks and reserves and with people who use them, the knowledge needed to facilitate and reach this objective. Thus, we not only have the capability but the responsibility to use the resources we have and our knowledge for the educational benefit of mankind. Because it can be an important role in bringing an enlightened sense of survival and joy to people's lives, we must make it our highest priority.

There is no other choice if we and our parks are to survive. We have tried to protect, manage, and interpret just the parks themselves. It seemed to work in the United States for almost a century. But as the first hundred years of national park experience here

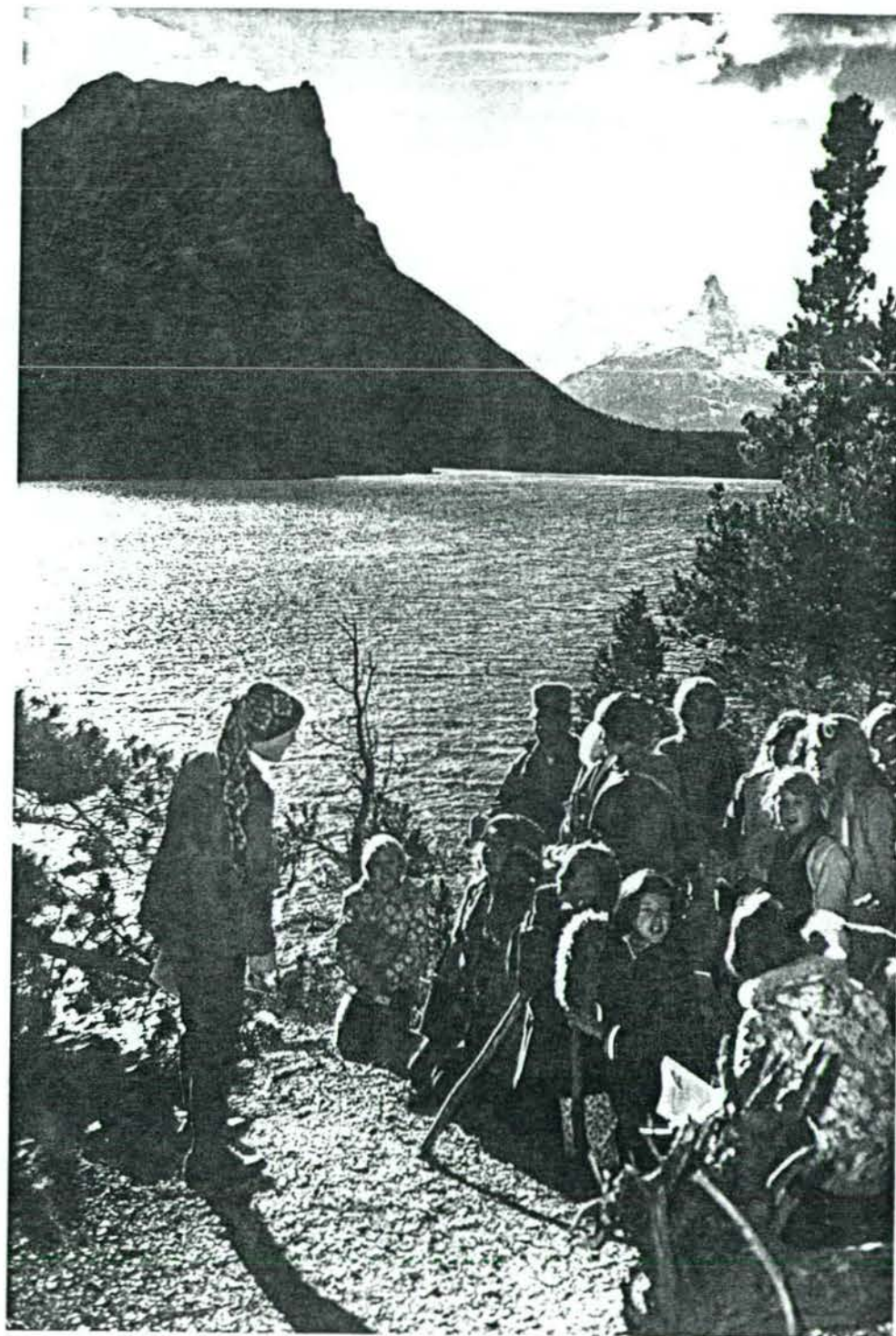


Figure 1. Glacier National Park, St. Mary's Lake. Discussion leader with students.

comes to a close, international attention is now focused on the fact that environmental quality cannot be maintained in one part of the total environment while neglect and abuse eat away at the surrounding parts. The imperiled Everglades National Park in southern Florida alone has taught us that. The park lies at the southern end of a vast water drainage system, and alteration of this system has drastically affected the park and the life within it. Consider the future of marine parks and riverways that cannot be completely protected by management efforts within arbitrary map lines; consider the future of canyon and mountain vistas that are being obscured by byproducts, combustion beyond the horizon; and consider, also, the future of diverse plain, forest, and aquatic communities that cannot escape from the currents of air and water contaminated in some distant place.

The concept of preserving parklands as unspoiled islands is now unrealistic. Clearly the parks are affected by the treatment of the land, air, and water far beyond their boundaries as well as by the attitudes and actions of people entering them.

One-third of a century ago, before environmental education became an idea whose time had come, Aldo Leopold wrote a ringing advocacy for the park position in this very field. His article, printed in a 1938 issue of *Bird-Lore* magazine, was entitled "Conservation Esthetic," and its prophetic tone makes a fitting Centennial text 34 years later. "To promote perception is the only truly creative part of recreational engineering. That fact is important, and its potential power for bettering 'the good life' only dimly understood." Today, this potential power is more clearly grasped, perhaps because, unfortunately, "the good life," irrespective of cultural differences, is so clearly slipping from our grasp.

Leopold was bound in 1938 by a concept which no longer holds us captive—namely, that parks were for recreation and one did not speak of them seriously in any other context. But Leopold managed, even hobbled by the terminology of recreation, to describe the rationale for parks as prime facilitators for environmental education. "The only true development in American recreational resources is the development of the perceptive faculty in Americans. All other acts we grace by that name are, at best, attempts to retard or mask the process of dilution of environmental quality." Today these thoughts have international application, for by opening our eyes to environmental mistakes, Leopold suggests a course of salvation.

In the grandeur of places like Yellowstone and Grand Teton National Parks, our perceptions take this road. Here in wonder and beauty our senses sharpen and hope revives that quality of life is still within our grasp. By studying the natural and historical phenomena, we gain a sense of humility and begin to understand subtle relationships. Now we may ask how it came to be this way and why, but no longer do we avariciously wonder what it is good for. Instead, we find that every park and reserve, each in its own way, has a unique set of stimulants—life's true values.

I had the good fortune to live for several years on the slopes of Mount Kilimanjaro in Tanzania, the highest and most massive mountain in Africa and one of the most magnificent places in the world. Part of this famous mountain has been proposed as a national park, for, as an inspirational and educational resource, it is outstanding. Its diversity includes the Chagga people with their fascinating history and culture, a variety of farmlands, wildlife, and a wealth of natural vegetation ranging from dry woodlands to rain forest, heath and alpine meadows, and the famous snow- and ice-capped dome of Kibo.

An incredible 2,000 or more species of indigenous flowering plants are found on this mountain—more than in any comparable area here in the United States.

Three-quarters of a million people, most of them of the Chagga tribe, live near or on the lower slopes of the mountain and, in one way or another, depend upon its plentiful resources. The consequences of most large and rapidly growing agricultural populations are often overuse of the land with loss of soil, productivity, and adequate water supplies. Eventually, this will precipitate an environmental crisis, unless major changes are brought about. The agonizing problem there, as in so many parts of the world, is to try to balance the immediate needs of people with their longer term needs and those of the natural environment. In an area where the immediate human welfare is clearly at stake, usually almost all else is sacrificed, and abstract values such as the welfare of descendants are less likely to be given serious consideration. However, there must be alternatives. If the basic needs of future generations are to be met, man and the land must be compatible.

If the concept of environmental quality anywhere on earth is to have meaning, it must be related to individuals and their own particular environmental circumstances. Thus, the educational potential of a park should be developed as an undertaking of primary value to people who live in the vicinity. It should apply to their personal economy, business, and agriculture. A man who can come to understand natural processes in relatively undisturbed surroundings which are familiar to him will be better able to understand the implications of his own manipulations of the environment. If ecological principles are presented and understood in the context of man's own personal habitat so that he relates to them wherever he is, eventually he will understand that the principles remain the same for the farmer on Kilimanjaro, the rancher in Argentina, or a taxi driver in New York. The Kilimanjaro situation is used as an example because there exists in that area an ideal combination of factors from which could be created an outstanding experiment in environmental education. The College of African Wildlife Management, located on the southern slopes of the mountain, is dedicated to training African students in the proper management and conservation of their magnificent wildlife resources. There are also a forestry school, a teacher-training college, and a number of primary and secondary schools located on the mountain. The College of African Wildlife Management has already demonstrated the value of park-based learning. Its students spend a good portion of their time in parks and reserves. The carryover of park-based perceptions to home environmental insights could be greatly increased if there were a cooperative program with the teacher-training college and the local schools. This could become a model environmental education program for all of Africa.

Quality of life is difficult to define in such a way that is applicable to any and all of the variety of living circumstances to be found on earth. Nevertheless, we do have the basis for defining some principles upon which everyone should be able to agree. Man's biological needs are known—at least the critical nature of his relationships to the life-supporting processes and resources is pretty well understood. The thoughtful and stimulating book, *Consider the Process of Living*, by Robert Milne, William Eddy, and Gonzalo Leon, through its chapters on air, water, earth, energy, and life, introduces us to these principles, processes, and attitudes upon which our existence depends, and helps us to understand the implications of our modifications of these processes. Consider this part of the intro-

duction. Only this kind of perspective can provide the basic humility upon which true environmental education, leading to working ecological behavior guidelines, can be built.

"And man the walker again falls forward and by pushing earth away once more, becomes the spacewalker—the upright creature with the superior view looking down on earth.

"And from that height he forgets that his breathing is older than his science—and is part of the process—

"Forgets that the ripened fruits of earth do not intend their shape or flavour for this benefit—but are part of the process—

"Forgets that his flesh and blood and bone can never be free from soil and sun and rain—but are part of the process—

"And still there persists the illusion of dominance, of uniqueness, of special destiny—forgetting that humility means a closeness to earth, a kinship with soil, and that this is a reality from which there is no escape."

In essence, the only uniqueness of man is his ability to realize and articulate this relationship. So far as we know, all other creatures merely inherit it.

This is the underlying idea behind the U.S. National Park Service's environmental education programs. Our traditional park interpretive programs have been educational and inspirational, and have helped visitors to appreciate and enjoy their country's natural and cultural heritage. It is a logical expansion of these programs to offer them to a wider range of people—especially teachers and, through them, to school children—in assisting them to understand and to relate to the total environment.

When the U.S. National Park Service began its environmental education programs, one of its moves was to set aside portions of park lands for environmental study. Park personnel also assisted in the development of environmental study areas outside park lands. An environmental study area is a special place for learning, chosen because it graphically illustrates the dynamic forces and processes that alter the environment and affect man. The site should also illustrate man's effect on the area. Interpretive material to facilitate learning in these places is developed by park personnel, in cooperation with teachers. Through cooperative workshops, resource people lend their knowledge of the area and teachers their knowledge of teaching. The environmental study area movement has become national in scope and now includes more than 100 National Environmental Study Areas (NESAs). This NESA program is a cooperative venture of the National Park Service, the National Education Association, the U.S. Office of Education, and local school communities. In 1971, a new program began—National Environmental Education Landmark (NEEL). It provides recognition and confers National Landmark status to outstanding NESAs on governmental or private lands.

A companion to the NESA program is the U.S. National Park Service's National Environmental Education Development (NEED) program, designed to reach people outside parks. This program provides curriculum enrichment materials. It is interdisciplinary and designed to aid the teachers in making mathematics, science, art, history, and other subjects relate to the natural and cultural aspects of the environment in which the child lives. We have called these "environmental" education programs rather than "outdoor" or "conservation" education, to emphasize the fact that the development of appreciation and

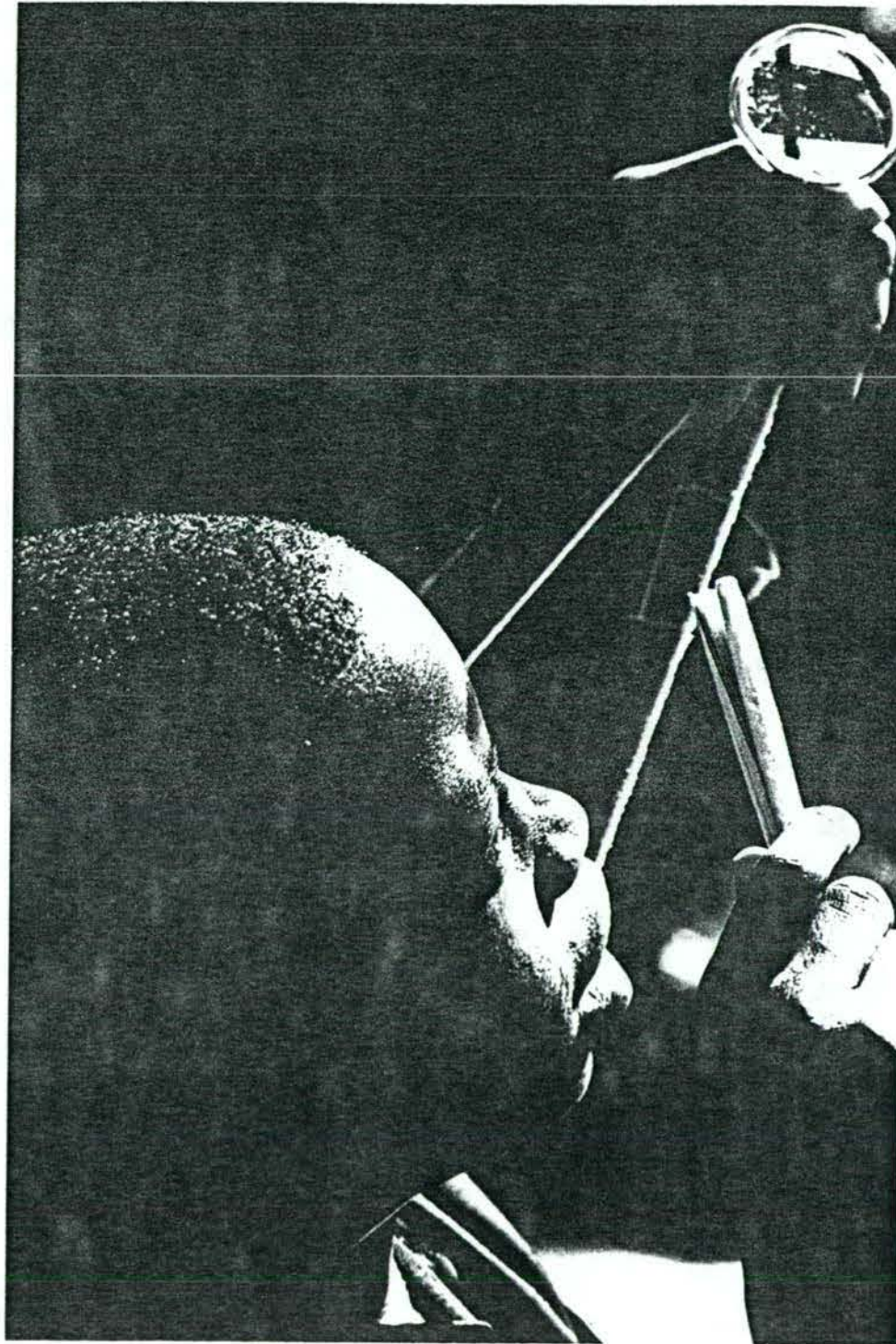


Figure 2. Child in NEED program, "A closer view of nature."

responsibility toward one's surroundings goes beyond mere nature study. Environmental education takes place wherever the student is—whether indoors or outdoors. In fact, rather than a program rooted to a particular site, environmental education is a process—a way of viewing the world. We want each student to become acquainted with the processes of living as they can be found operating throughout the total environment—cultural, social, perceptual, and natural. Only in this way can a person acquire some understanding of how all these processes interact to form our home—the world in which all of us live. To help the student understand and appreciate these processes and his niche in the environment, certain universally applicable concepts are used. These concepts, or "strands", are ways of viewing the world. When they are interwoven through traditionally separate subjects such as mathematics, art, science, and social studies, they can become pathways to understanding a complex but orderly whole. These universal concepts, or "strands", are:

Varieties and similarities

Recognition, inventory, and cataloging of the many forms we perceive around us is a first step to understanding. One way we identify forms is by their similarities to, and differences from, one another. Thus a scientist identifies a species. Thus we identify people. A child acts on this procedure when he asks, "What is it?" The answered name may unlock the specific form in his memory bank. A variety of forms and functions exists but sufficient similarities permit us to group them into patterns.



Figure 3. Prince William Forest Park, group of children.

Patterns

Patterns are spatial, as in design; functional, as in use; organizational, as in grouping. Life as we perceive and participate in it could not exist without our concept and use of patterns. We find patterns in minerals and rocks as well as in the social groupings and interactions of people and other animals. Functional patterns include traffic movements, classroom schedules, and taxonomies. Esthetics consist of spatial and color patterns. We perceive patterns both in nature and in the designs of our man-arranged physical and cultural environment.

Interrelationships and interdependence

All that is living and nonliving interrelates and interacts in interesting and complex ways. In the natural world, we marvel over the enzyme systems that direct replicating cells into tissues and organs, each one of which is an essential part of an interacting and interdependent system. We probe the wonders of these systems—multicellular plants and animals—and find that each species' success is dependent upon the success of surrounding species, either in direct or indirect flows of sun energy. Combinations of interdependent populations that exchange materials, transfer energy, and are influenced by similar physical factors are called ecosystems.

There exists also a world of human cultural exchange, interrelating at the social level in ways that reflect natural ecosystems, and perhaps outweigh them in terms of environmental impact. We do not know. We need to find out.

Continuity and change

All things change—galaxies and planets, bodies and cells, nations and citizens, and the daily newscast. Yet there is a continuity to even the most violent, seemingly abrupt change. Relative stability seems to be the preferred condition for life to continue in living cells. Social units within the overall world society go through the same process of incremental changes, forming a thread of continuity from each stage of development to the next.

Adaptation and evolution

A result of continuously occurring change are the modifications which favor survival of new life forms and social processes better suited to prevailing conditions.

These strands can be used in any combinations or singularly, to suit the particular situation. They are equally applicable to the natural and the cultural aspects of the total environment, which we are just beginning to perceive as an indivisible amalgam of nature and culture. A biologist may consider the strand "evolution" first in the order of importance because, through knowledge of how things have changed in the past, he can make better sense of the existing similarities and differences among living things. Also, through knowledge of such history and its mechanisms he can identify potentialities in controlling changes among plants and animals that feed, clothe, and house us.

A historian or sociologist will use adaptation and evolution in the cultural sense, tracing the evolution of societies through the continuously changing, evolving patterns of adaptive human behavior.

In school, the strands are defined and used in ways suitable to the student's sophistication and level of understanding. The complexity level of their use increases as the child progresses and develops greater ability to synthesize. Properly used, the strands can make traditionally separate subjects more meaningful and more enjoyable.

This is not to suggest that the concepts as defined here represent the one and only pathway to true environmental awareness. But they do represent a different kind of conceptual approach to knowledge. The attitudes and skills this kind of approach encourages can contribute a great deal to our personal lives and to the execution of our responsibilities as humans. They constitute a process that is adaptable to environmental awareness in any nation, no matter what its overriding environmental concerns, or the awareness level of its populace. It is a process that provides an organized basis for actually beginning to educate our children toward the kind of "generalist" view of the world which is so necessary today.

Deeper appreciation of the profound lessons in one strand—interrelationships and interdependence—should change man's attitudes and behavior patterns. Scientist Barry Commoner, in his 1971 book, *The Closing Circle*, reminds us poignantly of realities we have ignored in the past to our present peril:

"The paradoxical role we play in the natural environment—at once participant and exploiter—distorts our perception of it. Particularly serious is the illusion that we have 'conquered nature' and no longer depend on the natural environment.

"A good place to experience this illusion is in a jet airplane. Safely seated on a plastic cushion, carried in a winged aluminium tube, streaking miles above the earth's surface, through air nearly thin enough to boil the blood, at a speed that almost makes the sun stand still, we find it easy to believe that we have conquered nature and have escaped from the ancient bondage to air, water, and soil.

"But, like the people it carries, the airplane is a creature of the earth's environment. Its engines burn fuel and oxygen produced by the earth's green plants. Traced a few steps back, every part of the craft is equally dependent on the environment. The steel came from smelters fed with coal, water and oxygen—all nature's products. The aluminium was refined from ore with electricity, again produced by combustion of fuel and oxygen or generated by falling water. For every pound of plastic in the plane's interior, we must reckon that some pounds of coal were needed to produce the power used to manufacture it. For every manufactured part, gallons of pure water were used. Without the earth's natural environmental constituents—oxygen, water, fuel—the airplane, like man, cannot exist. The ecosphere and the multitude of living things that inhabit it supports every human activity; it is essential to our livelihoods and our lives."

Children brought up to understand the strands will not fall so easily into this kind of self-delusionary trap.

Environmental education has evolved from, and should be concurrent with, the now worldwide practice of the traditional interpretation of natural, historic, and cultural aspects of parks. It is a natural expansion of many countries' recognition and efforts to



Figure 4. Kenya National Park Education Center, Nairobi, Kenya.



Figure 5. Khao Yai National Park, Thailand.

prepare park visitors to understand and appreciate parks and park values. It is a widening horizon for the world community of parks to consider and a new territory to be explored together. Parks in countries widely separated by geography, but not in their perception of the need, can share in this exploration. Already, individuals in Kenya, Japan, Thailand, and in other countries as well are moving in this direction—beyond the boundaries of parks and beyond the immediate concerns of area management.

In the United States, environmental education is being used as a vehicle for bringing some of the values of a national park experience to children who might never see one. This effort to promote greater environmental awareness engenders no quarrel between park-resource people and professional educators. The educators generally welcome the opportunity to use our resources and our help. Together, our two groups possess a tremendous potential for developing this seedbed for greater environmental awareness. Our roles are complementary and each of our functions is enhanced by combining our efforts.

The need for such education programs is evident. But education programs require personnel to run them. Without a cadre of interpreters or education specialists, the potential of this immense new dimension of parks and reserves will never be fully realized. In most areas, it is likely that funds are insufficient and will likely continue to be, even if they are increased several times; so the question is one of priorities—how the money is spent. To do the job, we must rearrange our organizational priorities—as you know, this will not be done easily. And even before that, it will require a rearrangement of our own personal priorities. The job will be difficult but the rewards will be far reaching and as widespread as our expanded horizon.

One cost-time-saving device that has met with notable success is the use of volunteer assistance. In Nairobi National Park, Kenya, volunteers are made honorary park wardens to assist in visitor-animal relations during peak visitation periods and to assist the permanent staff in educational activities. In Bangkok, Dr. L. Boonsong, assisted by two Peace Corps volunteers, has contributed time and his unequalled knowledge and talent to the interpretive and research programs of Thailand's national parks. The U.S. National Park Service has begun a cooperative program with the Peace Corps to recruit and train volunteers in specific facets of park planning, management, and interpretation prior to their assignments to requesting countries. This is a twofold effort designed to help meet the increasing number of requests made to both the National Park Service and the Peace Corps for international assistance in the conservation field and subsequently to enrich the U.S. National Park Service with internationally experienced career employees.

The National Park Service also recently initiated a national program of "Volunteers in the Parks" (VIP) which provides an increased capacity to meet public-Park Service needs with otherwise unattainable talent. The major thrust of this program is directed toward environmental interpretation and education.

So we must make a choice. We have barely begun to rise to the challenge of using our resources to help shape the future with sound environmental ethics. We cannot cling to old patterns and responses as the future passes us by. The parks will sink to the level of merely existing as living museum pieces until impatient people deny them even that marginal function, unless we manage and interpret them as dynamic, adapting, responsive

parts of a changed and changing world. It is up to us. In the balance lies nothing less than the future of our parks and perhaps even our species. The parks and equivalent reserves today are among the world's greatest resources for the future. It is for us to keep them this way by directing their uses to purposes that match their promise.

DISCUSSION

Luis Garcia Correa (Panel Member): To show how an unsatisfactory environmental situation of very long standing is capable of being improved by an interpretive effort, I would like to quote the example of the Canary Islands. Here, the destruction of nature began with the arrival of my compatriots nearly 500 years ago; there were several causes—the destruction of the woodlands for charcoal, the taking of more and more land for agriculture by the evergrowing population, and, above all, the ignorance of the people about the importance of the environment and about the special interest of the flora, much of which is very localized. This ignorance has been reflected in a kind of lethargy or total insensitivity toward nature, which stems from an exclusively consumer society. Recently, however, we have opened a campaign of public education, using all the media and with ethical values as our basic consideration. This has proved that even after these centuries the public is receptive to such a campaign, provided it is led by persons they know and not by strangers. It has already led to the establishment of three reserves and the promotion of ecological research, in which we have been given the enthusiastic support of the authorities from the Governor downward. We may still have a long way to go but there is no doubt in my mind that the conservation gap will be closed.

Lars-Erik Esping (Panel Member): Although agreeing with the author of Paper 28 about the environmental education potential of national parks, I must point out that if these are selected in, and intended to protect, the best natural areas, they are often located too far away from urban areas and too lacking in facilities (e.g. wilderness areas without roads) to be used readily for education. Alternatively, if they are in densely populated areas, they tend to be too small. This state of affairs prevails in the regions with which I am concerned, namely northern, and southern, and central Europe, respectively. In an earlier discussion (Session X) Dr. Borg referred to "everyman's right" to outdoor activities, which is widely recognized in Scandinavia and has tended to maintain opportunities in the vicinity of urban centers. It also certainly facilitates the duty of local authorities to review the land resources available for meeting the requirements of schools, a duty recently emphasized by the Swedish National Board of Education. But, in any case, it is probable that in most parts of the world environmental education and interpretation of nature will have to be sited outside national parks. This underlines the importance of comprehensive physical planning at the national and regional levels, if the essential needs of preserving accessible areas and reaching all sections of the population are to be met.

William C. Everhart (Panel Member): In Session X, we attempted to define the difference between interpretation and environmental education and had considerable difficulty, although we agreed that environmental education is not solely concerned with park values

and park resources. This is in keeping with the present understanding that national parks cannot be saved just by programs and activities within their borders. If they are to survive, it will be because the public becomes committed to the preservation of the total environment. At one of the "workshops" this afternoon, we discussed the surrounding landscape without once mentioning we were in a national park. Obviously environmental education is an activity which can be carried out anywhere. I would predict that, by the time of the next World Conference on National Parks, interpretation will have been redefined in terms of environmental education, traditional programs being replaced or enhanced by a far-reaching effort to carry interpretation into the schools, where perhaps the best opportunity exists to safeguard the future of national parks.

Prof. Michel Maldague (Panel Member): I would define the six characteristics of modern environmental education as (1) being an integral part of human culture; (2) being concerned with social and economic as well as cultural aspects; (3) urgency—it must take effect in the very near future or it will be too late; (4) universality; (5) adaptability; and (6) the fact that, due to its interdisciplinary character, it can be used as a tool for further development. The proceedings of two IUCN Education Commission-sponsored meetings—one for Europe held at Rüschlikon (Switzerland) in 1971 and, very recently, in the form of an international workshop, the one held at London (Ontario)—should be very relevant to the matters now under discussion.

Christopher C. Maximea (Panel Member): It seems presumptuous in the setting of the papers and publications at this Conference and such films as "Earthbound" to speak again of my small island, but it is one in which we live close to the land, and where, even if such phrases as "environmental interpretation" would be unintelligible, that is exactly what people are involved with when they guide you through the forests. As interpreters of the land and what any particular piece of it is capable of producing economically, our illiterate producers are a long way ahead of the city folk who try to develop such land and fail. So, in our approach we have to start from what people know and want, and progress toward a better understanding, a knowledge of the value of conserving the environment, avoiding pollution, and preserving a balance. We need to get to the point where every so-called development project will be closely examined with respect to its ecological effects, which, as someone has said, demands an environmentally enlightened and adjusted citizenry.

A. J. Mence (Panel Member): Environmental education should be a total activity, though one in which national parks play an important role. Although its ultimate aim is the same in both the industrialized and developing countries, the problems involved in communication differ. In the former, an already technological-orientated philosophy and way of life requires radical readjustment to become compatible with environmental considerations; in developing countries the inculcation of awareness is necessary to develop sound land-use practices and avoid accepting "willy-nilly" technological products which may be incompatible. For the latter purpose, keen insight and acquaintance with the social and spiritual and psychological attitudes of people is necessary to ensure proper impact and acceptance of educational programs.

Juan Ignacio Saenz-Diez (Spain): Account must be taken of the psychological attitude of average citizens to national parks, as something that does not belong to them, a *res nullius* that belongs to nobody or to an imaginary owner, instead of being shared by every citizen. If this can be changed by environmental education, then instead of considering these precious lands as something that can only be entered by special privilege, people will defend them and will accept, as in the public interest, limitations on their use designed for their proper conservation. Secondly, since the surface area of a country is static while its population grows, we must fight to save natural lands or to redeem them from private hands into which they have been allowed to fall, even at great expense, if necessary. We should place the largest possible extent of these lands in community ownership, in the sense that the French author Saint-Marc has called the socialization of nature. This should be done even if the lands concerned cannot be properly managed at the moment, but have to be put in reserve for future generations. The latter will be more numerous than we are and their criteria for using these lands is certain to be much more sensitive than the ones that we have employed up till now.

Mrs. Anne von Hofsten (Sweden): Children and adults need to be told not only what they see around them but also how this is interrelated, if it is to arouse their interest. In this respect, I find the interpretation aspect of the nature trails I have seen in North American parks as sometimes missing or inadequate. The information given is most valuable but there are no environmental explanations of, for example, how man influences what one is studying or what happens if one factor in the biotope is changed or interferes with another. An environmental approach needs to be used in every type of area or institution concerned with nature. As an instance of such integrated environmental education, I might give the Swedish school camp, attended by children in the 6th and 8th grade. The camps themselves last for 1 week, but the children are well prepared beforehand, and afterward spend a couple of weeks summing up and interpreting what they have seen, which covers the social, cultural, historical, biological, geographical, agricultural, industrial, and overall environmental aspects of the site. This kind of training has even been extended by one of our organizations to very small children, 3-6 years of age, for whom short courses are arranged to teach them about nature in a very simple way and how to avoid causing harm to nature. The basic principles in all this are: continuing research on methods and making the results available to others; placing man, as part of the ecosystem, in the center of interpretation; and transferring the information to this interpretation.

Bernardo Zentilli K. (Chile): The importance of proper teacher training, if the methods described by taking children on field trips are going to be successful, needs more emphasis. Teachers must be made aware of how to communicate ideas of conservation in a coordinated way. A recommendation by this Conference to that effect might be useful.

Dr. Ricardo Luti (Argentina): A special program established for the past few years in our Cordoba Province is worth mention: it has been set up on an optional basis, at the secondary level, by the Department of Complementary Education. Camps are arranged for short periods in suitable places, with no expenses for the participating pupils except for the cost of food; the idea is to give them a general knowledge of the area, with emphasis on the natural environment. The approach is a dynamic one and is modified each year according to the results achieved and the financial resources available.

W. L. Franklin (U.S.A.): The message of environmental education is obviously intended for those who lack an attitude of appreciation of natural areas, the values of which, both to our urban society and themselves as individuals, need to be gotten across. The reception of the message varies greatly. Perhaps the environmental ethic can best be conveyed if we can teach a "sense of wonder," the sensitivity and curiosity toward things around us, especially in children at the receptive preschool and primary school age.

Ju-Suck Koh (Republic of Korea): I would just like to support the point that environmental education should extend to the whole country, beyond the boundaries of national parks, which are only a minimal goal. To do so must depend on the assistance of international agencies.

Peter Dohrn (Italy): I thought Christopher Maximea made a good point in reminding us of what can and should be learned from more "primitive" peoples in interpreting our environment, an environment with which we may often have lost contact. This should always be remembered and used when we are working for the quick and effective education of the half of the world's population which is below the age of 20.

Vernon C. Gilbert, Jr. (Author of Paper 28): This reminder of the size of the problem leads me to the concluding remark that we will probably always have too few people working in this field of environmental education, so that it is essential that we obtain the understanding and collaboration of all teachers.

Dr. Jan Čeřovský (Chairman): In closing the session, I would refer back to my opening observations. Some educationalists promote only the first approach I mentioned, teaching from the environment, in which the environment is used merely as a suitable "milieu" from which general education benefits are to be derived; there is not sufficient interest in, and care for, a real formulation of attitudes, both in the philosophical and pragmatical sense. When projected into the role of national parks and other protected areas, I see the supreme goal as helping those who visit them to become environmentally aware in the sense of active, cooperative participants in environmental conservation; they will have been taught to understand and appreciate the biophysical basis of their existence and welfare on this Earth.

SESSION XIII

INTERNATIONAL OPPORTUNITIES

Tuesday, September 26, 9 to 10.30 a.m.

OPPORTUNITIES TO EXPAND AND IMPROVE WORLDWIDE PARK SYSTEMS IN THE FUTURE, AND HOW THESE OPPORTUNITIES MAY BE REALIZED

- Chairman: Eskandar Firouz, Iran
Rapporteur: Chester C. Brown, U.S.A.
Authors: Paper 29: Russell E. Train, U.S.A.
(Presented by William A. Hayne, in author's absence)
Paper 30: John I. Nicol, Canada
(Presented by Len H. Robinson, in author's absence)
Paper 31: Dr. Raymond F. Dasmann, IUCN
Panelists: Dr. Michel Batisse, UNESCO
Ambassador Wymberley De R. Coerr, U.S.A.
Prof. Antoon de Vos, FAO
Baba Dioum, Senegal
Zafar Futehally, India
Robert R. Garvey, Jr., ICOMOS

RAPPORTEUR'S SUMMARY

In opening the session, Chairman Eskandar Firouz stressed the importance of the subject and his conviction that much in terms of quantitative results can be achieved in the field of international opportunities—witness the actions initiated in the 9 working days of the Stockholm Conference, which had far exceeded anticipations, despite the common charge that international agreements are easy to endorse but difficult to implement. Referring to the scope of the three background papers, he suggested that discussions might also cover other programs of broad international interest such as the Convention on Wetlands. Unfortunately, this was eventually precluded by the short time allocated to the session.

On the topic of the first paper, which was presented by William A. Hayne, Director of International Affairs of the President's Council on Environmental Quality, in the unavoidable absence of the author and Chairman of that Council, Russell E. Train, recognition was given to the importance of the world heritage trust as indicating international acceptance of the concept of natural and cultural areas of such unique value that they are truly a part of the heritage not only of individual nations but of all mankind. Special note was made of the desirably balanced attention to natural and cultural sites and values in terms of the Convention, and it was suggested that present participants in the session should

endeavor to ensure that the delegations from their respective countries attending the forthcoming General Session of UNESCO, at which the Convention will be presented for approval, give full consideration to maintaining that balance. Other speakers stressed the need for developing national systems of parks and reserves, in such a way that areas forming part of these systems but designated as part of the world heritage will not, as they need not, be in any way degraded. In this connection, it was noted that a recommendation developed along with the Convention addresses itself specifically to that point. Paper 30, on international parks, which in the absence of the author, John Nicol, was presented by his colleague in the Canadian National and Historic Parks Branch, Len Robinson, emphasized that "international" in this context did not refer to management or ownership but rather to the opportunity for establishing boundary parks by nations with common boundaries in situations where significant natural values or historic themes overflow borders and hence favor coordinated planning. The concept of "twinning" parks, which need not necessarily be adjacent, was advocated, based on exchange of personnel for research, where ecosystems are comparable, and also for training, education, and management-planning purposes. Attention was drawn in the discussion to the programs of a number of international or intergovernmental organizations, such as UNESCO, FAO, IUCN, and ICOMOS, which represent an important potential for furthering such cooperation.

Paper 31 on classification systems, made the point that areas are protected for a variety of different purposes, so that the aims and objectives of that protection and the management needed to achieve these aims must be considered in the light of the characteristic biotic community of the area. The classification suggested recognized the two broad categories of protected natural areas and protected cultural areas, the latter including reserves to protect agricultural or pastoral landscapes or nontechnical ways of life. National parks under this classification are usually and almost necessarily hybrid areas, since they combine the objectives of nature conservation with that of providing recreational experience and may well contain several quite different categories of areas.

It was clear from the number of interventions which followed that there is great interest in developing classification systems, but also that the subject has so many facets that they could not be resolved in a single short session.

In conclusion, two comments may be singled out as representing a thread running through the session, one from a panelist, the other from an intervention which, because of time limits, could not be read: the first; approval and ratification of the "World Heritage Convention" could be a significant step toward political unity among nations; the second, parks can contribute to the attainment of real world peace, since love of wilderness is an element of peace.

AN IDEA WHOSE TIME HAS COME: THE WORLD HERITAGE TRUST, A WORLD NEED AND A WORLD OPPORTUNITY

by RUSSELL E. TRAIN
Chairman, President's Council on Environmental Quality,
Washington, D.C.

One hundred years ago this great national park system was born—and with it the modern concept of national parks. As is the case with any new concept, acceptance of the idea of national parks took time, and it was many years before national parks were fully accepted and a comprehensive national park system became a reality. Internationally, too, the acceptance of the national park idea started slowly. Fifty years after the founding of Yellowstone, national parks were still only found in a few other countries. Then, the idea caught hold. Parks proliferated, particularly following World War II, and now there are more than 1,200 parks and equivalent reserves in more than 100 nations, and the importance of parks was stressed frequently at the United Nations Conference on Human Environment held earlier this year in Stockholm, Sweden.

There are a series of reasons for the recent success in international acceptance and development of national parks. One major factor is the growing national and international awareness of the value of the areas protected as national parks. Another is the growing recognition of the fragility of these areas and of the threats to their survival posed by human activities. Throughout the world, rapidly expanding human populations are requiring more lands for settlement, food production, and for other development activities. Increasing technology is providing man with the means to modify the environment on a scale and with a pervasiveness never before approached. Recognition of these factors leads often—although not often enough—to action to protect a nation's natural and cultural treasures.

With the growth of the national park concept in recent years has come increasing recognition of the international importance of national parks. The International Union for Conservation of Nature and Natural Resources (IUCN) was established in 1948, and its International Commission on National Parks started shortly thereafter. In 1962 the First World Conference on National Parks was held with the theme "National Parks are of International Significance." Now, 10 years later, we are assembled for the Second World Conference, 3 months after a major U.N. conference which was convened because of worldwide recognition of the international significance of environmental matters, among them concern with national parks.

In the past few years we have seen an extraordinary explosion of worldwide interest and concern in environmental matters. From the results of the Stockholm Conference, it is clear that environmental considerations are established as an important concern of governments. This has resulted in governmental organization and other institutional

changes throughout most nations of the world, and the development of a new set of environmental principles guiding some international relations and activities. This, then, is the background against which we have seen the world heritage trust progress in less than a decade from its introduction as an idea for the future to an international institution which may be initiated before the year is out.

The basic concept of a world heritage trust is disarmingly simple. It is merely an international extension of the concept of national parks. The national park concept is based on the recognition that certain areas are of such national significance and value that they should receive national recognition as such, and the nation as a whole should take a responsibility to assist with their protection and maintenance. With our broader international viewpoint, we now recognize that there are certain areas of such universal natural, cultural, or historic interest that they belong to the heritage of the entire world. Their preservation and sound management are important to the inspirational, educational, and recreational welfare of the peoples of the world, to scientific progress, and to the economic advancement of the country in which they lodge. Consequently, these areas should receive recognition as part of the world heritage, and as such they should be eligible to receive necessary assistance in their protection and maintenance from the international community.

The idea of the world heritage trust grew naturally from the national park concept. In 1965, I had the honor of serving on the Committee on Natural Resources Conservation and Development in connection with the White House Conference on International Cooperation. Our committee declared that the "conservation and development of natural resources provide significant opportunities for international cooperation." One of our major recommendations called for the establishment of a trust for the world heritage. This recommendation, much of which is as applicable now as it was 8 years ago, stated that:

"Certain scenic, historic, and natural resources are part of man's heritage, and their survival is a matter of major concern to all. Some of these resources, however, are in danger of being damaged or destroyed because of inadequate planning; because of the lack of knowledge of the value of the resources; or because of the costs of management and protection.

"Some examples of the unique and irreplaceable resources that are part of the world's heritage would include: the Grand Canyon of the Colorado; the Serengeti Plains, Angel Falls; the ruins of Inca, Mayan, and Aztec cities; historic structures such as the pyramids, the Acropolis, or Stonehenge. Also important but in a somewhat different way are the areas whose main value lies in the spectacular animal species they support—the Indian rhinoceros, mountain gorilla, and the orangutan, for example. Even though falling within national boundaries, resources such as those listed above are of legitimate international concern and should be maintained for the study and enjoyment of all peoples of the world and for the benefit of the country in which they lie.

"Many of these areas are already under protection of national governments, but some lie within states that may find it difficult to bear the costs of preservation and management. The establishment of preserves in some of the less developed countries may conflict with other economic development opportunities. In such cases, the world as a

whole may wish to help defray the costs of protection and wish to contribute in other ways to the better management and proper use of such areas as a means toward the economic growth of such countries.

"In other cases, the danger stems from a lack of interest and failure to appreciate the significance of the resource. In these cases, both national and international educational efforts would be required.

"Several steps are necessary for the preservation and long-term maintenance of these areas as a part of the world heritage. The first lies in the compilation of a basic list of areas and sites and responsibility of each nation to nominate those areas within its boundaries that might be considered for inclusion in the Trust. The next step would be to evaluate the basic list and select those few areas and sites that meet the high standards that would be required. It is essential that the criteria for selection be highly refined and that the Trust include only those areas and sites that are absolutely superb, unique, and irreplaceable. International cooperative efforts should be made to raise the funds and provide technical services to facilitate the establishment and continued maintenance of the areas. Educational programmes should also be established throughout the world in order to acquaint all people with the value of their heritage and the necessity for its protection. Tourism should be promoted for the benefit of the host countries and to demonstrate the value of protecting such areas."

Finally our recommendation in 1965 was

"That there be established a Trust for the World Heritage that would be responsible to the world community for the stimulation of international cooperative efforts to identify, establish, develop, and manage the world's superb natural and scenic areas and historic sites for the present and future benefit of the entire world citizenry."¹

The heritage trust idea was then discussed in the IUCN General Assembly in Lucerne, Switzerland, in 1966, and the following year I gave an address, "A World Heritage Trust," at the International Congress on Nature and Man in Amsterdam. The issue was raised again at the IUCN General Assembly in 1969 in New Delhi, India. Subsequently, at the 48th Session of the IUCN Executive Board, it was decided that IUCN should undertake the development of an international convention to implement the Trust. This task was undertaken by an International Task Force convened by IUCN and a draft convention was prepared early in 1971. In his Environmental Message to Congress on February 8, 1971, President Nixon took note of the centennial celebration of the establishment of Yellowstone National Park and stated "It would be appropriate to mark this historic event by a new international initiative in the general field of parks... It would be fitting by 1972 for the nations of the world to agree to the principle that there are certain areas of such unique worldwide value that they should be treated as part of a World Heritage Trust." Pursuant to the President's proposal, the United States forwarded the world heritage trust as a proposed agenda item to the Preparatory Committee for the United Nations Conference on the Human Environment. The Preparatory Committee requested that UNESCO, in collaboration with IUCN and FAO, elaborate proposals for consideration by the Intergovernmental Working Group on Conservation which was to be established to prepare

¹ Report of the Committee on Natural Resources Conservation and Development, National Citizens Commission, White House Conference on International Cooperation, November 23, 1965, Washington, D.C., pp. 17-19.

conservation items for the Stockholm agenda. That group met in September 1971, and recommended further development of the IUCN draft convention for the world heritage trust. The committee also took note of a draft convention concerning "International Protection of Monuments, Groups of Buildings, and Sites of Universal Value" which was in process of preparation by UNESCO pursuant to a resolution of the 16th UNESCO General Session held in Paris in 1970 (records of the General Conference, vol. 1, Resolution, 16th Session, United Nations Educational, Scientific and Cultural Organization, Paris, October 12-14, 1970; p. 55). Under the terms of that resolution, the UNESCO draft convention was to be completed by a meeting of experts in Paris in April 1972 and submitted to the general conference of UNESCO at its 17th Session in the autumn of 1972 for approval and action.

The UNESCO draft was primarily oriented to conservation of cultural properties and historic sites, while the IUCN draft included both cultural and natural and adhered to the original heritage trust concept. While the two conventions had some similarities, there were also significant differences.

Recognizing the significant differences between the two drafts but desiring to avoid duplication and to expedite development of the heritage trust, and believing that the desirable concept is a convention covering both the natural and cultural heritage, the United States proposed to UNESCO that the meeting of experts scheduled for April should consider both the draft conventions with a view to combining them into a single convention for a world heritage trust. It could be submitted to the U.N. Conference in Stockholm for endorsement and to the UNESCO meeting this autumn for action.

The suggestion was accepted, and in April at the UNESCO meeting of experts in Paris, the two drafts were combined into a single convention. Key provisions of this convention are: an equal and balanced treatment of both cultural and natural heritages; recognition that cultural sites and natural areas of outstanding universal value are part of the heritage of all mankind; undertakings by states to take national and international measures to identify and protect that heritage and pass it onto future generations; establishment of a world heritage list to provide for such recognition and international assistance; and the creation of a world heritage fund from government and private sources.

Under the terms of the draft convention, the states which become signatories to it—and we earnestly hope that all states ultimately will—elect a governing body initially of 15 members. This group provides policy direction and approval, and its decisions are carried out by a Secretariat within UNESCO. This Secretariat is to utilize "to the fullest extent possible the services of the International Center for the Study of the Preservation and Restoration of Cultural Properties (the Rome Center), the International Council of Monuments and Sites (ICOMOS) and the International Union for Conservation of Nature and Natural Resources (IUCN) in their respective areas of competence and capabilities." In practice, we believe that this means that these bodies will play a major part in carrying out the daily operations of the trust, including the compilation of the inventory, establishment of criteria and standards, providing recognition to areas approved for inclusion in the heritage, receipt and action upon request for assistance in the protection and maintenance of areas on the list, management of the fund, international educational activities, and other duties as appropriate.

This convention was forwarded to the United Nations Conference on the Human Environment at Stockholm where it received strong support. The Conference endorsed the draft as a "significant step toward the protection on an international scale of the environment," and proposed that all governments be invited to examine the convention draft "with a view to its adoption at the next General Conference of UNESCO." With the U.N. Stockholm Conference endorsement, the convention has been distributed to all member nations of UNESCO, and it will be taken up at the General Conference of UNESCO this coming October. If the General Conference approves it, it will then be opened from that date. The convention will enter into force 3 months after the 20th nation has accepted it. Consequently, if the General Conference approves the convention in October and at least 20 nations sign it immediately, the heritage trust could become a reality in January or February of next year.

The question then is where do we stand and what still needs to be done? It appears that the establishment of the trust is almost within reach, but there still may be obstacles to overcome. The first requirement is that the draft be approved by the General Conference of UNESCO this October. The document in its present form represents the culmination of a great deal of effort and negotiation, particularly during the past 1 ½ years. It has been approved by the UNESCO Committee of Experts at which about 50 countries were present, and was endorsed overwhelmingly by the Stockholm Conference where 113 nations were represented. Given this extraordinary endorsement, I would hope and expect that the draft would be approved by the General Conference of UNESCO in its present form.

Secondly, to enable it to enter force as soon as possible, it is essential that the required number of nations become signatories as quickly as possible. This can be accomplished if the representatives of sufficient nations go to the UNESCO meeting with authority and instructions to sign on behalf of their government.

Of course, once it enters into force, there are other questions which will arise, such as those of assuring adequate funding and obtaining appropriate highly qualified staff. Since the time of the original proposal of the heritage trust, I have continually sought to gain acceptance of a concept whose objectives were well defined but whose details of execution were admittedly somewhat uncertain. Now the situation has changed dramatically. We have an instrument developed by many of the world's nations and strongly endorsed by most of them. The details are here. But what is more important than the technical details, or even the actual working mechanism, is the international acceptance of the concept that throughout the world there exist natural and cultural areas of such unique value that they are truly a part of the heritage not only of the individual nations but of all mankind. This is the real heart of the matter. This is the idea that challenges the spirit. It is the idea that gives eloquent expression through cooperative international action to the truth that the earth is indeed man's home and belongs to us all, and this idea has been accepted and endorsed by most of the world's nations.

The opportunity is here before us and the challenge is to the nations that will be assembled at UNESCO this autumn to take decisive positive action.

The message is clear. The heritage trust is an idea whose time has come.

INTERNATIONAL PARKS AND COOPERATION FOR MORE EFFECTIVE MANAGEMENT

by JOHN I. NICOL

Director, National and Historic Parks Branch,
Ottawa, Canada

On behalf of the National and Historic Parks Branch of Canada, I am particularly pleased to be here today and to speak on international parks and cooperation for more effective management. Before I do so, however, I would like to offer to the U.S. National Park Service our congratulations on this Conference and on the centenary of Yellowstone National Park and all that this has come to mean to us. We are indeed fortunate to share the North American continent with our good friends in the United States and Mexico. In the North American scene, we have established an extremely close rapport with the United States. This has been done through a series of exchanges of personnel, through meetings, and through the exchange of technical working documents.

At the First World Conference on National Parks (Seattle, 1962), Walery Goetel, of Poland, spoke of parks between countries. In his remarks, he referred to the Waterton-Glacier International Peace Park between the United States and Canada. To the commemoration ceremonies, 1932, the President of the United States sent the following message:

"The dedication of the Waterton-Glacier International Peace Park is a further gesture of good will that has so long blessed our relations with our Canadian neighbors, and I am fortified by the hope and faith that it will forever be an appropriate symbol of permanent peace and friendship."

As Dr. Goetel said, "these significant words properly appraise the international importance of the boundary parks."

In 100 years, we have seen Yellowstone's concepts grow into more than 1,000 parks in more than 100 countries around the world. Through the work of the IUCN and its International Commission on National Parks (ICNP), we have seen international conservation cooperation blossom.

I will not speak of the "world heritage concepts," so eloquently placed before you by Russell Train, except to say that Canada heartily endorses this concept.

Parks between countries can take many forms: they may be national parks such as Waterton-Glacier; cultural parks such as the International Peace Garden between Manitoba and North Dakota; or historic parks such as the Roosevelt-Campobello Park in New Brunswick.

Without being exhaustive, I would like now to turn for a moment to some of the international border parks which have been recognized in the 1971 publication, United Nations List of National Parks and Equivalent Reserves. We have the well-known High

Tatra National Park in Czechoslovakia bordering with Tatras National Park in Poland. This park was reported on at some length at the 1962 Conference. In France, we find cooperation on two fronts: Gran Paradiso Park in Italy abutting La Vanoise National Park in France; on the Spanish-French border, there is an extensive project involving Parc National Del Valle de Ordesa on the Spanish side which has existed since 1918, and on the French side, a park which was established in 1967, Parc National des Pyrénées Occidentales. This project was reported on by Kai Curry-Lindahl speaking at the Canadian National Parks Today and Tomorrow Conference held in Calgary, Alberta, in 1968. In Africa, we find in Tanzania, Serengeti National Park abutting Masai/Mara Game Reserve in Kenya.

I believe I would be remiss in my responsibilities if I did not also touch on one of the major areas classified as equivalent reserves; that is Quetico Provincial Park in Ontario which abuts Boundary Waters Canoe Area which is in a U.S. national forest in the State of Minnesota. This wilderness canoe area is one of the outstanding areas in North America and is well known to conservationists around the world. It illustrates the situation where one of the provinces in Canada is involved in the operation and management of an international park in conjunction with a Federal agency in the United States. I am sure that anyone wishing further details on the operation of this park would be gladly received by the Director of Provincial Parks in Ontario, or by the U.S. Forest Service.

From this short résumé, we have then seen that there have been some very significant steps with regard to the establishment of international parks. There is, of course, further activity continuing in this area and there are a great many opportunities which may come to fruition during the next 10 years.

National parks in the case of "international parks" must be looked at as only one form of achieving our broad goal of international cooperation through conservation. In the northwestern extreme of Canada we have the potential of an Arctic International Wildlife Range (Canada) adjoining the existing Arctic National Wildlife Range (Alaska). This magnificent wilderness landscape demonstrates the full magnitude of social, economic, and ecologic complexities involved in the protection of natural areas.

Historic Chilkoot Trail from Alaska, through British Columbia and on into the Yukon Territory, is another type of park. Protecting primarily historic features, it, at the same time, encompasses a full range of natural environments from coastal rain forest to alpine tundra. To date, joint planning has been the keynote of this proposal.

In addition to terrestrial parks, we should not overlook the opportunities available for international marine parks. The vast majority of our globe is underwater; however, parks found in this environment are relatively scarce. The need for international cooperation in this sector is particularly significant and the opportunities are abundant. Dr. Tamura, of the Marine Parks Center of Japan, is continuing his significant contributions in this area of our endeavours.

Nature knows no boundaries and the international parks demonstrate that there is a growing recognition of the fact that management and cooperation must flow across international boundaries wherever and whenever possible.

Turning in more detail, then, to some of the methodology utilized in establishing international parks, I would like to discuss, for a moment, the case history of the Roosevelt-

Campobello International Park. This park is primarily a historic park to commemorate former President Franklin Delano Roosevelt. The park incorporates the former summer residence of the President. The area is managed by a commission. The following sequence of events outlines the procedures regarding its establishment:

1. On January 22, 1964, former Prime Minister Lester Pearson signed a joint agreement with former President Lyndon Johnson.
2. On March 26, 1964, the New Brunswick Provincial Legislature passed an act making the land available for the park.
3. On June 30, 1964, the Canadian House of Commons passed an act which ratified the agreement of January 22, 1964; this was followed by similar action by the U.S. Congress which passed Public Law 88-363 on July 7, 1964.

This basic agreement provides for a Commission consisting of six members of whom three shall be appointed by the Government of Canada, and three appointed by the Government of the United States. Further details on the legislation involved in this park proposal are available, should anyone wish to write directly to me.

I have quoted the above example because it illustrates the complexity which can arise in establishing international parks. It is also a demonstration of effective joint action in that all legislation was passed within a 6-month period. The National and Historic Parks Branch of Canada and the U.S. National Park Service both, of course, assisted in the planning for the park.

There have been dramatic changes, during the past 10 years, since the First World Conference on National Parks. If one was to seek what major change had occurred since the 1962 Conference, it would have to be the massive change in public opinion relating to the protection of our natural environment. In this respect, international parks which demonstrate international cooperation in the conservation of nature and natural resources must surely be one of the milestones. As an educational tool, international parks provide demonstration areas in which the public can seek knowledge about the natural resources and the methods of protection in each of the abutting countries. Publications resulting from these parks and their distribution to a highly mobile public provide a major vehicle for exchanging information on the international scene.

Recognizing the diversity of social and economic factors present in our membership I believe it is essential to reassess our position with regard to international parks. We must move beyond the concepts of border parks which, as a physical manifestation, abut national boundaries. These parks which recognize nature's disrespect for political boundaries ensure the protection of migratory species and the conservation of rivers, lakes, and their related habitat. These border parks must be looked on only as a starting point for true international cooperation.

The World Wildlife Fund has demonstrated dramatically how specialized financial or technical resources can be utilized to attain specific conservation objectives. We have within the resources of the ICNP an abundance of technical knowledge. I think particularly of the work of our associates in Japan on concepts of carrying capacity of natural areas and of their work on marine parks; the interpretive programs of the U.S. national parks; the wildlife management principles developing in Africa; and landscape planning techniques of the Netherlands—all are areas where effective management has been demon-

strated. The need is for more effective dissemination. This can be achieved through providing further technical assistance through the ICNP, either by financial assistance or staff assistance.

I would think that it is vitally important that we look at international parks from another perspective and these are parks which, although they are encompassed within the physical terrain of only one country, are international in the sense that they protect a priceless heritage, in a particular site. For example, Galapagos, Yellowstone, Serengeti, Fuji, and Banff must be protected and managed as world treasures. Natural resources were not spread throughout the world in equal distribution and there are places which have a bounty of these resources which may not have the technical and financial resources to protect them. It would be worth spending considerable time and effort in assessing the means by which we could improve our assistance to some of these areas in more distant places. The objective should be to assist the protection of unique resources without placing excessive burdens on those states which incorporate these resources.

Although we have come a long way, there is still a long road ahead of us. We have not yet reached a point where even our definitions are precise. This is essential if we are to understand on the international scene what is meant by the term national park, strict nature sanctuary, or wilderness area. Each of these terms is used in different ways in different parts of the world. As long as this is so, it is extremely difficult to come to an understanding of the degree of protection which exists over the range of environments we find in our park systems.

I believe we are still in a very early phase of cooperation on the international park scene, and it is important to look at the directions in which we should be going and how we may reach some goals. For example, I would think that there would be a great deal that could be done in strengthening our research, in furthering our planning, and in staff exchanges which lead to more effective management and operations of our international parks.

For your consideration, I would like to outline a 10-point approach to how we may be able to strengthen our activities in the role of international parks. Each of these 10 points, when applied to the management of a specific park or park system, could have a marked impact on management through international cooperation.

1. Education

This is the most critical of all of our functions. It must relate to operating personnel at all levels, and I would think that the strengthening of such initiatives as to the very successful program run jointly by the U.S. National Park Service and the University of Michigan with Canadian participation, could lead to similar seminars specifically serving the educational needs in other parts of the world.

2. IUCN and ICNP

A second area where education could be effectively directed, through the role of the IUCN and the ICNP in cooperation with UNESCO, is in the education of decision makers in our countries at the political level and in the media where there is such a great

opportunity for results. The exchange of parliamentary committees, the publication of books such as the very effective Sierra Club series, or the preparation of television and radio programs relating to conservation purposes are other means of effecting our objectives.

3. Personnel exchanges

A third means which we should be utilizing to greater extent is the exchange of personnel. This should be two-way, involving both management and operations: in one case, sending out specialists to assist in the planning and management of new parks, and, in the other case, attaching staff to specific parks for training under operating conditions. In the area of personnel exchanges, I believe it is vitally important that the national park staff work with the various departments relating to external affairs to ensure that officers in each embassy are fully aware of national parks and their country's capabilities for cooperation.

4. Handbooks and guidelines

Preparation of handbooks and guidelines, recognizing that each nation must devise and develop a system which meets its own social and economic circumstances, is essential. A "park system plan" must be developed to ensure that comprehensive comparative standards are utilized throughout the world. The preparation of master plan handbooks, standardization of terminology, and improvements in the creation of standards are all steps which can be of great assistance in this respect.

5. International nature conservation law

In the January-March 1970 IUCN Bulletin, V. A. Chichvarin listed 260 different treaties or agreements relating to international nature conservation and outlined some of the work that was being done to strengthen the legal base for international action. This is certainly a field which will bear much fruitful consideration in the next few years.

6. Creation of boundary parks

This was the basic subject discussed at the 1962 Conference and we have seen considerable progress in this respect. It is, however, obvious that there are many opportunities where further work can be carried out. Looking only at the northern portion of Canada and Alaska, three potential areas for joint cooperation include newly created Kluane National Park in Canada, Arctic National Wildlife Range (Alaska), and Chilkoot Historic Trail (Alaska, British Columbia, Yukon).

7. International conservation—tourism cooperation

In the criteria for selection of national parks the ICNP is quite specific: "Tourism is not to be included among the economic activities calling for prohibition in national parks and equivalent reserves; quite the reverse so far as national parks are concerned."

Yet, in many statements by members of the ICNP, an opposite or ambivalent position is taken.

If we are to assist nations in the development of national parks, our statements must adhere to our expressed policies. We must view conservation attained through tourism as an improvement upon destruction attained through industrialization. The encouragement of investment in conservation as a means of increasing gross national product should not be overlooked in assistance programs.

Within the broad precepts of national park criteria, we should keep in view Dr. Clawson's statement at the Calgary Conference, "National Parks have always got to be viewed against the background of the broad social structure, the functioning of the economy, and of life generally in the country today and as best can be foreseen for, say, a generation ahead."

8. Concept of twinning parks

Last year I had the opportunity of discussing with Ichiro Iwana of Tokyo, the proposal to twin national parks much in the same way as the universally recognized twin cities concept exists. In this respect for example, a national park in Canada could be twinned with a national park in Japan, and such a proposal could facilitate the interchange of operating personnel at the field level as well as providing a fruitful area for the exchange of new ideas between personnel who are so often overlooked in the broader scale of international exchange programs. I think we all recognize that it is at the working level of the field officer that very much of the effective international cooperation can be carried out and executed. I would offer this suggestion for your serious consideration, and perhaps followup through a program by the International Commission on National Parks.

9. Expansion of joint panels

The U.S. National Park Service has, through "joint panels," established exceptionally beneficial working committees relating to Japan, Canada, and South America. In many instances, these committees and committees such as the Latin American Committee on National Parks provide exceptionally fruitful means of exchanging views.

The expansion of such committees or creation of new interlinking panels could provide a sound basis for the interchange of information and exchange of personnel. The knowledge gained in such panels generally leads to more effective and fruitful international cooperation.

10. International conferences

I would suggest that the experience which we were so fortunate in having with the Canadian National Parks Today and Tomorrow Conference, held in Calgary in 1968, is an excellent illustration of the type of development that comes through effective international meetings. The Conference, which was organized by the University of Calgary and the National and Provincial Parks Association of Canada, received the full support of many of our

associates here today, and I would suggest to you that the two documents which arose from that Conference provide one of the most comprehensive reviews of the Canadian Park Scene that has been published to date.

There is little doubt that we have the technical expertise and a coordinating vehicle for more effective cooperation. IUCN's International Commission on National Parks provides such a vehicle. Effective cooperation must grow from effective communication and it is to attain this end that we are here today.

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DEVELOPMENT OF A CLASSIFICATION SYSTEM FOR PROTECTED NATURAL AND CULTURAL AREAS

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The conservation of species and of the ecosystems of which they form a part is a primary concern and responsibility of IUCN. Over the years, it has pursued this responsibility in a variety of ways; for example, through the work of its Survival Service Commission which is oriented toward species conservation, or that of its International Commission on National Parks, oriented toward the conservation of natural areas. Considerable progress has been made since IUCN was established in 1948, the majority of parks and reserves having been formed since that date, but the extent to which IUCN/WWF may take credit for these accomplishments cannot be determined.

Although progress in conservation can be made through concentrating on individual species and their habitats, this approach is useful only for the larger or better-known

species of animals or plants. For most species, conservation is likely to be achieved only through protection and management of the ecosystems to which they belong. Ideally, a network of reserves needs to be established to include representative areas of all natural communities on earth, along with manmade communities of interest. Outside such reserves, a program of rational use of land and resources would both protect and contribute to the usefulness of the reserves. With such a network and program there would be reasonable assurance that most species now on earth would survive.

Classification of national parks and reserves

Recent information on the extent to which conservationists have been successful in establishing a network of parks and reserves is summarized by Harroy (1971) in IUCN's "United Nations List of National Parks and Equivalent Reserves." Preparation of this list has been a monumental task which occupied IUCN/ICNP for many years. Part of the difficulty which was encountered by Harroy and his associates lies in the confusion that surrounds the definition of a national park. This term, or its equivalent, is used in many different ways by many countries. Similarly, the term "reserve" may convey any meaning from strict permanent protection to temporary nonuse (Buchinger, 1967).

According to the definition accepted by IUCN in its General Assembly in New Delhi in 1969, a national park has the following characteristics: It is a relatively large area (1) where one or several ecosystems are not materially altered by human exploitation and occupation; (2) where plant and animal species, geomorphological sites, and habitats are of special scientific, educational, and recreative interest, or which contains a natural landscape of great beauty; (3) where the highest competent authority of the country has taken steps to prevent or eliminate as soon as possible exploitation or occupation in the whole area and to enforce effectively the respect of ecological, geomorphological, or esthetic features which have led to its establishment; and (4) where visitors are allowed to enter, under special conditions, for inspirational, educative, cultural, and recreative purposes.

Further restrictions imposed by the London Convention of 1933, the Washington Convention of 1940, and the African Convention of 1968 specifically rule out the "hunting, killing, or capturing of fauna" and "destruction or collection of flora" except under "direction and control of park authorities." Exploitation of the park's resources for commercial profit is forbidden.

IUCN has further suggested restrictions calling for (1) a statutory basis giving sufficiently strict protection; (2) a certain minimum size; and (3) adequate staffing and an adequate budget for maintenance and protection.

The concept of a national park which emerges from these requirements and restrictions is sufficiently exclusive that a high percentage of the world's natural reserves actually included in the U.N. list would not be included if these criteria were strictly applied. This does not mean that the criteria should be abandoned, but rather that they should be carefully examined to see whether or not they contribute toward the purposes for which a national park or reserve is established.

Over the years, the term national park, like many other conservation terms has become overladen with emotional connotations and national legal definitions. Its definition is both overly broad and also overly exclusive, and, in consequence, is not a useful term to work with if one seeks clarity of expression. Rather it is preferable to ask "what are we trying to accomplish?" A goal should be the development of a functional system for delimiting and classifying the protected areas of the world, but, more importantly, through the use of such a system, to encourage governments to question the purposes for setting aside and protecting areas of land and water, and from that to consider whether the protection and management afforded is consistent with these purposes.

Why do we want to set aside areas of land or water and provide them with protection in a certain state? There are several goals that need to be examined. Thus, we may seek to (1) protect natural communities and wild species; (2) protect outstanding natural landscapes, scenic wonders, and geological formations; (3) preserve certain manmade structures or formerly occupied sites, and their settings, for their anthropological, archeological, or historical interest; (4) maintain in their present state landscapes of unusual charm or value created by man, particularly in view of the growing disappearance of those ways of life responsible for their creation; and (5) provide opportunities for people to develop an understanding of the values of the foregoing and, at the same time, to enjoy outdoor recreation in natural surroundings.

These are general goals, but some of the more specific reasons for protection need stressing. Thus, under the heading of protection of natural communities and wild species there are scientific and esthetic values to be derived from (1) ecosystems unmodified by man to the fullest extent that this is possible; (2) ecosystems or species that require disturbance and active management for their perpetuation, as, for example, open pine savannas, or successional forms of wildlife; and (3) certain rare or endangered species of plants or animals likely to disappear without intensive protective or management measures that may include the removal of competitors or predators, or the creation of more desirable habitats.

Under the heading related to people and recreation, there are special requirements for (1) wilderness enjoyment, which requires the absence of large numbers of other people and of obvious signs of human interference with the landscape; (2) enjoyment of natural scenery, vegetation, and animal life in an outdoor setting by people unwilling or unable to undertake arduous wilderness travel; and (3) outdoor centers for mass recreation, including skiing and other winter sports, water sports of various kinds, and the feeding and transporting of people in the areas selected for these activities.

Virtually all of the above goals and their special requirements are being pursued throughout the world in areas designated as national parks or by some equivalent term. I believe they may well be appropriate to such areas, and much would be lost if we were to discourage such objectives and uses. However, confusion and controversy have derived from failure to designate the purposes for which areas have been set aside and the uses appropriate to those purposes.

As a means for reaching some solution to a classification of national parks and equivalent reserves, I would like to propose two general categories—protected natural areas and protected cultural areas—and to examine their purposes and the implications of manage-

ment directed toward these purposes. The term "protected area" is used in an attempt to avoid the connotations attached to such terms as "parks," "reserves," "sanctuaries," "preserves," or "refuges." It is assumed that each country will use that term best suited to a description of the function and purpose of each area.

I. Protected natural areas. A protected natural area as here defined is an area of central concern to IUCN, since it would have as its primary purpose the permanent protection of nature. Other purposes would be secondary, and the uses or management of such an area must contribute toward, or at least not detract from the accomplishment of, that purpose. Natural features to be protected may be geological or physiographic, landscapes of special interest, natural communities, or various combinations of these. Areas to be protected may be outstanding in beauty or scientific interest or, equally as important, only representative of natural ecosystems that are, or once were, widespread.

Each biotic community or ecosystem will have special requirements for its perpetuation, and it is not possible to set up criteria that will apply everywhere. Nevertheless it is important to recognize some broad categories of natural areas:

Class Ia is a category that has often been termed a strict or integral nature reserve (Bourdelle, 1948; London Convention, 1933). Its purpose is to protect nature in an undisturbed state in order to have it available for scientific study, esthetic interest, or for the contribution it can make to the value of other areas. In such an area, natural processes are allowed to take place in the absence of any direct human interference. These may include those processes that are destructive to the biota that exist at any one time, such as natural succession, the action of naturally occurring fires, insect or disease outbreaks, and storms. Man-caused disturbance of any kind is necessarily excluded.

As defined here, such an area is not appropriate for the protection of successional vegetation or successional animal life unless the perpetuation of these forms is assured by the action of recurrent natural disturbances (e.g. lightning fires). Thus a pine forest placed in a reserve of this category might well disappear in time, through natural succession leading to its replacement by a broad-leaved forest.

Class Ib is a category that has been termed a directed natural reserve by Bourdelle (1948), but also includes his geological, botanical, zoological, and biological reserves. Its purpose, as defined here, is to protect a species, a group of species, biotic communities, or physical features of the environment where these require specific human interference for their perpetuation and consequently would be in danger of disappearing in a Class Ia area. The vegetation, animal life, or terrain in such an area may be managed and modified to afford near-optimum conditions for the species, communities, or features of special concern. This may include the removal of competing vegetation or animal life or the introduction of other useful forms. Thus, a particular grassland community may only be protected and perpetuated through a limited amount of livestock grazing, a *Sequoia gigantea* forest may require controlled burning for its perpetuation, a marsh for wintering waterfowl may require constant removal of excess reeds and the planting of waterfowl food plants, a reserve for an endangered animal may need complete protection against predators, and so forth. Although a wide variety of protected areas must be included in this category, each must have as its primary purpose the protection of nature, and not, for example, the production of harvestable resources or the provision of outdoor recreation space.

In both of these categories (Classes Ia and Ib) of areas, human use need to be carefully controlled and regulated. Even scientific study must be done under permit and be of a nature that will not interfere with realization of the purpose for which the area was set aside. Recreational uses, esthetic enjoyment, or educational values to be derived from such areas must not be permitted to contribute to their disturbance except where (in Class Ib) such disturbance is appropriate. However, none of these uses are necessarily ruled out if carried out under the proper controls. For example, appreciation of a Class Ia area can be gained from boundary roads, trails, or lookout points.

A Class Ic area has two principal purposes, that of protecting nature (defined as primary) and that of providing recreation for those capable of enduring the vicissitudes of wilderness travel by primitive means (without motorized transportation, roads, improved trails, and developed campgrounds, etc.). Such areas have been termed Strict Wilderness Reserves in the Washington Convention of 1940. The reserve is maintained in a state in which its wilderness or primitive appearance is not impaired by any form of development, and for which the continued existence of indigenous animal and plant species is provided. However, it is available to wilderness travelers, essentially in its entirety and thus does not have the limits on use that are imposed in Class Ia or Ib areas. Some modifications of natural conditions resulting from wilderness recreational use may be expected, but major modifications need be avoided through restricting either the number of visitors or their activities.

II. Protected cultural areas. Areas having as their primary purpose the protection, from development or destructive alteration, sites modified by man that are considered to have anthropological, archeological, or historical importance, and high esthetic value or other cultural or scientific importance. These include Bourdelle's (1948) anthropological reserves and certain of his special natural reserves. Category II areas in The Council of Europe system also fit here (Noirfalise, 1972). These may include various agricultural, pastoral, or other landscapes modified by man, with the exotic or domesticated species appropriate to them. They may also include sites surrounding and including buildings or other structures, villages, towns, or cities. Activities encouraged or permitted in these areas are those appropriate to maintaining their natural or manmade features. Viewing or visits by the public will normally be encouraged under special safeguards for the areas concerned. Where appropriate, farming, pastoral activities, or other occupancy of the protected sites will be carried out, but changes in land use or other major alterations in the nature and character of the area would only be permitted when they were considered appropriate or not detrimental to the purposes for which the reserve was established.

These areas may be variously classified—obviously Mesa Verde National Park, The Lake District National Park of the United Kingdom, and Angkor in Cambodia cannot all fit in one category. However, such a classification is beyond the scope of this paper.

III. Other protected areas. It is recognized that for the purpose of protecting nature or cultural sites, protected areas other than those described above may be quite effective. These may be defined as *de facto* natural or cultural reserves in that they, in fact, serve a purpose for which they were not primarily intended. Examples are readily found: the national forests of the United States, although intended for multiple-use purposes including

the production of timber, range forage, water yield, and recreation, include in their functions the protection of nature. This is often subordinated to other uses, but, in fact, up to this time these forests have served as highly effective natural reserves. Some areas within national forests have been set aside in Class Ia, Ib, or Ic category or as protected cultural areas, but the national forests as a whole may still be considered as *de facto* reserves. The same statement applies to forest reserves in many other countries as well as to various areas reserved for hunting, watershed protection, or primarily as recreational areas. Where such areas come under intensive management, which in some cases is consistent with their purposes, they may lose the character of *de facto* natural reserves and assume an artificial or exotic aspect not consistent with the protection of indigenous fauna or flora; examples are the exotic plantation forests of East Africa or Australia, or intensively managed outdoor recreation areas.

National parks

It will be noted that none of these protected areas described thus far fits the category of national park. National parks are usually hybrid areas which frequently combine protected areas of Class I or II with other areas that are variously developed for outdoor recreational use. These developed areas no longer have as a primary function the protection of nature or of cultural values and, sometimes, are not compatible with these purposes. Some existing national parks have been so efficiently developed for tourism or recreation that they would barely qualify as *de facto* Class III areas. Most existing national parks need careful zoning by which the various categories of protected areas are clearly demarcated, and areas developed or to be developed as roads, campgrounds, recreational facilities, accommodations, or service structures are excluded from the protected area category.

In recognition of its primary concern for the conservation of nature, IUCN must continue to look critically at the management of national parks and urge governments to designate in various appropriate categories those areas to be protected against the forms of development needed to accommodate mass tourism and intensive recreational use. In respect to any area designated or to be designated as a national park or equivalent reserve, IUCN should urge governments or other responsible agencies to question the purposes for which the reserve is being established and to zone it accordingly. When these are clearly defined, management practices to be carried out and allowable uses of the reserve may be judged by the degree to which they fit the purposes of the areas concerned. Obviously, reserves that exist only in law and are not protected or managed are of little or no value for the conservation of nature. Equally, reserves that are managed or used in ways that are inconsistent with their function will have limited value for nature conservation.

The term "national park" has now a prestige value which facilitates the reservation of areas by governments through its political appeal. It can serve as a blanket under which many categories of protected natural and cultural areas may be assembled under the economic and sociological justification that such areas are attractive to tourists, serve a useful function in providing outdoor recreation, and attract tourist dollars to

the area concerned. The danger remains, however, that the direct economic returns associated with tourism and recreation will overshadow the less obvious values to be obtained from the protection of nature or of cultural areas. Careful and permanent zoning of each national park into the various categories of protected areas designated here, or some similar system of categories will forestall this danger. Such zoning has of course been carried out in many park systems. Thus, in Canada, Classes Ia and Ib of this system are grouped as "special preservation areas" and include 19 percent of the land in Canada's four contiguous Rocky Mountain national parks. Class Ic appears in the Canadian system as "wilderness areas" and amounts to 70 percent of the land in these parks. An additional category "natural environmental areas" also fits the category Ic, save for its proximity to developed sites, and occupies 9 percent of the total area. All developed sites occupy only slightly more than 2 percent of the total land (Nicol, 1972 *in litt.*). These parks, if the existing ratio is maintained, could almost serve as models, in this respect at least, for a proper balance between protection and development.

Nevertheless in these parks, as in those of the United States, sufficient attention is not shown to the differences between Class Ia and Ib protected areas, although recognition of this essential difference between the "strict nature reserve" and the "directed or managed nature reserve" is essential to management and to the long-term ecological value of these areas. The concept that the Class Ia strict area is the norm and the Class Ib directed area the exception in national parks can only lead to trouble if the parks are to play their proper role in the protection of species and biotic communities.

I believe that acceptance of a system of classification based on the purpose for which an area is established and protected, and leading from this to its management and use, may help to eliminate some of the conflicts and controversies now surrounding the management and use of national parks. For example, in Tsavo National Park of Kenya much dispute has centered on the policy of elephant management. If Tsavo is set aside to protect in a condition as free as possible from human disturbance a segment of the East African biota—in other words, if it is to be designated in large part as a Class Ia area—then it is entirely proper to allow elephants to build up and die off in accordance with their natural dynamics. In the process, they may change the vegetation, create erosion problems, and affect all other forms of animal life; however, this too is to be expected and accepted. Furthermore, if the purpose of Tsavo is defined in this way, then it is appropriate to allow naturally occurring fires to burn unchecked, while excluding insofar as possible man-caused fires.

However, if Tsavo is set aside to protect and maintain the biota that existed at the time when Tsavo was established as a park, then a different course of action is called for. Tsavo falls into the category of a Ib area, and management must attempt to duplicate the processes that gave rise to the conditions that prevailed at the time of establishment. These may include annual removal of part of the elephant population, appropriate use of controlled burning, and other measures needed to perpetuate the *status quo*.

Since Tsavo National Park is of large size, both categories of areas might well be included as well as other subdivisions of the Ib category managed—for example, to favor a particular species. Furthermore, the development of tourism within the park

necessarily removes certain areas from the category of protected natural area. These areas also need to be clearly defined and restricted in relation to the distribution of protected areas. The category of wilderness recreation area (Ic) has scarcely been considered in relation to African national parks. However, it represents a category of use that would have a wide appeal to the more hardy visitors, who are willing to undergo the obvious risks in preference to the existing and rather stultifying experience of following long lines of tourist vehicles from lodge to lodge. Reasonable provision for the protection of such users would be required to prevent an unacceptable rate of visitor mortality.

To move beyond Tsavo, a clear definition of the purpose for which the northern Yellowstone National Park elk herd range would be managed might have prevented much of the controversy that has raged around elk management in Yellowstone. A similar definition would have made it far easier to protect and manage the big trees in Sequoia, Kings Canyon, and Yosemite National Parks in California. Such definition will be essential to the management of California's new Redwood National Park.

I do not wish to propose here at the Second World Conference that the national park idea is one whose time has come and gone. But I do suggest that the national park concept, as it is now both idealistically and fuzzily defined in most parts of the world, will require a major overhauling if such parks are to continue to serve for the protection of nature. This paper, which has developed from an earlier one presented at the AAAS Symposium on National Parks (Dasmann, 1971), is one more attempt to bring a greater degree of order to the existing world system of parks and reserves. No pretense is made that the classification described here is entirely satisfactory. Further efforts along these lines are called for.

For the immediate future, it is proposed that IUCN, through the ICNP, continue to maintain and bring up to date the United Nations List of National Parks and Equivalent Reserves as a world "honor roll" for protected natural areas of these categories. Certain parks, however, now included in this list must be deleted and all such parks and reserves must be protected and managed in accordance with the pursuit of the goals and purposes of nature protection. Essentially, the greater part of any national park accepted for inclusion in the U.N. list must consist of protected areas of categories Ia, Ib and Ic in this paper, recognizing the need for certain sections to be developed for recreation and tourism. Protected cultural areas (Class II) of international importance now included in national parks or equivalent reserves may also be included in the U.N. list providing, however, that a significant portion of such parks or reserves fit category Ia, Ib or Ic in this classification. Thus, cultural monuments and sites not included in areas dedicated to nature conservation would not be included, e.g., Mesa Verde National Park would qualify, whereas the pyramids of Egypt would not.

For protected natural areas of international importance of the Class Ia, Ib, and Ic types, IUCN will develop a looseleaf Directory of Protected Natural Parks and Reserves. This will include those areas included in the U.N. list as well as other fully protected reserves that do not qualify as national parks or their equivalents. Thus strict nature reserves, game reserves, wildlife refuges, and similar protected areas will be listed in this directory. This directory will be developed with a view to indicating the degree

to which the biotic regions and wild species of the earth are receiving protection and management and will serve as a basis for urging future conservation action. IUCN, through its Commission on Environmental Planning, is also developing a Green Book of outstanding and threatened landscapes. This will include areas not now included and generally not suitable for total inclusion in national parks or reserves, which nevertheless need protection through zoning or other forms of land-use management and control. Examples might include the vineyard and village landscapes of the Rhine Valley, the hedgerow and farmstead country of Great Britain, or the terraced ricefields of Bali. All such books and directories, of course, while worthwhile in themselves, achieve significance only as they serve as guides to essential conservation.

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DISCUSSION

The introductory remarks of Chairman Eskandar Firouz are summarized by Rapporteur Chester Brown in the first paragraph of the report on the session. They led up to a brief presentation of the three background papers, of which the first two, as also recorded by the rapporteur, were introduced by colleagues of the authors, both of whom were unable to be present. William Hayne noted, with reference to Paper 29, that the final combined draft of the World Heritage Convention contained 37 articles; he felt that there was still some underemphasis of natural as opposed to cultural sites, which those in a position to do so might well draw to the attention of their Governments. For Paper 30, Len Robinson highlighted the point that contiguous boundaries are not necessarily always essential for the concept of "international parks," as indicated by the reference to "twinning." One of the main objectives of the concept was to facilitate the conservation education of people in both countries concerned. Dr. Dasmann summarized the main points of his Paper 31, as recorded above by the rapporteur. He stressed the point that much confusion could be avoided if a national park is carefully zoned and then managed so as to achieve the appropriate aims of each zone. Large parks can perfectly well incorporate a great variety of zones. If these are clearly demarcated, and their purposes and any necessary restrictions are explained, public cooperation and support can usually be obtained. Indeed, if we are truly to protect natural diversity and provide for the broad spectrum of wild species in national parks, such a system of zoning, with its regulation of management and use, is essential.

Dr. Michel Batisse (Panel Member): The world heritage idea is an extension of the national park idea, and it is very important that it should put as much emphasis on natural as cultural sites, for two reasons: first, because there has been a great deal of confusion of thought on the subject, exemplified in the Abu Simbel affair, but chiefly because the principle environmental problem of the present time is the reconciling of man and nature. It is also worth remembering that the world heritage is entirely dependent on national heritages.

Prof. Antoon de Vos (Panel Member): In general, FAO fully supports the IUCN views expressed in Paper 31 about the development of a worldwide system of classification of protected areas. The new definitions proposed are an improvement on the old ones, in which we found most difficulty with the characterization of a national park as an area in which one or more ecosystems are not materially altered by human activity or exploitation; this seems too limiting and unrealistic. Perhaps a further category of "national park" should be added to recognize the need, in certain cases, to include the human presence. As for the international opportunities to which the present session is directed, those concerned with staff training, in which FAO is very active, were reviewed in Session XI. Support can be given at regional and national level and includes the organization of seminars, workshops, and working parties, such as those concerned with wildlife and national parks operating regularly in conjunction with the meetings of Regional Forestry Commissions. Technical assistance is available on national park planning and requests have recently been received for such assistance within the framework of regional planning and including the problems and economics of tourism development. It extends also to the establishment of international parks and assistance that has been offered to Dahomey, Upper Volta, and Niger with respect to their joint interest in The 'W' National Park. In Africa, FAO has a regional wildlife and national park officer and hopes to make similar appointments next year in Latin America and Southeast Asia. In short, FAO assistance in national park activities has increased rapidly in the past few years and is a true reflection of increasing demands.

Zafar Futehally (Panel Member): The possibility of a world heritage trust is to be welcomed, but we must guard against the danger of downgrading some of the existing national parks in the process of elevating others to a world position. Let us remember, also, that our responsibility does not end with protecting national parks, since these will at best constitute only 3 to 5 percent of the land surface of the world. It has become clear in the discussions that, to achieve national park objectives, it is essential to have a sound land-use policy for the country as a whole, and we should also do well to recall Recommendation 9 of the First World Conference, which emphasized the need for establishing small national areas in densely populated lands, obviously both for their recreational and ecological functions, even though they could never qualify as national parks. In Paper 31, we are asked not to be too concerned with words but to question what exactly are our aims. I believe we are pretty clear that we are trying to preserve in perpetuity certain areas in their ecological totality for esthetic, cultural, scientific, and economic reasons. I hope, however, that the suggestion that standardization as a necessary tool for promoting understanding and assistance between countries will not be accepted; in a world where most of our products, even our ceremonies, have become standardized, let

us ensure that each national park retains its uniqueness and that any human artifacts within it are related to that individuality.

I agree with Paper 30 about interchange of staff between countries. I would like to see some of the distinguished wardens of African parks taking a turn in the parks of Asia, where the management infrastructure has not yet been built up, due to economic and other factors. There are certainly considerable "international opportunities" in this field, while Asia's staff to handle sensitive ecosystems is being trained. But the greatest opportunity—our deepest obligation—is to ensure that the park movement remains an area of international cooperation which is not vitiated by the constraints of political boundaries. I hope the present Conference will be remembered as the one in which the exchange of ideas between the Old World and the New hastened the creation of the One World for which we have waited so long.

Baba Dioum (Panel Member): Commenting on the three papers, in turn, I feel sure that the world heritage concept will be welcomed by developing countries which have hitherto lacked the technical, scientific, and financial resources to conserve their cultural and natural patrimony, in the face of all the economic and social development priorities. One fundamental principle must, however, always be borne in mind, namely the differences between the cultures of one country and another, which incidentally is a source of enrichment for the world as a whole. The definition "cultural and natural heritage having an exceptional universal value," therefore, raises the question of who, and on what criteria, is to decide whether this applies to a particular site. Another major problem is, of course, the precise method to be followed in raising funds for the world heritage, particularly in the light of the article of the Convention calling on the beneficiary State to make a substantial contribution, a requirement which has, in the past, been a limiting factor in other multi-lateral aid programs. My feeling is that a formula will have to be found for assistance up to the point where recurrent expenditure can be taken over, otherwise less wealthy countries are unlikely to be in the position to act as effective guardians of a world heritage site. Paper 30 makes the perfectly valid point that ecosystems ignore frontiers, but we nevertheless have to face the politico-juridical realities and constraints. Anything which appears to threaten the sacrosanct principle of national sovereignty is, in the present political climate of many regions, unlikely to be acceptable. This applies especially to small countries which have recently won independence and are jealous of that independence. Nevertheless, something can and should certainly be done to encourage coordination of management of protected areas and the establishment of adjacent or "twinned" parks, and we already have an excellent African precedent, which Professor de Vos mentioned, in the 'W' National Park, with its Dahomey, Upper Volta, and Niger sectors. Finally, with regard to the classification system proposed in Paper 31, it seems that a considerable amount of confusion still persists in our minds, particularly in African countries which have recently concluded a convention and were beginning to implement its provisions, which, so far as national parks are concerned, were based on the definitions adopted at New Delhi. Despite the efforts of IUCN to clarify some of the different concepts, I fear it will be some time and need much discussion between national experts before we can arrive at a consensus acceptable on a worldwide basis and one that can be considered as a universal reference system.

Ambassador Wymberley De R. Coerr (Panel Member): The previous speaker has drawn attention to the possible conflict between the world heritage trust and national sovereignty, and I would only make the point that perhaps the World Heritage Convention will mark a first significant step toward international unity on the real values of the human environment and so toward political unity.

Robert R. Garvey, Jr. (Panel Member): The World Heritage Convention, in its plan to recognize, protect, and give assistance to the natural and cultural heritage, provides for the cooperation and use of existing organizations and systems as opposed to establishing a completely new mechanism. So a brief review of ICOMOS, the International Council of Monuments and Sites, IUCN's counterpart for cultural resources, seems appropriate, since these two organizations are qualified to give assistance required under the Convention. ICOMOS was created as a result of a conference held in Venice in 1964 and operates, like other nongovernmental bodies, through a system of national committees. Like IUCN, it has as its members, governments, organizations, institutions, and individuals throughout the world, and its general aim is to develop a program that will serve officials and experts responsible for preserving the cultural heritage.

The methods used to advance this program include technical publications, the organization of symposia and specialist meetings, and the creation of the UNESCO/ICOMOS Documentation Center, which will begin to function early in 1973 at the Paris headquarters of the organization. UNESCO has called on its members to submit technical and practical information to the Center, where it will be available to other members and where the answers to tasks and problems can be found. The latter include such topics, some of them already discussed in the symposium program, as weathering and deterioration of wood and stone; maintenance of historic gardens; special problems of baked and unbaked brick buildings, of monuments in the tropics, and of urban and rural historic centers; contemporary architecture in historic centers; archeological problems; and photogrammetry.

The two specific aims of ICOMOS are, therefore, to promote the study and encourage the conservation and enhancement of monuments and sites, and to arouse and develop the interest of governments and populations of all countries in their monuments and sites and their cultural heritage in general.

Dr. V. V. Krinitskii (U.S.S.R.): In the light of the biological, engineering, and socio-economic difficulties commonly experienced when trying to establish a worldwide system of national parks, I suggest that success in this task is closely connected with the following factors: (1) the correct definition of all the necessary kinds of protected areas, depending on their aims and, hence, organizational activities, situation, and the degree of impact from surrounding areas; (2) the elaboration of measures to counteract human influence on the protected area, to preserve or restore natural diversity and to regulate development; (3) integrated long-term research, forming initially a part of the Man and the Biosphere Program; (4) the rational use of different categories or different zones of protected areas for science, tourism, education and so on, according to the various degrees of protection

accorded; and (5) an international agreement on the scientific and organizational basis for the distribution and size of protected areas, including special categories such as international or boundary parks and twinned parks (the Caucasus and Rockies, Volga and Colorado would make good pairs!), supported by adequate inventory, estimation of carrying capacity and the determination of the specific aims of each one of them.

C. Warren Bonython (Australia): On the assumption that a classification system, such as proposed in Paper 31, must eventually be agreed to, I believe that the next question is whether a quantification of park values is practicable. Some people will argue that it is not, that the values are too intangible, but I can see no reason why this should be so any more than in other fields of human activity, such as big business in which the personal attributes of the staff are successfully estimated by a "points system." Five years ago I attempted to construct such a system for the national parks of South Australia, allotting 30 points out of 100 to "area," but because a larger area of arid land equates with a smaller area of well-vegetated land, multiplying the area factor by mean annual rainfall, 45 points were allotted to "natural values"—flora, fauna, scenery, geology, anthropology, and wilderness being given equal status—and the remaining 25 points were available for "visitor potential." Applied to the 35 South Australian parks and reserves, the results tended to confirm preconceived notions and intuitive conclusions, and I now realise that an evaluation must take more account of the ecological aspects and other IUCN criteria. I also realize that, at best, a quantitative evaluation of this sort can only give some general guidance and cannot be used for final classification.

Perez M. Olindo (Kenya): I am concerned with the implications of any numerical or alphabetical style of classification, or the combination of the two used in Paper 31. I am also concerned by Professor de Vos's proposal for a special park category which would include cultivated areas. I believe a great deal more consideration and experimental work are needed before any conclusions can be reached, and these should be discussed and agreed at a separate conference or meeting.

Dr. Raymond F. Dasmann (Author of Paper 31): Responding briefly to the last three speakers, I believe Dr. Krinitskii's criteria can easily fit in with my classification system, and I also think there is much to be said for C. Warren Bonython's points system, except that it might be risky to apply it too rigorously to some existing parks, since they might well rate so badly as to be de legislated! I take Perez Olindo's point about the unfortunate subjective meanings sometimes attached to numbers and letters (C being "worse" than A, etc.), and would be willing to substitute any other kind of symbol. I should, perhaps, also make it clear that although my paper introduces some new categories, I personally believe that the definition of "national parks" should remain as agreed at Delhi.

Prof. Valerio Giacomini (Italy): I am grateful to Dr. Dasmann for presenting methodological principles rather than concerning himself with problems of nomenclature which should be left to regions or countries to sort out in the way most convenient to them. Two conclusions seem to me to emerge: first, that although there is urgency for the establishment of a worldwide national park system, it should be a realistic system, with a wide variety of protected areas, if it is to provide effectively for safeguarding the interests of man and nature; second, that there is a distinct difference between the "reservation" type of conservation, aimed at maintaining ecosystems, and the more "constructive" or

dynamic approach of finding new ways to reconcile man and nature, a difference reflected in the categories of "strict reserve" and "national park." The latter is therefore much more complex and difficult to get to function effectively. To do so, we do not need to be too perfectionist or to take a tough line on optimum standards and declare that, if they cannot be achieved, it is better not to have a park at all. That is not good conservation policy, which has been defined as the "art of the possible." A national park, in short, should be conceived as a gradual, progressive program of action, rather than a much heralded masterpiece. The country which possesses such masterpieces is fortunate, but the general run of countries, engaged in the struggle for existence or development, does not look for fixed models but for practical methods of constructive action. Let us, therefore, leave enough room for a prudent, political approach to regional needs in aiming for the progressive adoption of the system proposed in Paper 31. The Delhi Conference established the ideal final objective, but our present Conference should concentrate on practical realistic means of guiding and assisting countries or, better still, regional groupings of countries.

Dr. José Candido de Melo Carvalho (Brazil): Referring to Paper 30, the idea of "boundary parks" or "*parques nacionais fronteiros*" is well accepted in South America. Following the example of the Iguacu parks of Argentina and Brazil, we have recently established the 70,000-hectare biological reserve of Caracara on the Bolivia/Brazil border and action is also being taken to reciprocate the establishment of Silipawini National Park by Surinam by a similar one on the Brazilian side of the frontier. In accordance with suggestions made at the IUCN-sponsored Conference at Bariloche in 1968, we are also canvassing public support for a joint park in the mountainous area on the Brazil/Venezuela border, since we are convinced of the value of these parks for international relations and as permitting a joint effort to be made to save outstanding natural areas.

Adalbert Bayigamba (Rwanda): Reference has been made to the reconciliation of man with nature, but I believe a greater problem is reconciliation of man with himself and his fellow creatures. The interest in nature and culture in which people tend to take refuge, should simply be regarded as a means toward that end; otherwise it will be in vain.

José Imana (Bolivia): A point which has not been specifically mentioned in connection with "boundary," or "binational," parks, is that they may be a vital strategy for the protection of a species which regularly cross the border. The vicuña, as already explained by Dr. Dourojeanni in Session VII, is a good example, and the joint protective arrangements being established on the Peru/Bolivia border are worth noting.

John Cripps (U.K.): I would like briefly to put on record the welcome which will certainly be given in England and Wales, and I am sure a number of other countries, to Dr. Dasmann's constructive and helpful approach to the matter of classification and his emphasis on the importance of related management. I hope the latter will be reflected in any recommendation which emerges from this session.

SESSION XIV

HELP

Tuesday, 26 September, 11 a.m. – 12.30 p.m.

AN OPEN FORUM ON HOW, WHERE, WHEN,
AND WHAT HELP CAN BE MADE AVAILABLE
FOR THE ESTABLISHMENT AND/OR
DEVELOPMENT OF NATIONAL PARKS AND
EQUIVALENT RESERVES

Chairman: Dr. Justin Leonard, U.S.A.

Rapporteur: John P. Milton, U.S.A.

Author: Paper 32: IUCN, from data furnished by organizations working
in this field

Panelists: Dr. Michel Batisse, UNESCO

Prof. Antoon de Vos, FAO

Dr. Gerardo Budowski, IUCN

Dr. Wolfgang Erz, Frankfurt Zoological Society

Richard S. R. Fitter, Fauna Preservation Society

Peter F. Jackson, World Wildlife Fund

Robert K. Poole, Peace Corps/Smithsonian Institution

RAPPORTEUR'S SUMMARY

The opening presentation of the session was given by representatives of the intergovernmental and nongovernmental organizations indicated beside their names in the above list of panel members. The role of each organization in assisting the national park movement was stressed, with guidelines for how, where, when, and what help can be made available. Cooperative, interagency efforts emerged as a new goal for increased effectiveness. Supporting details of the help available from the agencies represented on the panel and from a further nine agencies operating in the international field were included in background Paper 32 distributed for the session, the second half of which was devoted to interventions from the floor and panel responses.

During the 10 years since the First World Conference on National Parks, national parks have spread to more than 136 countries that manage more than 2,000 different sites. At the same time, the demand for local, national, and international assistance in the park movement has grown to awesome proportions. This demand for assistance has been made all the more critical due to the accelerating loss of prime existing and potential national park sites from land-use competition, pollution, population shifts, and mass recreation-orientated tourism. These new pressures come at a time when the complex values of national parks are being increasingly recognized not only for wild-land recreation and education, but also for preservation of representative dynamic ecosystems and the

genetic materials they contain, ecological research, protection of critical watersheds from downstream flooding and upstream erosion, and for studies of unmodified ecosystems against which to measure environmental changes outside the parks.

These new negative pressures and newly perceived values of parks place new responsibilities upon those nations establishing and managing national parks and the various organizations assisting this work. Some of the related central points raised in the session included:

1. Expanded direct and simplified assistance to national and regional institutions to develop local expertise in park planning, management, research, and the establishment of indigenous training and education centers.
2. Assistance in establishing new foundations or other sources of local financial support for national and regional park assistance efforts.
3. More vigorous and imaginative efforts by bilateral- and multilateral-aid organizations to expand and improve the quality of park assistance programs in developing countries. Numerous intervenors stressed the current need to channel relatively more financial, planning, fellowship, and training assistance into national parks due to the historical neglect of parks in overall development assistance.
4. Greater care to protect parks from the numerous negative impacts of large-scale international tourism and to encourage the consideration and inclusion of the diverse local cultural needs, life styles, and architecture, etc., in national park assistance programs.
5. Greater concern for assistance that fosters local economic benefits from parks and relatively less to large international tourism concerns.
6. More attention by other, economically oriented development entities (engaged in such projects as tourism development, road construction, agricultural development, forestry improvement, and hydropower programs) to the integrally related role of national park survey, planning, management, and training assistance. Two aspects of this concern were elaborated in the following two points.
7. Initiation of the new bilateral park assistance programs in those countries now giving aid to developing nations, but which have not traditionally supported national park assistance projects.
8. Initiation of new park assistance programs in those multilateral agencies supporting related development projects, such as tourism, but which have not yet supported local park programs. The various lending agencies such as the World Bank were mentioned by several intervenors as particular agencies that have not yet supported national park programs.
9. More park assistance to critically threatened and fragile environments, such as submarine and coastal areas, islands, river basins, and humid tropical forests.
10. Increased assistance for local education programs and for local park management research programs in developing countries to help and encourage the growth and improvement of their national park systems.
11. Last, but by no means least, increased national and regional support, both financial and political, for the excellent work on national park assistance already underway by the international agencies represented by Session XIV panelists.

HELP FOR NATIONAL PARKS

by IUCN
from data furnished by
organizations working in this field

National parks offer expanding opportunities for a growing range of social uses and improvements, for science, and for economic benefits. Because of their multiple values, national parks have become highly desirable in any country's system of reserved or controlled land. This is evident throughout the world from the number and variety of new parks set aside by official governmental action.

National parks and equivalent reserves usually are highly complex, specialized natural areas. Anyone who has worked on their behalf is well aware that this imposes an imperative need for carefully trained personnel. It brings as well a wide range of technical, financial, scientific, and social problems which must be solved as park development programs are carried forward.

For a variety of reasons, many countries are not prepared to cope fully with all of these conditions and requirements. Increasingly, outside assistance is sought from international, national, and private groups who are able and willing to provide it in a variety of ways as a means of advancing their own objectives.

IUCN asked the most active of these organizations to provide information on their assistance programs. Most of them responded and their statements are included in this paper as background for discussion. It will be seen that many offer limited or specialized assistance which must be related to the organization's own terms of reference. All in all, however, both the degree and scope of available help for national park projects is substantial. The following statements are arranged in alphabetical order:

Canadian International Development Agency

The Canadian International Development Agency (CIDA) has supported a few selected projects to assist the development of national parks in developing countries.

In Tanzania, for example, Canada has had a long association with the development of Ngorongoro Conservation Area. This is an experiment in multiple land use. Canadian biologists have carried out a number of behavioral studies of individual animal species, and an ecologist, seconded to CIDA by the Canadian Wildlife Service, has completed a land utilization survey of the whole area. This work, which embraces the mapping and description of all the ecological zones, together with an assessment of their potential, will be published shortly by the Canadian Wildlife Service. The cost of this work is being met by CIDA. More recently, a management team of three Canadians has assisted the Tanzanians in the overall planning and development of the area.

In the mid-1960's, CIDA provided the National Parks Organization in Tanzania with a fleet of dump trucks, together with maintenance and servicing equipment and spare parts, to enable a comprehensive all-weather road network to be established. More recently, a complete replacement fleet has been provided. A Canadian technical adviser on the planning and development of national parks has worked with the Tanzanian Government for the past 7 years. His task has included carrying out economic studies of the establishment of new parks, the preparation of plans for developing existing parks, and the training of Tanzanians in their management and administration.

In Uganda, CIDA has carried out a wildlife management project in which advisers were provided to examine ways of establishing game cropping in national parks in order to provide wild meat to people in their locality and eventually to sell surplus wild meat to tourists. A CIDA expert has written a report on game in Uganda which has been widely distributed by CIDA.

CIDA provides aid in response to requests received from developing countries. This aid is given in order to assist the social and economic development of recipient countries. Specific proposals for assistance for the national parks would be considered on their respective merits in relation to other priority needs of the country in question. Assistance to develop national parks would be given in relation to the ways in which those parks could aid development. For example, in addition to conserving wildlife and the natural environment, they can help the development of tourism and so help increase foreign exchange earnings. Some of the expenditure on this type of project would be spent within the developing country and could help promote employment, although the effect would probably be slight. The financial assistance provided for national park projects would normally take the form of grants for technical assistance to enable Canadian advisers to be sent to the country in question.

For further information, address the Canadian International Development Agency, Ottawa 4, Canada.

Fauna Preservation Society

The Fauna Preservation Society makes small grants, usually of not more than £500, from the Oryx 100 Percent Fund set up in 1971. The Society prefers to make a grant to cover the whole of a small project rather than to contribute a small sum toward a larger project. Projects preferred are those involving the study, survey, or protection of endangered species, especially mammals and the larger reptiles. Grants may also be made toward the acquisition of land for reserves or national parks. Grants are considered quarterly and applicants are requested to write for and fill in a form.

Technical assistance is not provided directly but the Fauna Preservation Society is always willing to put people in touch with scientists who may have experience with their particular problems.

For further information, contact the Fauna Preservation Society, c/o Zoological Society of London, Regent's Park, London NW1, England.

Food and Agriculture Organization of the United Nations

FAO serves as an executive agency for funds dispersed under the United Nations Development Programme, and can offer a variety of different types of assistance in the fields of wildlife and national parks. The following discussion may serve to introduce this part of FAO's services to responsible officers in developing countries.

1. Technical assistance under this program normally involves one or more experts for periods of a few weeks to a few years. The scope of the work varies greatly, ranging from advice on administrative or legal matters, and surveys of parks or reserves, to training at various levels and assistance in the preparation of larger projects. Equipment is sometimes included.
2. Regional officers in various subject-matter fields make visits to the countries in their region, contacting the technical officers, heads of departments, and ministries to keep in touch with the problems and needs of the countries in the region and assist with the preparation of requests for various forms of technical assistance. In some cases, quick assessments may be made by such officers during their visits.
3. Fellowships for study outside the requesting country can be arranged as a direct request for technical assistance. However, they are most easily arranged as an integral part of other requests for technical assistance or as a part of a special fund project. It is a basic principle in United Nations Development Programme projects that external experts have local counterpart officers working with them on the job during the project. This is obviously important to facilitate the continuation of a favorable trend that may have been started during the period of U.N. assistance. In many cases such counterparts are not available, and it is in these cases that fellowships are a particularly urgent and important kind of assistance.
4. Associate experts are supplied by various developed countries as a means of assisting and strengthening existing FAO programs; that is, associate experts are assigned to assist the work of technical assistance or special fund experts. One of the features of associate expert programs is that from the donor countries' point of view, it provides a means of arranging for training on an apprentice basis with a senior expert in an area of study not available in the donor country.
5. The so-called Operational Assistance Programme is a rather special and modified form of technical assistance. It is appropriate especially where the country needs an experienced man for either starting, reorganizing, or strengthening a Game or National Park Department and cannot, from their own budget, afford the type of senior expert they desire. In these circumstances, the country applies to the UNDP office for assistance under this OPAS program and an arrangement is made whereby the country pays the normal salary they can afford to the United Nations, which in turn makes up the difference in salary and engages an officer acceptable to the government in the usual way.
6. Regardless of the specific form of assistance requested, to be successful it must be given sufficient priority by the government in competition with other types of requests. Judging from the considerable number of successful projects in the field of wildlife and national parks, it is clear that these subjects compete successfully for external assistance. This has usually been on the basis of their proposed economic contribution from unused

lands, an improved contribution from marginal lands, or a fairly rapid increase in national income through the development of national parks and game reserves or by improving management of hunting areas to attract tourists.

7. Within the appropriate government division or department, the first step is to establish the precise form of assistance required. If the particular field is in an early enough stage of development, this may take the form, as it has in several countries, of asking for an expert to survey the resource, estimate the potential, assist the department concerned in reviewing priorities for development, and assist with the preparation of a request for technical assistance.

8. The following simplified approach is suggested as a practical way of getting started in the event that you have not already obtained technical assistance from FAO in the field of wildlife, national parks, or recreation areas:

a. Decide on the required assistance. b. Contact the country's U.N. or FAO representative to (1) determine the most appropriate program to provide the assistance and, consequently, the form for presenting the request; and (2) learn the exact governmental procedures for submitting U.N. requests. c. Prepare and submit request for approval by the government, and forward to the United Nations through the latter's country representative.

9. Most forms of technical assistance provided through FAO require some kind of contribution by the government, or arranged by the government, before the assistance can become effective. Counterpart assistance may involve, for example, transportation, office facilities, and government officers assisting the project. The exact nature of the counterpart contribution by the government varies with the nature of the project, the financial status of the government, and a variety of other considerations. For these reasons, it is important to contact the local FAO or UNDP officers at an early stage of project formulation, as this, even on a very informal basis, can save a great deal of time in the preparation and initiation of appropriate assistance.

For further information, contact the Forest Resources Division, Forestry Department, FAO, Rome, Italy.

Frankfurt Zoological Society

The Frankfurt Zoological Society (Zoologische Gesellschaft von 1858, Frankfurt a.M.) is a private, nonprofitmaking organization based in Frankfurt, Federal Republic of Germany. The Society has provided financial and technical assistance for the establishment, management, and consolidation of various national parks and reserves throughout the world. Most of this support was given to projects in Central and East Africa, South America—in particular, Peru, Bolivia, and Galapagos Islands, Ecuador—for Indian parks, such as Kaziranga, and to Indonesia for the conservation of orangutans. It was also one of the leading organizations which helped to set up Bavarian National Park in the Federal Republic of Germany. While the Society was particularly involved in national park projects in Africa in the past, it is now extending its activities to other continents, in particular South America and Asia. One of the great achievements of the Society is

the initiation and promotion of tourism to African national parks and to South America. For further information address the Frankfurt Zoological Society, Alfred-Brehm-Platz 16, 6 Frankfurt/Main, Federal Republic of Germany.

International Secretariat for Volunteer Service

For the most part, the services performed by volunteers in helping to combat the deterioration of our environment have been concentrated in three principal areas: (1) technical assistance to relevant projects, (2) environmental education, and (3) community development. This work is being carried out by both domestic and overseas volunteer service organizations.

In developing countries, the majority of volunteers who have so far been involved in environmental programs are young specialists working as park rangers, foresters, water engineers, fisheries biologists, soil scientists, etc. Lately, more and more volunteers are being organized as teams to work with experts in undertaking soil and resource surveys (with the use of air photos), vegetation mapping, and wildlife management projects.

Volunteers with expertise in conservation, veterinary medicine, water supply, forestry, range management, and animal husbandary have served all over the world at the request of governments and project-executing agencies. Their skills have been applied to park management programs in a host of countries involving a variety of tasks. Furthermore, volunteers can supply the requisite manpower for national park projects at a fraction of the cost required to engage paid experts. It is estimated that the per annum cost of financing an expert is \$30,000; the cost of financing a volunteer for the same job is approximately \$3,000 per annum. From this per annum figure for volunteers, the host country normally provides only housing, health care, on-duty transportation, and basic equipment or materials required for an assignment. The volunteer-sending organization assumes the costs of recruitment, selection, training, living allowances, overseas transportation, and insurance. Volunteers traditionally work alongside host-country counterparts on projects planned by the host country or executing agency.

The International Secretariat for Volunteer Service (ISVS) performs a variety of services which can be used by developing countries to secure skilled volunteers for national park projects. Working in close association with its member governments and associated volunteer-sending organizations, the International Secretariat is in a position to process requests from governments for volunteers either on a bilateral or multinational basis. In addition, ISVS, through its relationships with volunteer-sending organizations, would make available, upon request, the services of a specialist to conduct preliminary project studies on the utilization of volunteers in the development of national parks or to serve as an adviser on special areas of concern to host countries and volunteer-sending organizations working in this area. Finally, ISVS maintains a materials resource library and disseminates information on volunteer organizations and projects through regular mailings. Every effort is made to secure up-to-date information on volunteer activities in all spheres of activity.

ISVS would welcome the opportunity to discuss with developing countries ways in which volunteers could be incorporated in national park programs, and to explore how ISVS

can best serve the needs of those countries in designing and implementing these cooperation programs.

The International Secretariat would also be pleased to lend whatever technical assistance is necessary to investigate possibilities that might be of help in developing environmental programs which include the services of domestic youth organizations and university students. For some time, it has been known that domestic youth services and student volunteers in developing countries could be effectively involved in labor-intensive projects in the development of national park systems. Soil-erosion control, access road construction, and reforestation projects are three such areas where their help is vital. Indeed, organizations like the Kenya National Youth Service, the Tanzania National Service, the Service Civique of the Ivory Coast, and the Iran Corps set an example of the possibilities imminent in this type of service. When called upon, ISVS is prepared to offer technical assistance to the local youth organization in order to assist with the design and preparation of such assistance.

For further information contact the International Secretariat for Volunteer Service, 10-12 Chemin Surville, 1213 Genève-Petit-Lancy, Switzerland.

International Union for Conservation of Nature and Natural Resources

Since its foundation in 1948, IUCN has always given very high priority to national park planning, establishment, and management throughout the world and, more particularly, in developing countries.

The Union, through its various activities and especially through the efforts of its International Commission on National Parks, has accumulated a great body of scientific knowledge in the field of national parks and equivalent reserves.

All IUCN field assistance projects are now operated jointly with the World Wildlife Fund and details as to the type of assistance offered are described in the statement by that organization. More than 50 different assistance projects involving financial aspects and connected with national parks are currently under way, almost entirely in developing countries.

IUCN has also given various types of assistance through scientific and technical counsel, letters, and pleas at the highest level toward the cause of national parks, and by personal visits of world experts.

IUCN, unilaterally or in cooperation with FAO, UNESCO, and other organizations, has organized a large number of international, regional, or national meetings where the subject of national parks received prominent attention, leading to action-oriented resolutions that have had great significance toward the establishment of new, and protection of existing, national parks. Prominent among these IUCN activities have been the First World Conference on National Parks held in Seattle in 1962, the 11 General Assemblies and 12 Technical meetings, and the regional and national meetings held in Africa, Thailand, Argentina, Pacific islands, and Madagascar. Regionally, the Latin American Committee on National Parks (CLAPN) has also held significant meetings and undertaken action in the region, fostering the cause of national parks and directing requests for assistance to appropriate funding sources.

Park-related projects of any type will be jointly considered by IUCN and WWF, but those related to park resource surveys, planning, zoning, protection and management, and education are given priority.

Enquiries should be addressed to the Director General, IUCN, 1110 Morges, Switzerland.

Nuffield Foundation, U.K.

The Nuffield Foundation is a charitable trust devoted to the improvement of human health and social well-being by means, particularly, of support for research in medicine, the sciences, and social science. The advancement of education is also incorporated in its objects, and there is a special charge on us to promote the better care and comfort of old people. The Foundation's operations are confined to the United Kingdom and Commonwealth, and from a total income, varying at the moment between £1 million and £2 million, some 20 percent has customarily been devoted to activities overseas (divided between project grants and individual scholarship and fellowship awards).

The Foundation's capability overseas, in financial terms, is therefore small when seen against the background of the many countries of the Commonwealth, and their many and diverse needs. Most grants are given for support of original and worthwhile research, again mostly in universities. The work of the Foundation in Australia, New Zealand, and Canada is carried out with the assistance of local advisory committees, but the Canadian program does not, at the moment, include research-project support.

Grants in the past have not been made directly in support of the development of national parks, but a substantial project in Uganda, for the promotion of studies of tropical animal ecology, does have obvious major relevance. Similarly, but on a much smaller scale, the Foundation supported a specific piece of ecological work forming part of the Serengeti Research Project.

Further details of the policies and procedures may be requested from the Nuffield Foundation, Nuffield Lodge, Regent's Park, London NW1 4RS, England.

Organization of American States

The Organization of American States has been, for many years, involved in a policy of support and assistance to member countries in the establishment of national parks. This interest of the Organization has been expressed through the sponsoring and support of meetings, publications, and natural resource development in many of its technical assistance missions.

As early as 1940, a Pan American Union Convention on the Protection of Nature, Fauna, and Flora was held in Washington, D.C. A number of Round Tables on Conservation of Nature have since been held in collaboration with the Inter-American Press Society and the Rockefeller Foundation. The first of these was held in Mexico (1967) followed by one in Rio de Janeiro and another in San José, Costa Rica, in the same year, and a fourth one in Lima, Peru, in 1968. In all these meetings, careful attention was given to the subject of national parks.

In the field of technical assistance, the Unit of Natural Resources of the Department of Economic Affairs provided technical support to Peru in the establishment of Cutibireni National Park in 1964. As a result, a brochure was published describing the beauty of, and points of interest in, the park.

In 1965-66 a study of the natural resources of the Dominican Republic, carried out with assistance of OAS, identified areas for national forests and national parks and recommended policies for the conservation of forests, soils, and waters.

More recent activities related to national parks have been a study for the Conservation and Development of the Renewable Natural Resources of the Department of Meta, in Colombia (1971-72) which proposed the establishment of La Macarena National Park. Assistance was provided to Peru in the establishment of policies for the conservation of renewable natural resources in 1971.

In the field of training, OAS has used, and will continue to use, the facilities of its Special Training Programme (PEC) to support training activities related to the establishment, management, and conservation of national parks.

Travel grants are provided for courses and seminars on this subject. This year (1972), 10 fellowships have been granted to participants in the Second World Conference on National Parks being held here at Yellowstone and Grand Teton National Parks. A special post-Conference tour for Spanish-speaking participants will be given to study national park and other reserves.

The course in economics and management of natural resources offered by the program of regional development at the University of Michigan includes national parks management as an optional subject. As part of this course, interested Latin American participants may visit several National Park Service facilities in the United States.

Technical assistance and training services related to national parks continue to be available to member countries of OAS through the Regional Development and Tourism Development programs of the Executive Secretariat for Economic and Social Affairs and, for some specific subjects, from the Executive Secretariat for Educational, Scientific, and Cultural Affairs.

The request for technical assistance or training in this field should follow the normal procedure for other technical cooperation activities through the National Plans of Technical Cooperation presented yearly by the member countries to OAS.

Information on available training is regularly transmitted to the member countries by the Subsecretariat for Technical Cooperation and a brochure prepared by the Regional Development Office lists technical assistance services and training provided by that program.

With the increasing concern over environmental matters which has been long shared by the Organization of American States, it is expected that future programs will tend to stress support and assistance to the establishment, management, and conservation of national parks as part of activities related to the environment.

Headquarters of the Organization of American States is at 17th Street and Constitution Avenue NW., Washington, DC 20006, U.S.A.

Overseas Development Administration, U.K.

Under the provisions of the Overseas Aid Act 1966, the Minister for Overseas Development is authorized to furnish financial, technical and other assistance for the purpose of promoting the economic development of a country or the social advancement of its people. In practice, subject to certain criteria being met, such assistance is given only at the request of the overseas government which, of course, determines its own needs, priorities, and fields in which it desires help. It therefore follows that the British Government does not as a matter of practice indicate general fields in any one area in which it is prepared to help more than another because this is for overseas governments to decide. For further information contact the Foreign and Commonwealth Office, Overseas Development Administration, Eland House, Stag Place, London SW1, England.

Rockefeller Brothers Fund

The Rockefeller Brothers Fund is a philanthropic organization based in New York City that makes grants to local, national, and international organizations depending on the general public for funds. Its international program, amounting to about U.S. \$1 million a year, currently concentrates on assistance toward the developing countries of Africa, Asia, and Latin America in the fields of natural resource management, rural development, training, and employment generation.

In the field of natural resource management, the Fund is currently supporting projects in Africa and Latin America. In Africa, after many years of assistance to national parks in East Africa, the Fund has turned to West Africa and is currently providing support to the School for the Training of Wildlife Specialists in Garoua, Cameroun. In Latin America, the Fund is helping FAO launch a program in wild-land management that presently consists of training and planning projects in Chile, Colombia, and Costa Rica.

To be considered by the Fund in its natural resource management program relating to developing countries, projects generally should: (1) relate to the solving of basic problems which currently form obstacles to the advancement of sound natural resource management; (2) act as catalysts; (3) be developed and implemented on a cooperative basis, especially with local agencies and local professionals at the grassroots level; (4) depend heavily on local inputs and support; and (5) provide information and methodologies which are useful to other countries.

The Fund's local, national, and international programs are continually being evaluated so that areas of current emphasis may not necessarily be areas of future emphasis. Also, with a great number and wide range of opportunities presented to the Fund, because of limited resources and program priorities, there are many interesting and worthwhile undertakings that cannot be responded to favorably.

The Rockefeller Brothers Fund is located at 30 Rockefeller Plaza, New York, N.Y. 10021, U.S.A.

Smithsonian Institution-Peace Corps Environmental Program

The Smithsonian Institution and the U.S. Peace Corps have undertaken a combined program to provide skilled volunteers for environmental assignments in developing countries. A large percentage of these assignments have occurred in the fields of natural resource conservation and ecological research. The emphasis of the program has been directed toward the provision of qualified applicants with Masters or Ph. D. degrees in their areas of specialization. Assignments cover a broad spectrum of scientific and technical fields—national park planning and management, preservation of endangered species, environmental monitoring, ecological research, wildlife management, air and water pollution research, watershed management, conservation education, environmental health, water resource development, forestry, fisheries research, etc.

The Smithsonian Institution works directly with host-country institutions in the development of assignments for this program and assists the Peace Corps and the host governments by obtaining the skilled volunteers requested for individual environmental assignments. The requesting institution designates the specific qualifications required for the assignment: academic and professional background, marital status, language proficiency, etc. The volunteer's salary, living allowance, international transportation, etc., are furnished by the Peace Corps. The host country is normally requested to furnish modest housing and the equipment required for the assignment. Most assignments are for 2 years' duration.

Approximately 300 volunteers have been placed in environmental assignments of this nature. Many of them are at work in national parks and equivalent reserves. The response to the program on the part of skilled applicants has been so large that the Smithsonian distributes each month brief summary backgrounds of more than 100 applicants who are awaiting placement in the program. When an individual applicant is selected for an assignment, his professional qualifications are reviewed by the host-country institution with which he will work.

The most frequently represented skills among applicants to the environmental program are:

Botany	Plant pathology	Marine biology
Conservation education	Range management	Oceanography
Ecology	Sanitary engineering	Ornithology
Entomology	Silviculture	Park administration
Environmental health	Water quality	Park planning
Environmental education	Ichthyology	Watershed management
Fish biology	Land management	Microbiology
Forestry	Landscape architecture	Wildlife biology
Herpetology	Limnology	Wildlife management
Hydrology	Mammalogy	Wood technology
		Zoology

In addition to the program with the Smithsonian Institution, the Peace Corps will initiate, in September 1972, a joint program with the U.S. National Park Service to provide qualified personnel in park planning, park administration, and environmental education.

The National Park Service will assist the Peace Corps to obtain applicants with professional experience in these fields and will conduct training programs to further prepare volunteers for their overseas assignments. Some of the volunteers available for park assignments will be U.S.N.P.S. staff serving with the Peace Corps during a 2-year leave of absence.

In addition, the Peace Corps will contract with the U.S. National Park Service to provide an experienced staff to assist in the overseas planning and development of park assignments for volunteers in this program.

Requests for volunteers from the Smithsonian Institution-Peace Corps program should be directed to the local Peace Corps Director by the host government institution concerned. If there is no Peace Corps office in the country for which volunteers are required, the request should be sent directly to the Office of Ecology, Smithsonian Institution, Washington, DC 20560, U.S.A.

Swedish International Development Authority

The Swedish Parliament has decided that a limited number of countries—today about a dozen—are to share bilateral Swedish assistance. At regular intervals, representatives of those countries discuss with SIDA the distribution of the grants for the following 3 or 4 years. Apart from contributions to those countries, SIDA supports multinational programs in different fields.

In principle, the recipient countries allocate the Swedish funds according to their own priorities. Thus, if they attach great value to the establishment and maintenance of national parks, they use a part of the Swedish contribution for this purpose. To some extent, of course, Swedish ideas do influence the sectorial distribution of development-aid funds. In general, SIDA takes a positive attitude toward requests from our recipient countries for aid to projects of an ecologically positive character, such as land reclamation and soil and water conservation. National park projects can, of course, sometimes be included in this category.

The aid policy of SIDA implies that we do not have a decided policy as to where our recipient countries allocate the funds we contribute. Further, it is of no use for developing countries other than our recipient countries to apply to Sweden for assistance to their national park programs. The present list of these countries comprises Bangladesh, Botswana, Cuba, the Democratic Republic of Vietnam, Ethiopia, India, Kenya, Tanzania, Tunisia, and Zambia.

Further information on the Swedish program can be obtained from the Swedish International Development Authority, 105 25 Stockholm, Sweden.

UNESCO and National Parks

Ever since IUCN was created in 1948 under its auspices, UNESCO has given continued support to this nongovernmental organization, through subventions and contracts of various kinds, for many activities relating to the promotion, study, and maintenance of national parks.

This close cooperation with IUCN, which is continuing and increasing, is far from being the sole activity of UNESCO in relation to national parks and nature reserves. It also acts directly, so to speak, at the global, regional, and national level. At the global level, it is worthwhile to recall the resolutions adopted at various sessions of the UNESCO General Conference, such as, for instance, at the 13th session, which were addressed directly to member states, urging them to take certain conservation measures within their respective territories. Experience has shown that such recommendations have some real effectiveness in promoting ideas at the governmental level and do provide support to those concerned with conservation in the various countries.

On a more practical level, UNESCO has been instrumental in the establishment of permanent structures or institutions aiming at the conservation of natural areas or of certain species. For instance it has sponsored the establishment of the Charles Darwin Foundation and provides continued expert assistance and equipment to the station in the Galapagos. Efforts are being made toward setting up similar machinery for the Rumphius Laboratory on the island of Ambon.

At the specific request of the country concerned, and using either funds provided by its regular budget, or by the United Nations Development Programme, UNESCO has sent a number of missions to member states to develop measures for conservation and maintenance of national parks. For instance, in Ethiopia, short-term and long-term missions were sent between 1963 and 1969 with the participation of such experts as Julian Huxley, Lloyd Swift, Théodore Monod, E. B. Worthington, Ian Grimwood, Leslie Brown, and J. H. Blower.

In the difficult times between 1961 and 1963 in what was then known as the Congo, the measures taken locally and the equipment provided under the direction of Alain Gille to Albert National Park and other parks played a little-known but very important role in the preservation of these unique resources. The Huxley mission to Central and East Africa (1960), the Aguesse mission to Guinea (1962), the Curry-Lindahl-Gille mission to Zaïre (1967), the Jungius-Pujol mission to Bolivia (1969), the Worthington mission to Jamaica (1970), the Petter mission to Madagascar (1971), and the de Rham mission to the Ivory Coast (1972) are further examples of this aspect of UNESCO's action.

At the same time, activities were developed on the regional level particularly through conferences, seminars, and training courses, either directly organized by UNESCO, or organized by IUCN or other bodies with UNESCO's assistance. Meetings of this kind have been organized in Africa, Latin America, the Middle East, South Asia and Southeast Asia, using again funds provided either under the regular program of UNESCO or under the UNDP regional activities. They contribute undoubtedly to the promotion of national parks in these regions and to the training of personnel for their planning and management. The establishment under UNDP funds of a regional ecologist in the UNESCO Science Office in Nairobi is developing this action further in Africa, and it is hoped that similar posts will be established to cover the needs of other regions.

The establishment of international conventions, in cooperation with FAO and IUCN, constitute another essential aspect of UNESCO's work in relation to national parks and conservation. Most important in this respect is the UNESCO convention on the protection of the world's cultural and natural heritage which will be considered at the

UNESCO General Conference in November 1972 and is designed in particular to provide international assistance to national parks and similar natural areas of outstanding interest. No doubt this convention, when it is signed and ratified, should play a major role in ensuring the safeguard of national parks.

Finally, the launching by UNESCO of the international research program on Man and the Biosphere (MAB) constitutes another important tool for the establishment and preservation of biological reserves, and, indirectly, of national parks. One of the projects established under this program is related to the "Conservation of natural areas and of the genetic material they contain," and proposes the development of a coordinated worldwide network of protected areas.

This project recognizes that the establishment of reserves, protected and managed in various ways, is not only of scientific, economic, educational, and recreational importance, but is essential for study of ecosystems and for the MAB where they represent the baselines or standards against which change can be measured, as well as the means for conserving gene pools of wild animal and plant species. It will be the responsibility of the national committees established in each country with the guidance received from the MAB International Coordinating Council, and eventually with assistance received from the international agencies cooperating in the program.

Thus, the development of the MAB program, together with the convention on the world heritage and the increased attention given in UNESCO's program as a whole to the concept of the quality of life, is likely to expand considerably UNESCO's action for the promotion of national parks and conservation of nature in the coming year.

UNESCO headquarters are at Place de Fontenoy, 75 Paris 7, France.

U.S. Agency for International Development

The U.S. Agency for International Development (AID) has, over the years, provided limited technical assistance and loan financing for the establishment and management of national parks and wildlife reserves in a number of developing nations. Technical support has included provision of consultants on park and wildlife management, training of participants abroad, and curriculum development and teacher training in the host countries; and development loans have financed construction of transportation and visitor facilities and purchase of maintenance equipment. Private American groups concerned with the preservation of wildlife resources and cultural sites have also contributed both funds and technical experts in response to direct requests from institutions in developing countries.

The total number of requests AID has received for assistance in this area has been small, reflecting the fact that the governments of most cooperating countries have heretofore not assigned the establishment of national parks a high priority within their development programs. In addition, countries seeking assistance have usually turned to several of the United Nations' specialized agencies which have been supporting a wide variety of projects related to national parks. It is recognized, however, that as population growth places increasing pressure on limited land and wildlife resources, the opportunity to develop tourism and the desire to preserve valuable wilderness areas and cultural sites

will undoubtedly stimulate a growing number of requests for such assistance. While it is anticipated that the United Nations will continue to be the principal source of development assistance, AID is prepared to consider proposals to provide technical and capital support for national park projects in cases where governments assign them a high priority within their national development programs, and where such proposals fall within existing sectors of concentration for development assistance as mutually agreed upon by AID and cooperating countries.

U.S. bilateral technical assistance may be able to play a special role in the survey and appraisal of candidate park areas, park design and integrated resource management, analysis of the economic and environmental consequences of park development, and training of business and resource managers for park operations.

The U.S. Agency for International Development can be addressed at the U.S. Department of State, Washington, DC 20523, U.S.A.

The World Bank

The World Bank in recent years has undertaken to finance development projects in the field of tourism and has also been paying ever-increasing attention to the environmental impact of its operations in its member countries. It is, therefore, logical for the Bank to be interested in and concerned with park development. Some economic development projects by virtue of location, nature, and operation can have an effect upon a park. A recent example involved the planned location of a power transmission line serving a hydroelectric project financed by the Bank in an African country. Examination of the proposed route revealed it to traverse a national game park in full view of a lodge recently completed by the government. That it detracted from the scenic qualities of the park was evident. The Bank undertook to negotiate with the borrower and the government for a rerouting of the line. The result was a route acceptable to park interests and the public utility company alike.

Projects which may have adverse effects on parks are carefully studied by the Bank in conjunction with the borrower and the government with a view to preventing or mitigating these consequences. Similarly, opportunities that may be presented by a project for enhancement of park values are sought out and incorporated wherever possible.

Assuming a government considered a park project to be among its priority investment proposals, such a proposal would be treated by the Bank in much the same manner as a tourism project of similar importance and subjected to the same economic and financial tests. In this regard, the project must show an acceptable economic rate of return and, of course, allow for the repayment of the loan from additional tax revenues resulting from its operation or specific taxes collected from some of the beneficiaries; i.e., tourists and/or owners and operators of tourist facilities. It is likely, in most cases, that park projects will show acceptable economic returns as part of a package of investments which includes tourism accommodation facilities, the benefits of which would be enhanced as a result of the establishment of the national park. It should also be stressed that a major portion of the cost of establishing such parks is likely to be the

cost of land acquisition for which the Bank Group would not be a suitable source of financing.

The Bank does not make outright grants-in-aid nor does it, with very few exceptions related to its own sectors of activity, provide funds for research as would a foundation. Headquarters for the International Bank for Reconstruction and Development (the World Bank) is at 1818 H Street NW., Washington, DC 20433, U.S.A.

The World Wildlife Fund and National Parks

The World Wildlife Fund believes that the establishment and good management of national parks is one of the most important factors in conservation of nature and wildlife. Since its inception in 1961, the Fund has worked constantly to encourage nations to declare more national parks, to stop encroachments and potential degradation of existing parks, and to finance the provision of expert advice, equipment, specialist staff, and, in some cases, purchase of land.

It is important to recognize that the World Wildlife Fund does not have at its disposal large funds which can be allocated at short notice to projects, however worthwhile. It is a fund-raising organization and its procedure is first to establish the importance, financial requirements, and urgency of projects, with the scientific advice of IUCN (International Union for Conservation of Nature and Natural Resources) leading to the assignment of priorities. The projects are then circulated to National Appeals in various countries which are then given the task of raising the necessary funds from various sources such as the general public, other foundations, and industry.

Early in 1972, the World Wildlife Fund announced the creation of a Biotope Conservation Fund specifically to receive donations for land purchase and to ensure continual availability of finance to safeguard threatened areas. These areas may be potential national parks. The thinking behind this special fund is that the WWF should be able to step in quickly to prevent the loss of important biotopes, but that any funds paid out should be considered as loans, repayable in due course by national or local authorities who, for various reasons, may not be able to act quickly. Where necessary, special earmarked donations will be sought to replenish the fund. The Biotope Conservation Fund, which is in the early stages of development, would thus be a revolving fund.

The World Wildlife Fund supports surveys and other activities leading to the establishment of national parks and the enhancement of their conservation status through proper management practices.

Protection of the habitat and of animal and plant species in parks is most important. The World Wildlife Fund also supports national park authorities in strengthening surveillance activities of national parks and for controlling illegal activities by providing equipment and training facilities for local staff.

Those seeking assistance should write to the Director General, World Wildlife Fund, 1110 Morges, Switzerland. Application forms can then be provided on which the full details can be given for consideration by WWF/IUCN specialists.

DISCUSSION

Dr. Michel Batisse (Panel Member: UNESCO): There are only a few points in the background paper to stress or amplify. The wide range of UNESCO expert help, whether on a regional basis, as in East Africa, or in a specific locality such as the Galapagos, and of the seminars and symposia which we sponsor or in which we collaborate, should perhaps be emphasized. So far, we have only made one or two initiatives in the educational sector, but this is because the problems involved are delicate, national educational systems are very diverse, and the way in which each should best be adapted to environmental questions has to be negotiated, as we always aim to do, individually with the country's Ministry of Education. Finally, the Man and the Biosphere Programme is often relevant to national parks; for instance, its Project 8 is concerned with establishing a network of reserves to ensure the continuance of a global system of genetic and ecological diversity. The interdisciplinary aspect of MAB and its close association with existing NGO environmental initiatives and programs are essential features, and it is hoped that will also have the effect of supporting national park authorities.

Prof. Antoon de Vos (Panel Member: FAO): Technical assistance through FAO can only be provided if requested by governments through the resident representative of UNDP for their country or region, whose job includes assisting in the drafting of applications. In the future, UNDP support will usually be given on the basis of a 5-year country allocation. If in a particular country's program no reference is made to parks or wildlife management needs, the park authority in that country may have difficulty in obtaining support. Other points worth stressing are that, for a complex project, it may be desirable to start by applying for an adviser(s) to help prepare it, and that in all projects the government has to make a counterpart contribution, so that if this is to be partly in the form of qualified personnel, it may be necessary to begin by requesting a fellowship(s) for the training of such personnel. A mission to a country to discuss how assistance can be obtained can be arranged at any time if a good case can be made out, indicating the urgency. FAO is cooperating increasingly with bilateral agencies and private foundations: for example, we have strong links with the Swedish agency SIDA and the Rockefeller Brothers Fund, the latter having supported the present assignment of Dr. Kenton Miller in Latin America. (In general we are in favor of a regional approach.) We are anxious to cooperate with UNESCO's MAB program and already have several relevant projects under way.

Dr. Gerardo Budowski (Panel Member: IUCN): In general, IUCN's role is a complementary one, often involving mediation between the country requesting help and the financial and technical sources of that help. For this purpose, our aim is to maintain scientific and technical advisory services; act as a clearinghouse for documentation; intervene when necessary, without the restrictions to which a governmental body would be subject but always after very careful scrutiny; and, in general, organize support for and by our members. Our closest relations are and must be with the World Wildlife Fund. For an application to or through WWF to be successful, the main requirements are that it should have a solid research basis, that its conservation content is clearly defined, and that, in developing countries particularly, local scientists and/or well-trained officials

should be involved wherever possible. Greater attention is likely to be given to a project if its implementation enhances the prestige of local conservationists and their organizations vis-à-vis official institutions, and it also increases the effectiveness of followup action.

Dr. Wolfgang Erz (Panel Member: Frankfurt Zoological Society): Our small organization has about 3,000 members, and the Director of Frankfurt Zoo, Professor Grzimek, is its President. The main aim is fundraising for conservation in parts of the world mentioned in the background paper, and we try to fill in gaps left by other aid organizations. For example, during the time of troubles in Zaïre, we took responsibility for the payment of the salary of one of the park directors and several of the staff; in East Africa we have contributed more than \$20,000 in the past 5 years to conservation and research in Tanzania, covering mainly equipment items; and \$24,000 to wildlife clubs in Kenya to support youth activities, to the National Park Service for equipment and research and public relations work, and to the Game Department for poacher control. The Society also, of course, contributes to projects within Germany itself, such as that quoted in the paper concerning our first national park proper. It may be useful, in conclusion, to mention how our funds are raised: this is only to a limited extent from membership fees and donations, and methods of greatly augmenting our resources include appeals for legacies, special campaigns supported by Professor Grzimek's monthly TV shows, such as the recent *Aktion Hilfe für die bedrohte Tierwelt* (which brought in large contributions from the "man in the street," mostly ranging from DM7 to DM30), and the royalties from the TV programs, films etc., contributed by Professor Grzimek himself. All these have enabled our help to reach a figure of about \$200,000 a year.

Richard S. R. Fitter (Panel Member: FPS): The point I wish to stress is that the Fauna Preservation Society can act really quickly, and it is in this way we seek to supplement, never conflict with, such organizations as WWF. Naturally, as the Society's name implies, our main field of interest is in endangered animal species and, in general, we specialize in giving help to small self-contained schemes.

Peter F. Jackson (Panel Member: WWF): The aim of the World Wildlife Fund, to conserve endangered animals, plants, and places, can, in our view, best be achieved by strategic injection of funds as "seed money." A large part of the 734 projects and the \$10 million raised for them have been concerned with national parks, and have included survey; park management planning; in a few critical situations, such as that of the Walia ibex of Ethiopia, the captive breeding of stocks of the endangered species; all kinds of equipment; and, more occasionally, land purchase. For the latter, a Biotope Conservation Fund, as mentioned in the background paper, has been specially established. Another point to stress is that WWF seldom has funds ready for immediate disposal; they have to be raised through National Appeals, with every possible help that can be obtained from the media. Much use is also made of special kinds of campaign such as that among the children of the Netherlands, Britain, Sweden, and Switzerland to support the extension and consolidation of Lake Nakuru National Park in Kenya.

Robert K. Poole (Panel Member: Peace Corps/Smithsonian): In 1970-71 the U.S. Peace Corps and the Smithsonian Institution launched a 2-year voluntary service program for natural resource conservation. Applications to work in the program are still in excess

of applications for our services, and we currently have about 300 people, mostly scientists, available. A recent development is the creation of a very similar joint program by the Peace Corps/U.S. National Park Service, centered around recruitment and training of park planners and environmental educationalists. In obtaining help through these two organizations, the essential thing is that a complete job description, background information, and assurances as to facilities (such as accommodation and transportation) which can be provided locally are included on the application.

Mario Andrés Boza (Costa Rica): The many different channels of help which have been described are of great interest, but it is always necessary to remember how easily they can be blocked by some senior person who says that the kind of help offered does not seem very important to him or that he proposes to give priority to aspects other than conservation. It is true that organizations which can maintain local offices, where their representatives can be in personal contact with the Ministries or Ministers concerned, are in a stronger position, although even then bureaucratic systems may prevent actual applications ever emerging. Perhaps what is needed is for aid organizations to be a little more aggressive in their approach. Offers of help should be "pushed" from the top down.

Prof. Antoon de Vos (Panel Member): I agree to much of what the last speaker says, but, of course, organizations such as FAO and UNESCO, just as much as governments, are often considerably hampered by red tape. Again, though we both maintain some regional offices, staff shortages are often a difficulty.

Dr. Marc J. Dourojeanni (Peru): The help of international agencies can often be decisive in the establishment of national parks, for which in Peru, for example, the first effective steps were undoubtedly owed to FAO and later to IUCN, WWF, and bilateral aid from Belgium, Britain, and Germany. Yet many international agencies still give low priority to conservation, lack the imagination and originality to suggest genuine new forms of land and soil use, and fall into precisely the same errors as the Third World which seeks their aid. In my university, for example, FAO established a Faculty of Forestry Sciences, the first in the country, but its whole emphasis was on industry, extraction, and inventory, with little reference to sustaining future production, i.e. conservation. All sorts of other projects have been assisted in Amazonia and on the western Andes slopes with little or no consideration of the need for reserves or the conservation of fauna; in the marine fishery projects, in which an important FAO group has been involved, no reference has been made to the idea of marine national parks. Instead, the accent is on such proposals as the extermination of predatory species as part of the fishing techniques to be applied. In short, I think that the policy and actions of many international aid organizations still need deep and sincere revision; land development projects should not continue to be based on traditional concepts involving heavy use of pesticides or unlimited destruction of forests by turning them over to the production of domestic livestock, and so on. Signs of some improvement in these attitudes, for example, toward balanced land use achieved through conservation, have only very recently become apparent in some of the great agencies.

My last point is that national parks are for mankind, but a large part of mankind has no resources for conserving them. Thus, it is natural that those who do have the resources should help those who do not, especially as the situation of the latter may to a large measure be due to the pressures exerted by the former, or even their direct activities (e.g. mining, or establishing industries in developing countries simply because the rules there for controlling industrial pollution are less strict). I do not mean that there may not be a greater need for national parks in wealthier countries, but conservation in view of its international interest has to be carried out by whoever has the economic potential to do it. It is perhaps significant in this context that the Yellowstone budget is three times as big as that of the whole Forest Service of Peru.

Dr. Michel Batisse (Panel Member): The shortcomings just described undoubtedly do exist, though they simply reflect the general trends in political thought, for example the belief that economic development is an absolute condition for the use of UNDP Funds. All the same, the mood is changing, and as soon as it becomes clear that this is how people want it (for politicians are, after all, dependent on people), I have no doubt that environment will play as big a part as development in the allocation of funds and help.

Robert James MacLachlan (New Zealand): In discussing international aid, let us not forget the scope for countries to help one another within a region. For the past 6 years, Australia has had an annual conference of State representatives to discuss national park problems; for the past 3 years New Zealand has been invited to participate and there have been supporting exchanges of material. This year the conference was widened, partly as a mark of recognition of the Yellowstone Centennial, to include all the countries of the South Pacific Commission. A second such conference is planned to be held in New Zealand in 1975, when it is hoped that some SPC countries who could not attend this year, such as Tonga and Fiji, will be represented. Meanwhile, New Zealand is offering all South Pacific countries advice and assistance in training and possibly, if requests come in, other types of technical assistance. These various regional initiatives should certainly help in the establishment of effective park systems in countries like Papua New Guinea, Fiji, and Western Samoa.

Hans Helmut Stoiber (Austria): The needs and deficiencies of continental Europe tend to get overlooked in these discussions about help. We have done our best to make some contribution to helping other parts of the world, but often lag behind ourselves in respect to our own national park systems.

Bal Siew Ramdial (Trinidad and Tobago): I wish that such organizations as FAO could find some formula for giving aid which would impose less strain on the resources of developing countries than the "matching contributions" principle. I also suggest that the fellowship program of many international agencies is poorly represented in the field of national park planning and management.

Prof. Antoon de Vos (Panel Member): It should, however, be remembered that the UNDP fellowship program, which can be at any level and may or may not involve specific training, is one that is entirely for the country applying for fellowships to decide.

José Rafael García (Venezuela): One of the kinds of help which is needed in Latin America is in setting up our own foundations and trusts, in other words help us to help ourselves.

Dr. José Candido de Melo Carvalho (Brazil): Another rather special kind of help to which attention may be drawn, in the same neotropical region just mentioned, concerns the techniques and costs of repopulating parks and reserves with species that have become extinct or severely depleted. Reference may be made in this connection to the manatee and some primates of Amazonia. Help is needed for establishing legally protected breeding sites, genetic banks, and, generally, guidelines for the controlled economic use of forests and biological reserves.

Allem Berhanu (Ethiopia): Despite the help my country has been given, mentioned specially in the reports about UNESCO, I would just like to say that further help will be needed for a long time to come.

Dr. Subhi A. Qasem (Jordan): A means of international aid which may become more important is the one which we are establishing in Azraq National Park. The research facilities in this 1,500-square-mile desert area are being developed by the University of Jordan, with national and international assistance, so the aim is to provide accommodations and facilities, not only for national students, but also for students from other countries, who would like to work in the park.

Percy de Alwis (Sri Lanka): I would like to give as an example of the kind of help that is often required, the need of our Wildlife Department for heavy machinery for desilting, deepening, and improving waterholes and tanks in our parks and reserves. Development work of this sort seems to be the only way of ensuring against heavy loss of animal life every time there is a failure of the monsoons, yet the plain fact is that we cannot afford it.

Dr. Gerardo Budowski (Panel Member): The kind of expense just mentioned is exactly the kind which ought to be met by a National Appeal of the World Wildlife Fund, and I would like to stress the importance of extending these National Appeals gradually to every country, as a method of coping with conservation needs. The same applies to the establishment of foundations or trusts, as mentioned by José Rafael Garcia; Costa Rica is a country that has recently set an example by establishing its own Environmental Foundation. IUCN would always be especially glad to assist in these self-help measures and, in conclusion, I hope that this session has given a better idea of all the aid available, as well as of the basic principle that the purpose of international organizations must be to strengthen local structures. This, in the long run, is the best approach to the effective conservation of the world's national parks.

SESSION XV

DEVELOPING PUBLIC SUPPORT

Tuesday, September 26, 2 to 3:30 p.m.

NEED AND BENEFITS OF PUBLIC SUPPORT FOR NATIONAL PARKS AND EQUIVALENT RESERVES

Chairman: E. Max Nicholson, U.K.
Rapporteur: Ing. Carlos F. Ponce del Prado, Peru
Panelists: Ing. Mario Andrés Boza, Costa Rica
Peter F. Jackson, WWF
Laurence W. Lane, Jr., U.S.A.
Dr. Alceo Magnanini, Brazil
Richard D. Piesse, Australia
Dr. Douglas H. Pimlott, Canada

RAPPORTEUR'S SUMMARY

E. Max Nicholson, who had kindly agreed to preside over this final working session, in the absence of the designated chairman, Dr. David P. S. Wasawo, pointed out that, although the discussion would have to be short, it was not in this instance tied to a background paper, so could be entirely flexible. He proposed, therefore, that the subject should be subdivided into three sections, each of which would be introduced by designated panelists.

For the first section—the strategy to be adopted in winning public support—the two panelists from Latin America, Mario Andrés Boza and Dr. Alceo Magnanini, gave examples of the problems encountered in a rather small and a very large country. Dr. Douglas H. Pimlott and Richard D. Piesse, from Canada and Australia respectively, and Peter F. Jackson, on behalf of the World Wildlife Fund, introduced the second section by outlining the organizational structure which had been found useful at the national and international level. Laurence W. Lane, Jr., led the discussion in the third section which concentrated on the right methods of using the media and other methods of communication between park authorities and the public.

In general, it was agreed that the future maintenance of national parks in whatever part of the world was very dependent on public support and the employment, for the purpose of winning that support, of a very wide variety of techniques, always with the aim of establishing the best possible coordination between the activities which are undertaken respectively by the private sector and by governmental agencies. The essential basis for this is the same in both cases, namely, the indoctrination of all levels of society with the principles of conservation. There lies the best hope of ensuring that the national park movement throughout the world will steadily gain in strength.

DISCUSSION

Opening the session, Chairman E. Max Nicholson stressed that the subject was a very important, urgent, and practical one, and that the aim of the discussion should be to produce realistic and specific guidelines. Although public support had been greatly developed in the 10 years since the First World Conference on National Parks, the pace of development now needed to be greatly speeded up. This can only be done by studying the varying ecosystems, of which man is a part and in which parks operate, and choosing the right processes and channels for the optimum productivity of popular interest. The bits and pieces of successful experience in many parts of the world need to be put together and properly evaluated.

The Chairman then suggested that the discussion be divided into three parts: (1) strategy, targets, and priorities; (2) structure and working of support; and (3) role of the media and public opinion. He added that for the first of these, on which the other two largely depended, there were at least five possible approaches, which might be conveniently listed as the "summit," "elite," "mass," "expanding circle," and "customer" approaches. It is always a hard choice to decide at which of these types of support to aim and to allot resources and priorities accordingly.

A. Strategy, targets, and priorities

Mario Andrés Boza (Panel Member): The creation of a favorable public opinion depends on hundreds of small factors, impossible to sum up in a few minutes. There are no magic formulas: the park director must take advantage of every opportunity, of the "tricks" that have been successful in other countries and, most importantly, since he should have no scruples about it in furtherance of the interests of his parks, of popular religious, political, or national sentiments. An example of the last-mentioned is what is now Santa Rosa National Park of Costa Rica, which could be said to have originated from a public outcry about the land it now occupies, belonging to the family of one of the Latin American dictators: "How can it be that the cradle of our liberty is now the property of X?"

It is a fact that the ability to establish a national park system in a developing country will largely depend on the support and active assistance of the public; this at least has been the experience in Costa Rica, which can be summed up briefly as follows: We have relied on five main methods: (1) continuing a propaganda campaign, aiming at the publication in newspapers, agricultural journals, and cultural reviews of something about the parks not less than once a fortnight (it is significant that, to start with, we had to write all the articles, but now, 2 years later, about half the contributions are made by university students and other enthusiasts); (2) establishing a regular program of illustrated talks in the secondary schools (this paid off very well in one instance, where the pupils made such a fuss about the incursion of cattle into one of our parks that the problem was solved straight away); (3) providing special short courses for biology students toward the end of their university careers or training as teachers, so that when they go on to teach they are inclined to think of and refer to the national

parks, which has in turn led to the compulsory coverage of the latter in the secondary school syllabus; (4) establishing good relations with private and official organized groups, such as forestry associations, garden clubs, and Rotary clubs, etc. (the assistance of such groups in protesting, suing, or taking other tough action against any governmental department or official threatening to do something against the interest of the parks—the kind of thing which the park director himself is seldom in the position to do—is often most valuable); and (5) concentrating on such facilities for visitors as camping and picnic grounds, paths, and, above all, information centers, which can help people to appreciate and see something of the wildlife of an area as well as just to admire the scenery. There are, of course, many other methods of stimulating support, such as creating groups of "friends" of particular parks, making sure that the staff is always courteous and helpful, providing library and scientific facilities, inviting distinguished scientists from other countries to visit and write up the parks; and, perhaps most important, the constant indoctrination of local journalists, tourist agencies, etc.: it is well worth spending some money to cover their expenses—and a good lunch!—to get the story of environmental conservation in the parks across to them and see it published in their newspapers, magazines, and brochures.

Dr. Alceo Magnanini (Panel Member): We are concerned at this session with many complex questions, which have a bearing on our own survival as a species. There is probably general agreement about the broad basis of that concern: *what is it all about?* the creation of more parks and equivalent reserves; *where?* throughout the world; *when?* now, urgently, because of the great acceleration of man's ability to disturb the natural world; *for what purpose?* to retain some samples of primitive nature in a planet which is undergoing anthropogenic alterations; *why?* so that comparative material may be available for the study of the interrelations between natural and cultural landscape, so that educationalists may have somewhere to give practical demonstrations, and so that everyone may have some possibility of appreciating the intellectual values at the root of their own well being, for which direct contact with nature is essential; *how?* this is fundamental and has already been discussed by the previous speaker, though we need to give further consideration to whether the same tactics and strategy are applicable in all countries, despite varying national characteristics.

Public support is basic to the solution of all these questions and it falls into two main categories, that of the leaders and that of the masses. It is important, in some countries the most important thing, that all professional and administrative cadres should have some knowledge of ecology, for conservation or the best national use of natural resources is nothing more than practical ecology. To obtain this understanding is often difficult, because of the background of some professional training, e.g., the tendency of economists to think that what they are concerned with is a branch of mathematics rather than of human ecology. To achieve success in the educational programs involved, much obviously depends on the size and resources of the country. In my country of Brazil, as big as the U.S.A. (without Alaska) but with less than half its population (about 100 million), all of whom are Portuguese speaking, about 60 percent literate and nearly 65 percent less than 15 years of age, the task is enormous. It is no coincidence, therefore, that our three representatives at this Conference have a university or teaching back-

ground. We feel that our greatest problem is the middle or long-term one of training future leaders, remembering that the technological capacity for change in a good or bad direction will not last very much longer. For this purpose, we are making full use of the literature provided by international organizations, such as the IUCN Bulletin of which some 300 copies are distributed monthly, though we are faced by a special language difficulty, to which I have already referred, and have to spend a great deal of time and money on translation. We are also relying very much on the media and the excellent films distributed by such organizations as the National Geographic Society, which have had a tremendous impact.

Perhaps, in conclusion, I might make a plea that the Third World Conference on National Parks should be held within another 5 years, and preferably in a developing country with few, if any, parks, so as to strengthen and elaborate the efforts of which I have been speaking. I believe it would also have more impact on the public, not only in the host country, but also in most developing areas.

Zafar Futehally (India): It emerges clearly from the remarks of the panelists that we are concerned with a two-way process: on the one hand of educating the decision makers into being aware of ecological considerations in their planning and, on the other hand, of trying to interest and involve the public in environmental issues. In India, we have recently set up a National Committee for Environmental Planning and Coordination, but it needs much more technical assistance from international experts before it will be able to translate its policies into effective action. In short, although an enlightened administration plus an educated people would clearly be the ideal, we have still a very long way to go. Meanwhile, I would agree with Dr. Alceo Magnanini that the objective of "training" the administrators should have priority, because it is likely to be much more effective than attempting to educate a vast population in the hope that they will ultimately motivate the administration.

Patrick Shea Pineda (Philippines): Not long before leaving for this Conference, we launched in the Philippines a project for converting a mountain in the Bataan peninsula, Mount Samat, into a "Mountain of Peace," where friends and relatives of those who died in the World War II could make pilgrimages to plant trees in their memory. The branches would symbolize human hands reaching out for other men, for that elusive eternal peace, and ultimately, we hope, a forested "Mountain of Peace" would symbolize universal brotherhood. But somehow this proposal, though a seemingly fine one, is not enough if we are ever to win the complete support and trust of the people who long for peace. We must recognize, as we have avoided doing at this Conference, that destruction still goes on, that war and the instruments of war are still destroying wilderness in a way which may affect generations to come, and that unless some way is found of prohibiting these activities, converting what has been ruined back to its original environment, and recognizing love of wilderness as an instrument for peace, we shall never finally find one common language to speak.

B. Structure and operation of public support

Dr. Douglas H. Pimlott (Panel Member): The intensive use of advertising to sell commercial products has led to many misconceptions in North America about what constitutes appropriate means of gaining support for conservation programs. Recent experience indicates that much more attention needs to be paid to these programs or, in other words, to what the relevant organizations do rather than to what they say they are doing. There has been a dramatic evolution of private conservation organizations in this region in the past 25 years: they are attracting a wide variety of citizens, including professional conservationists, and are developing a strong capability for examining programs and making the results of their investigations known to the public. When policies and programs are inadequate, no amount of public relations work will win support for them; the private organizations are able to advertise the facts very effectively and sometimes cause the governmental agencies concerned to lose much public support. Although it may seem strange, it can also be true that the agency criticized sometimes benefits a great deal from that criticism. This occurs when the problems are caused by political or other forces which the park authorities cannot by themselves change or control. For example, in Ontario during the past 5 years, a number of private organizations have disagreed very strongly with policies which allowed large-scale forest-felling in many sectors of the Provincial parks. One park had 24 different companies operating within its boundaries, as part of the so-called multiple-use policy which the forestry branch of the Ministry of Natural Resources was working hard to maintain. This policy has been under very active public discussion during the last 4 years and, in the process, the National Parks Branch has lost a great deal of support, because of its acquiescence. As a result of the debate, however, commercial forestry has now been stopped in two parks and the National Parks Branch has been strengthened and begun to develop the status which will permit it to face the pressures of other governmental branches and of politics. Two more lessons that can be learned are that park administrators will, in future, have to make certain that their programs measure up to the descriptions of them and, secondly, that public support cannot always be measured by the words of praise one actually receives.

Richard D. Piesse (Panel Member): Our experience in Australia suggests that four ways of developing public support for national parks and equivalent reserves are (1) establishing strong citizen park associations and kindred societies; (2) encouraging the appointment of special correspondents and feature writers on nature conservation to the staffs of important newspapers; (3) creating a popular natural history-cum-travel magazine, such as Australia's *Walkabout* or California's *Sunset*; and (4) launching a national non-governmental conservation organization, such as the Australian Conservation Foundation, the development of which I propose to outline, as a case study, in the remainder of my remarks.

The Foundation is a national voluntary scientific and educational organization set up in 1965, which now has more than 7,500 members. At the time of its establishment, the position in Australia, where land and water and their resources are under the control of the States but financial power lies largely in the hands of the Commonwealth Govern-

ment, was as follows: there was little interest or understanding of the aims or needs of conservation of natural resources among either the Commonwealth or State Governments or the public at large; revenue-earning departments, such as forestry, water, and fisheries, were comparatively well developed at State level, but the nature conservation movement was uncoordinated and lacked a national voice; there were many conservation issues and problems, such as the Barrier Reef, or kangaroo and waterfowl exploitation, which were and still are national in character and require solutions through cooperation between the States; and there was no "bridge" available between the sciences and the community or between the public and the national government in respect to conservation problems.

The Foundation was designed, accordingly, to fill these vacuums and meet these needs, by promoting commonwealthwide understanding and practice of conservation. While similar in its aims to the Conservation Foundation of the United States, it differs in having various categories of membership, including corporations and member bodies, and in receiving a Commonwealth Government grant, amounting in 1972-73 to \$A150,000 out of a total income of \$A262,000. It has the same concern, in a rapidly developing world, for maintaining the quality of the environment by intelligent watchfulness which takes into account the community's many and various needs. A major objective from the start has been to encourage the development of a national park and reserve system, covering representative samples of the principal vegetation types and outstanding landforms.

As Dr. Alceo Magnanini, Zafar Futehally, and others have already stressed, there are basically two levels at which any voluntary organization can influence the support given to conservation. One can concentrate on the apex of the pyramid, the decision makers, for which purpose it is essential to win their respect and retain one's own credibility by producing well-documented, politically oriented requests and recommendations, which are also politically feasible. Or, since this by itself will not necessarily ensure success, one can, like the Australian Conservation Foundation as its membership and resources grew, turn one's attention to the general public. We are now, for example, about to publish a magazine directed at the laymen who are potentially conservationists. Involvement with these two levels of activity has inevitably meant that, on occasion, the Foundation must act as a pressure group; we become activist in our operations on a selective basis, for instance, when we believe that an important conservation principle must be demonstrated or defended, as in opposing an application to carry out mining in an area carefully chosen for reservation by a proper and expert authority.

Finally, it is worth noting that one should be careful not to become overdependent on the interest or financial aid of any particular one of the four main categories of potential supporters, namely government, industry and commerce (both of them tending to be "two-edged"), scientists (whose views can often be too narrow), or too large or unmanageable a membership of the general public (which runs the risk of a "tail wagging the dog" situation).

Peter F. Jackson (Panel Member): The effectiveness of international, as well as national, conservation organizations depends to a large extent on the informed support of the public at large and the scientific community in particular. It is not enough for such

organizations to be active, they must be seen to be active; their strength is immeasurably increased by the kind of support which can only be won by keeping supporters informed of exactly what is being done. It is equally important for the enhancement of the reputation and influence of conservation organizations that the scientific community should be convinced that the conservation effort has a sound scientific, and not merely emotional, basis. With these objectives in view, the practical method of operation, followed by such organizations as IUCN and WWF, consists both in maintaining a flow of information through regular bulletins and newsletters and also, when occasion demands, offering prompt informed comment, although a decision has sometimes to be made whether approaches to a government should be made public or whether such publicity would be counter-productive. In general, our attitude is that publicized comment should always be constructive rather than denunciatory.

WWF's primary function is to raise money for conservation projects, so its publicity must be directed to creating a suitable climate, which at the same time helps to awaken a public awareness that, in turn, exercises an influence on decision makers. For example, the campaign to stop the drain on spotted cats for the luxury garment trade has certainly created a climate in many places in which dealing in, processing, or wearing of the furs of endangered species is beginning to be considered socially reprehensible. Television is, of course, a most powerful tool in creating such a climate and one can point to the impact in Britain in recent months of TV showings of films on whales and wolves, which have aroused a considerable sympathetic feeling and better understanding of the issues involved in the conservation of those animals.

My last two points on operational methods for obtaining public support are, first, that it is always important to be responsive to approaches from individuals on matters which have caused them concern, to treat them with respect and consideration, even if they sometimes seem to be naive or emotional; and, second, the fact that to get material into the press, particularly the daily press, it must be topical and also concise (in view of the demands on space): it is especially valuable to stress any local angle, since newspapers like news of community interest involving home areas and local people.

Anthony Wayne Smith (U.S.A.): The National Parks and Conservation Association, of which I am President, is a good example of one of the private organizations to which reference has been made. With our large membership, we have been able on many occasions to exercise a beneficial influence on controversial issues, such as those of the road proposed for Assateague National Seashore or the nuclear tests in Alaska. For the past 18 years, there has also been an effective Citizens' Committee for Natural Resources and we are working toward an environmental coalition for North America, in which farmers' organizations and industrial unions play a full part.

George B. Hartzog, Jr. (U.S.A.): It has been said that praise, like strong brandy, should be sniffed but never drunk, but the favorable reception given to our efforts to establish a good working relationship between the citizens' organization mentioned by the previous speaker and the National Park Service means a lot to us. The difficulty is, of course, that the former are responsible to their membership only, whereas the Service is responsible to the Congress. Nevertheless, our system of sitting down together for discussions every 3 or 4 months has paid off.

J. Ross Vincent (U.S.A.): The title of this session and the discussions thus far seem to suggest that the best way to develop support for parks is to engage in massive programs designed to manipulate public opinion. This approach has been used widely in the past in other areas and has scored some successes in the short term, but has usually failed in the long run; there is no reason to expect that it will work in the present context, either. The only method which holds any real hope of developing significant and sustained public support for the parks is to actively involve the public in park management decisions. This will not be easy or happen overnight, but without public involvement in decisionmaking, public understanding of the park planning process will be superficial and public support fragile. We should pay much more attention, therefore, to how we can prepare the public to participate in an effective way, rather than to hope they will follow while others make decisions about how their parks will be defined, acquired, managed, and used.

E. Max Nicholson (Chairman): The snag about the last suggestion is that in very many of the most important countries from the conservation point of view, for example in India, as Zafar Futehally has emphasized, necessary channels for any form of widespread public participation simply do not exist and would take very many years to construct, by which time little might be left on which it would be worth making decisions.

C. Role of the media and public opinion

Laurence W. Lane, Jr. (Panel Member): Quite a number of the speakers in the previous sections of this discussion have already touched on the subject which I have been asked to introduce. I feel the urge, therefore, to concentrate on an aspect of attitude and frame of mind that is essential to ultimately justify the support of the media and of the general public influenced by the media. No doubt every country has its variation of the saying "you can't make a silk purse out of a sow's ear." In brief, it is dangerous and sacrifices longrange goals to exaggerate, mislead, or otherwise build up an image of great substance and significance—whether it be to gain a favorable opinion of government officials or to generate citizen support—that cannot stand the heat of close investigation.

As a life-long member of the communications industry and having served with many organizations where success ultimately depended upon the goodwill and support of the public and mass media, I should stress this point most emphatically. Lack of complete frankness in gaining public support has weakened and even killed many projects that had the highest level of setting priorities and establishing an expert organization. There is no worse sin against a reporter than to make him feel he has been misinformed, and the public is increasingly resentful of misleading information, whether from an advertisement extolling the advantages of a new refrigerator or an editorial describing the virtues of a new national park.

On the other hand, there is no greater compliment than the feeling you are getting the truth and a balanced picture that is rarely all roses. Everyone's garden has a weed—even if it is only a seed hiding in the soil and threatening to sprout into view if not attended to. The public responds to frankness. Increasingly, a world society of curious and adventuresome people reacts favorably and with less caution to a situation where there

is an assurance that we have all the facts—good and bad. One of the strongest responses our *Sunset* magazine editors ever had to an editorial was to one with the headline "the roads are terrible, the mosquitoes are huge, but the scenery is beautiful and the fishing is usually great!"

This does not mean that honesty will excuse unsound objectives, sloppy organization, or stupidity. But accepting the critical need for the best effort in these areas, I strongly urge the importance of a reputation for an "open door" policy of access to all essential information, to gain the initial confidence, and later the decision, from public officials and mass media, to accept your beliefs and to work on your behalf to help you gain full public support for your objectives.

Dr. Stefan Myczkowski (Poland): The starting point for public support for national parks and for interest in environmental issues in Poland in recent years has tended to be among university students and latterly has resulted in an organized movement attached to the Polish Students Union. One of its most popular manifestations are the study camps held in the national parks during the summer holidays. They are an entirely voluntary, out-of-school activity, but university teachers and conservation specialists assist with them. The students work in groups based on various disciplines, from botany, zoology, pedology, geology, and geography to landscape planning, water management, archeology and history, economics, and legislation; they rely on comparative studies of the material in the parks and in adjacent areas. At the end, all groups come together, synthesize their results and prepare a multidisciplinary evaluation, which is made available to the authorities and institutions concerned and often published. Cracow, with its 12 colleges and universities, is the center of this movement, which, in February 1973, is due to hold an international conference to which it is expected that about 40 foreign participants will be invited. I would be happy to give details to anyone interested.

E. Max Nicholson (Chairman): I might make the point that nothing that has been said alters the fact that public criticism of national parks can be regarded as a form of support—as opposed to the apathy which indicates disinterest. Starting with such criticism, many instances of progress can be quoted—the classic recent example of victory, in an unpromising situation, being the affair of Vanoise National Park in France.

Albert L. D. Mongi (Tanzania): It is perhaps worth noting that in my country public support is often linked to "grassroots" involvement in the original proposal for establishing a national park. The common course of events, of which there have been several recent instances, is that the people living in the immediate periphery of a suitable area for a national park or reserve raise the matter in their Ward and District Development and Planning Committees. If the proposal receives support and is endorsed, it is almost invariably ratified by Parliament. Any conflicts of interest which later arise between the park and the local people can usually be dealt with quite easily since the park was a local idea in the first place.

There being no further time available, Chairman E. Max Nicholson closed the discussion and with it the working sessions of the Conference. It was clear that, despite the wide field that had been covered, the great variety of views expressed, and the large number of contributors (in addition to the comments of the chairman, authors, and panelists, more than 250 interventions had been made from the floor), there would have been much more to be said and many new points to be added if more days and hours had been available. Toward the close, for example, a paper entitled "Suggestions for National Parks" was tabled and distributed by Robert Ermerins (U.S.A.) on behalf of a group of American and Canadian students who have formed a "Student Alliance for Landscape Architecture"; it included some novel ideas such as parks or sections of parks specially designed for minority groups, as well as several variations on the theme of the ideas that had come up during the 5 days of discussions.

The meeting was adjourned after a special round of applause for Cochairman of the Conference George B. Hartzog Jr., who, as Panel Member Lane reminded those present, had played a leading part in the work of the Centennial Commission which had started its preparations for the Conference little more than a year previously.

SESSION XVI

REVIEW OF CONFERENCE DISCUSSIONS

Tuesday, September 26, 3:34 to 5 p.m.

REPORTS OF RAPPORTEURS

Chairman: Sir Hugh Elliott, U.K.

Panelists: Session Rapporteurs

When the Conference was reconvened, Sir Hugh Elliott as Rapporteur General reviewed the results of the 14 working sessions. Sir Hugh explained that as many of these sessions had been held in pairs, it had been impossible for anyone to attend them all, fully, so that before participants met again the next day for the closing session and to consider the recommendations of the Conference, they might be glad to be given an overall impression of some of the main points that had emerged in the presentation of the papers and the discussions.

That it was possible for this to be done at all was a great tribute to, and achievement on the part of, the rapporteurs, particularly those of the later sessions, who had had to sift and summarize a mass of material within a very short time and now had less than 5 minutes each to present it! In the circumstances, no specific record of what was said at Session XVI would be included in the Proceedings of the Conference, but the rapporteurs' summaries would preface the reports of Sessions II to XV. To make sure that nothing of importance was left out of the record of the deliberations of the past few days, the Chairman expressed the hope that all contributors, even if their interventions had been squeezed out by lack of time, would make sure before they left for home that the rapporteur of the session concerned received a written version of what they had said or had hoped to say. One of the interesting things about the discussions had been the amount of overlap and interplay between what at first sight might seem rather different topics. This was, of course, exactly what any ecologist would expect, but the aim of the final Proceedings, which it was hoped to have in the hands of participants before memories became too blurred and before the anniversary of today's meeting, would be to set out all the views that had been expressed in a way that would make future use and reference easy and bring out the complex interrelationships and vital considerations in the past, present, and future of national parks.

SESSION XVII

CONCLUSIONS

Wednesday, September 27, 1972, 9 a.m. to 12:15 p.m.

ADOPTION OF RECOMMENDATIONS AND CLOSING STATEMENTS

On the invitation of Conference Secretary-General Roger J. Contor, Dr. Gerardo Budowski took the chair. Dr. Budowski said that his first and very pleasant duty was to call on Chairman Edmund B. Thornton of the National Parks Centennial Commission to announce the last in the series of awards recognizing distinguished services in the national park movement. Chairman Thornton said that these final awards of the Second World Conference were made *in absentia* to six persons, four in the United States and two abroad, who, although prevented by circumstances from being present today, had contributed so much in their different ways to the advancement of the world movement. He then read the citations. The names of the recipients are set out in appendix B.

Chairman Budowski next called on Dr. M. E. Duncan Poore, Chairman of the Recommendations Committee, to present the committee's report.

Dr. M. E. Duncan Poore (U.K.): It is both my duty and pleasure on behalf of the committee which, under my chairmanship, was entrusted by the Conference, in Session I, with the interesting and also onerous responsibility of drawing up recommendations, to present them to you. A final draft of the 20 has now been circulated, together with a recapitulation of the rules of procedure or terms of reference, of which 3 are particularly relevant at this point: first, the recommendations were to be based both on suggestions or drafts put forward by participants and, also, on the deliberations of the committee itself; second, recommendations concerning individual persons would not be accepted; and, third and similarly, it would not be feasible to include recommendations about individual parks. Nevertheless, the committee believes that the draft recommendations cover all issues of concern raised by participants and reflect, by their very different character from the recommendations of the First World Conference on National Parks, how very much has been accomplished and how much the climate of opinion has developed in the last 10 years. The great debt owed to participants, their suggestions and their excellent cooperation during the drafting processes, can, therefore, hardly be overstated. The committee's task was not easy, but without the cooperation and consideration received it would have been well nigh impossible. Inevitably, with a group of persons of this size, the views of those who have participated in the work have sometimes been in conflict, but the aim has always been to try to extract the principle behind the conflict and to present in the recommendation the essential issue which has majority support.

Altogether, more than 50 drafts of recommendations were submitted to the committee and another 6 or so were generated by the committee itself, from which the first draft

of 18 recommendations circulated to conference participants was prepared. More than 100 written amendments to this first draft were received, from which the final draft of 20 recommendations now under consideration was prepared. Needless to say, if some 60 recommendations and 100 amendments are condensed in this way, the original form of words and the location of the ideas involved may not be immediately recognizable in the resulting text, but the committee trusts that all essential points are included somewhere in their appropriate context.

This does not necessarily mean that all suggestions received by the committee have been included. Some were adjudged to be outside the terms of reference of the Conference (on which we have always sought a ruling from the Steering Committee) or otherwise too impractical; examples are the proposals concerned with the need to consider ecological principles when evaluating and executing development projects, or one recommendation which referred to the effects of slash-and-burn agriculture. These seemed to us to have been taken care of by, or more appropriate to, the Stockholm Conference and the recent IUCN 11th General Assembly at Banff. But the committee hopes that such suggestions will appear briefly in the record, under the heading of my present remarks, in the Proceedings of this Conference. The same applies to several other useful ideas, which for one reason or another it has not been possible to incorporate in our draft recommendations: the potential use of parks in developing countries to relieve pressure on parks in industrialized countries, together with appropriate tourism adjustments to that end; the substitution of some new nomenclature to replace the traditional references to "developing" and "developed" countries, which we felt could not be pursued at this stage without causing confusion; the impressive initiative taken by Iran in proposing to set up within its territory an International Environmental Reserve under an international board of control; the various projects for helping the international exchange of experts and, especially students, in the national park field, such as "Operation Crossroads Africa"; the development of a private association of individuals interested in marine conservation and the activities of the American Revolution Bicentennial Commission; and finally the proposal for the holding of a Youth Conference before the Third World Conference on National Parks (a proposal which has been passed on through the Steering Committee to those concerned with planning for the latter). In short, I think we have done our best to see that all important views and ideas are either in the recommendations or will be mentioned in the Proceedings.

In conclusion, there are one or two general points to be noted about the recommendations. Their order has been determined by purely logistic considerations of typing and reference, but their final order, which should obviously be as logical as possible and on which any suggestions are welcome, can suitably be left to the Secretariat. Secondly, we would like it to be placed on record that where it is implied that a recommendation should be submitted to a Government and any ambiguity is involved in this, it is understood that it should be submitted at all appropriate levels—Federal, State, or otherwise. Thirdly, there are two matters of outstanding importance, not reflected in the recommendations nor strictly the affair of a National Park Conference, yet affecting the whole future of parks, which we suggest should be covered by a very carefully worded preamble to the recommendations and again drafted by the Secretariat. I refer,

in the first place, to world population growth, that underlying cause of so many problems of the world and not least of the national parks (it affects the whole business of planning, managing, and safeguarding park areas); and, second, to the fact that national parks alone cannot be effective in conserving the world's natural heritage—the principles, and values for which they stand need to be applied to the world as a whole.

I now propose to introduce the draft recommendations, one by one, for approval, remembering that there are certain provisions in the rules of procedure which are particularly relevant at this point. The first is that we are present at this Conference as participants and experts, not delegates or representatives of particular countries and interests, so that we are voting on the recommendations as individuals, with expert knowledge, we hope, of the subjects involved in the recommendations. Second, under rules 9 and 10, we are debarred from adding recommendations, or making major, substantive changes (recommendations must either be accepted or rejected), but can suggest editorial adjustments which, if accepted by the Conference, can go back to the Secretariat for use in the final editing of the text. In the latter connection, I would mention that the translators have been working under very great pressure (the work of the committee has had to be conducted in English because of time limitations), so that the French and Spanish versions of the recommendations are no doubt in need of very considerable correction: this, again, I feel can be safely left to the considered and methodical attention of the Secretariat when preparing the final texts for publication.

Dr. Poore then took the meeting through the 20 recommendations, several of which attracted considerable debate but all of which, after some agreed modifications, were finally adopted. Voting was by show of hands and no recommendation, phrase, or amendment was accepted unless it was clear that a very substantial majority of those present were in favor. The text of the recommendations as approved and edited by the Secretariat, in accordance with the instructions of the Conference, follow as part of this report of the closing session.

Recommendations

The establishment of a comprehensive series of national parks and reserves and their effective planning and management is only a part, although a vital and important part, of world action in the conservation of natural and cultural features and values. The Conference was conscious of the pressures resulting from the rapid growth of human populations and from the development of both primary and secondary industry, which involve more pollution and encroachment on natural areas.

Although the recommendations of the Conference relate mainly to issues directly concerning national parks, it was emphasized that conservation principles must be applied to planning and management of all natural resources. The recommendations are not comprehensive, but are directed to those matters that the Conference felt were of urgent and immediate concern. It was agreed that special mention would be made here of one proposed amendment, to broaden Recommendation 18 to embrace all forms of education, including university degree programs, on which the Conference vote was about equally divided. This point is not made a part of the formal recommendation because a majority was not obtained in its support, but it was considered too important not to report in the record.

The Conference was not of an intergovernmental character and, in consequence, it decided that its final conclusions should only be in the form of recommendations to governments and various agencies concerned, as follows:

1. CONSERVATION OF REPRESENTATIVE ECOSYSTEMS

Recalling Recommendations 2 and 3 of the First World Conference on National Parks concerning the constitution of a series of natural reserves for the conservation of representative habitats;

Recalling, also, Project 8 of the Unesco Man and the Biosphere Programme concerned with promoting the conservation of natural areas and genetic resources through the establishment of a coordinated worldwide network of protected areas;

Considering Principle 2 of the Declaration of the United Nations Conference on the Human Environment (Stockholm, 1972) and recommendations in the Action Plan of that Conference calling for the safeguarding of representative samples of natural ecosystems;

Being aware of the action taken by the International Union for Conservation of Nature and Natural Resources (IUCN) and the International Biological Programme in assembling information about representative ecosystems and their conservation status;

Recognizing the particular threats to tropical forests and grasslands, polar regions, and island ecosystems and coral reefs because of development programs;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Expresses satisfaction at the action taken by those nations that have successfully established national parks and other protected areas;

Calls upon all governments to widen the coverage of their protected areas so as to ensure that adequate and representative samples of natural biomes and ecosystems throughout the world are conserved in a coordinated system of national parks and related protected areas, and that the selection and setting aside of such areas should be considered as an essential element in regional and natural land-use planning;

Proposes in this connection that high priority be given to the conservation of representative biomes and ecosystems on land and sea that are still virtually undisturbed, those in danger of disappearing totally, and those containing threatened species and important genetic resources;

And, in particular, proposes that special attention be given to tropical forests and grasslands, polar regions, and island ecosystems and coral reefs;

Urges all agencies providing technical and financial assistance, particularly those in the U.N. system, to give high priority to requests for help in establishing, developing, and managing additional protected areas;

And, in particular, invites IUCN to intensify its activities connected with the collection of data on representative ecosystems and the publication of a World Directory of National Parks and Other Protected Areas.

2. CONSERVATION OF TROPICAL RAIN FOREST ECOSYSTEMS

Recalling Recommendation 2 of the IUCN 11th General Assembly (Banff, 1972) concerning the conservation and development of tropical rain forests;

Welcoming the high priority being given to this topic in the Man and the Biosphere Programme of Unesco (Project 1), the programs of FAO and the projects of IUCN/WWF;

Recognizing the rapidly accelerating destruction of these ecosystems now proceeding in many countries and the consequent danger of extinction of plant and animal species and communities, and depletion of genetic resources;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Draws attention to the paucity of protected areas in the tropical forest biomes;

Urges governments concerned, acting either alone or in concert, to take effective steps to increase protected areas of virtually untouched natural forests of the humid tropics;

And recommends that financial help from international sources be made available for this purpose.

3. CONSERVATION OF NORTH POLAR AND SUBPOLAR ECOSYSTEMS

Considering that the present numbers and distribution of protected areas in the north polar and subpolar regions are inadequate to ensure that samples of representative ecosystems from all bioclimatic zones in these regions are safeguarded;

Recognizing that the discovery and extraction of petroleum and mineral resources is proceeding at an unprecedented rate and threatens to damage or destroy ecosystems in many parts of these regions;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Commends those nations that have taken steps to protect representative ecosystems, including those sites designated under the International Biological Programme, by establishing national parks or other protected areas;

And urges all nations concerned to expand as rapidly as possible their networks of protected areas to accomplish the above purposes.

4. MARINE NATIONAL PARKS AND RESERVES

Recalling Recommendation 15 of the First World Conference on National Parks urging that governments extend existing national parks and equivalent reserves with shorelines to appropriate offshore boundaries;

Expressing satisfaction at the action already taken by some countries to establish marine national parks and other protected areas to conserve underwater habitats of special significance, and sites where the remains of past cultures are to be found under the sea;

Being informed of action taken by IUCN to prepare guidelines for the establishment of marine national parks and other protected areas;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Urges all governments concerned to set aside appropriate marine areas as national parks and reserves and to take action to extend the boundaries of existing terrestrial national parks and reserves to include representative marine ecosystems.

5. ESTABLISHMENT OF ANTARCTICA AS A WORLD PARK UNDER UNITED NATIONS AUSPICES

Recognizing the great scientific and esthetic value of the unaltered natural ecosystems of the Antarctic Continent and the seas surrounding it;

Recognizing that the Antarctic Treaty provides, to an unprecedented degree, protection to these ecosystems;

Believing that, in this second century of the national park movement, the concept of world parks should be promoted;

Considering that Antarctica offers special opportunities for the implementation of this concept;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Recommends that the nations party to the Antarctic Treaty should negotiate to establish the Antarctic Continent and the surrounding seas as the first world park, under the auspices of the United Nations.

6. INTERNATIONAL PARKS

Recognizing that natural ecosystems often extend across international boundary lines;
Being aware that discussions have taken place on the establishment of international parks to protect such natural ecosystems;

Believing that considerable benefits can ensue from coordinated planning and management of national parks that are contiguous and separated only by international boundaries;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972;

Requests governments to collaborate closely in the planning and management of neighboring or contiguous national parks.

7. REGIONAL SYSTEMS OF NATIONAL PARKS AND OTHER PROTECTED AREAS

Being informed of the collective action being taken by the countries of the Central American isthmus to establish a regional system of national parks and other protected areas;

Realizing that such collective action permits the unification of objectives and standards, resulting in greater scientific, cultural, educational, recreational, and economic benefits, and enables the most economic and effective use to be made of personnel and technical resources;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972;

Recommends to governments concerned that they establish as soon as possible adequate mechanisms to permit the early functioning of this regional system;

Urges international agencies concerned to give strong support to this initiative;

And commends this example of regional cooperation to the attention of other regional groupings of nations.

8. CONSERVATION OF THE WORLD HERITAGE

Recalling proposals by conservationists for the recognition of outstanding natural and cultural areas as constituting the world heritage and the initiatives taken by Unesco and IUCN in this connection;

Being aware of the draft Convention on Conservation of the World Cultural and Natural Heritage that will be considered by the General Conference of Unesco in Paris in October/November 1972;

Noting the endorsement of this draft Convention by the U.N. Conference on the Human Environment (Stockholm, 1972);

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972;

Calls upon governments to take action to conclude and adhere to the Convention on the Conservation of the World Cultural and Natural Heritage.

9. WETLANDS CONVENTION

Being aware that the Convention on Conservation of Wetlands of International Importance has been opened for signature by Unesco at its headquarters in Paris;

Recognizing the importance of this convention in assisting in the protection of important ecosystems of international significance;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972;

Urges all governments concerned to adhere to the Convention on Conservation of Wetlands of International Importance.

10. STANDARDS AND NOMENCLATURE FOR PROTECTED AREAS

Recalling the action already taken by IUCN in relation to the definition and classification of protected areas, particularly the important definition of "national park" adopted by its 10th General Assembly (New Delhi, 1969);

Recognizing the great value of international standards for selection and management of protected areas for specified purposes;

Recognizing, nevertheless, the difficulties inherent in the adoption by all nations of a standardized nomenclature for protected areas;

Recalling Recommendation 8 of the First World Conference on National Parks concerning the executive administration and control of national parks and equivalent reserves;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972;

Recommends that IUCN should, taking into account existing terminology in international treaties and in close consultation with governments concerned:

1. define the various purposes for which protected areas are set aside; and
2. develop suitable standards and a nomenclature for such areas;

Recommends, also, that governments, in setting aside protected areas, should adhere as far as possible to such standards and nomenclature;

And recommends further that the executive administration and control of such areas, either on land or offshore, be vested in a statutory organization with clear responsibility for conservation and management of national parks and with adequate powers and competence to maintain the required standards.

11. INTEGRITY OF NATIONAL PARKS AND EQUIVALENT RESERVES

Recognizing the importance of national parks and equivalent reserves as a sensible use of natural resources and the importance of areas dedicated as national parks in safeguarding plant and animal species, biotic communities, geomorphological sites, and

habitats of special scientific and educative interest, as well as landscapes of great beauty, and in providing for inspirational, cultural, and recreational purposes;

Being aware that in some instances the integrity of national parks and equivalent reserves is being violated by exploitation of natural resources, including the establishment of hydroelectric works, prospecting, mining, timber cutting, and grazing of domestic animals; by encroachment; by hunting and commercial fishing; by various forms of development including construction of inappropriate roads and recreational and touristic facilities; and by the use of vehicles in ways incompatible with park objectives;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Urges all governments to respect the integrity of national parks and equivalent reserves by taking urgent measures to give complete and continuous protection to all national parks by adequate legislation banning all disturbing activities of the type specified in the preamble to this recommendation and by effective enforcement of such legislation.

12. USAGE OF NATIONAL PARKS

Considering that conflicts may occur in national parks between nature conservation and other legitimate uses, especially tourism;

Believing that some of the activities now carried out in national parks could equally well be catered for in less valuable and sensitive areas outside national parks;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Recommends to all authorities concerned with national parks:

1. that a system of zoning be introduced where necessary, designating sections of the national park for specific usage;
2. that measures be taken to limit the use within each zone to a level which will not adversely affect the conservation of those features for which the zone was established;
3. that, wherever possible, facilities for tourism be located outside national park boundaries;
4. that, wherever possible, more imaginative systems of transportation be provided to and inside the park which will permit discouraging or banning the use of automobiles;
5. that where roads and other access facilities are necessary, care be taken in their siting and planning; and
6. that every effort be made to reduce undue disturbance by visitors;

And urges governments to take action to set aside and develop suitable areas, to provide for public use and recreation and reduce visitor pressure on national parks.

13. DETRIMENTAL EFFECTS OF LAND VEHICLES, BOATS, AND AIRCRAFT IN NATIONAL PARKS AND OTHER PROTECTED AREAS

Considering the great increase in the use of land vehicles, boats, and aircraft in national parks and other protected areas;

Recognizing that such protected areas often include virtually undisturbed ecosystems con-

taining threatened species of animals and plants and fragile biotic communities, sensitive to disturbance resulting from the indiscriminate use of such vehicles or snowmobiles, hovercraft, other all-terrain vehicles, and boats;

Recognizing the disturbing effects on particular species and biotic communities, as well as to the esthetic value of the area, caused by land vehicles, boats and aircraft;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Recommends that all governments take the necessary steps through legislation and administrative action to control the use of land vehicles, boats, and aircraft so as to eliminate disturbance and damage to species and biotic communities as well as other values.

14. RESEARCH ON NATIONAL PARK VALUES

Considering the valuable contributions to the quality of life, science, education, and touristic potential that derive from national parks;

Being aware that the great pressure on land for development in many countries, often caused by rapid increases in population, may endanger existing national parks and militate against the establishment of new national parks;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Stresses that provision for protecting areas as national parks or equivalent reserves to meet the various needs listed above should be an essential ingredient in regional and national land-use planning;

Emphasizes the urgent need for further research and investigation to evaluate the manifest contributions of national parks to the well-being of the community in social, environmental, and economic terms;

And requests governments and agencies concerned to give high priority to the initiation and support of such research and investigation.

15. PLANNING OF NATIONAL PARKS AND OTHER PROTECTED AREAS

Recalling Recommendation 12 of the First World Conference on National Parks concerning the need for planning of national parks and park systems;

Recognizing the vital importance of a management plan as a basis for proper operation and management of such protected areas;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Recommends that the planning, development, and management of national parks and other protected areas be fostered on a comprehensive and long-term basis within each country with careful attention to environmental protection and improvement, and in doing this:

1. that a system of protected areas be set up, embracing a variety of park areas and purposes;
2. that the park needs of all the people of the country be taken into account;

3. that parks be provided in many locations ranging from remote wilderness to metropolitan regions;
4. that a balance be sought by zoning among the several uses of parks, ranging from conservation of nature to tourism;
5. that compatible land-use practices be implemented outside boundaries of national parks;
6. that provision be made within or related to park systems for conservation of cultural features, historic areas, and buildings;

Urges that strenuous efforts be made to ensure that national and regional plans include provision for park systems and especially that national investment programs and budgets provide adequately for parks;

Proposes that a means be found for coordinating the planning of park systems among the various countries for their mutual advantage;

Requests that all agencies concerned advance park planning systems, making full use of work already accomplished, initially stressing the following activities:

1. a research program to develop further the basis for methods of park system planning;
2. a technical-aid program for park systems planning and development;
3. several demonstration projects in selected countries or regions, and
4. an information and education program to acquaint interested persons with park systems approach and its advantages;

Urges all authorities concerned with national parks and other protected areas to develop a management plan for each protected area using skilled planning personnel and the results of scientific research and to adopt this management plan as the basis for operation and management of the area;

Calls upon all agencies providing technical assistance to give priority to requests for the services of such skilled planning personnel and for the training of such personnel;

And stresses that provision for continuous ecological research and monitoring is essential in all park management planning.

16. EXCHANGE OF INFORMATION

Recalling Recommendation 35 of the Action Plan of the United Nations Conference on the Human Environment (Stockholm, 1972) calling for an exchange of information between nations on all matters affecting national park planning and management;

Being aware of the action already taken by various agencies including FAO, Unesco, and IUCN to facilitate such exchanges (including the convening of the present Conference);

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Urges all governments and agencies concerned to implement Recommendation 35 of the Stockholm Conference Action Plan;

Commends the proposal that IUCN publish a loose-leaf National Park Handbook as a ready reference to those concerned with park operations, management, and interpretation;

Welcomes the suggestion that an international periodical be published as a medium for

exchange of information on national park operation and management, and stresses the need for its contents to appear in different languages and be adapted to the varying conditions throughout the world;

Recommends that all agencies concerned give special attention to the preparation and distribution, in appropriate form and languages, of material about national park research, operation, management, and interpretation, including manuals, model management plans, and information on national park systems.

17. TECHNICAL AND FINANCIAL ASSISTANCE FOR NATIONAL PARKS

Recognizing that many countries cannot allocate adequate resources to permit the satisfactory development of a system of national parks;

Recognizing, also, that the setting up of national parks and equivalent reserves is of concern to all nations, not only the country in which they are situated;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972;

Urges developing countries to give serious consideration in their requests for aid to this important aspect of land-use planning;

Further urges developed countries to set aside a proportion of their technical and financial assistance programs to provide aid to other countries in this field;

And recommends that all governments and international agencies concerned give high priority to requests for technical and financial assistance in the establishment and management of national parks and other protected areas.

18. TRAINING

Realizing the need for qualified personnel to be charged with the management and operation of national parks and equivalent reserves;

Being aware of the shortage of such qualified personnel, particularly in developing countries;

Noting with satisfaction the establishment of schools at Mweka, Tanzania, and Garoua, Cameroun, with technical assistance from UNDP/FAO, serving respectively English-speaking and French-speaking countries in Africa, and providing training in wildlife management and in national park operation and management.

Noting, also, the splendid record of the short courses in national park administration organized by the U.S. National Park Service in collaboration with Canada and the University of Michigan;

Recognizing the initiatives that have been taken by various agencies in Latin America in organizing training opportunities open to national park personnel;

Recalling Recommendation 34 of the Action Plan of the United Nations Conference on the Human Environment (Stockholm, 1972) concerning the need for additional training for national park personnel, particularly in Latin America and Asia;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Recommends to all agencies providing technical assistance that action be taken to establish additional training schools where required at all levels and to provide more opportunities for short courses for national park personnel.

19. INTERPRETATION SERVICES FOR NATIONAL PARKS

Recognizing the important role of national parks in social and cultural life and in contributing to achieving a high quality of life;

Recognizing the important contribution that environmental education makes to man's awareness of his place in the natural world;

Recognizing the need for interpretative services associated with national parks to foster an appreciation of park values and to contribute to environmental education;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Recommends to all national park authorities:

1. that interpretative and environmental educational services be promoted both within and associated with the national park system; and
2. that special attention be given to the needs of youth in organizing these services;

Draws attention to the Environmental Study Area concept and programs developed by the U.S. National Park Service;

Suggests the inclusion of training in interpretation and environmental education services as a regular component in the courses preparing personnel for national park activities;

And proposes that all governments and agencies concerned consider the designation of an international week for environmental education aimed at promoting environmental awareness.

20. EDUCATION IN NATIONAL PARKS AND OTHER PROTECTED AREAS

Recognizing the need for environmental education among young people and the special approach involved;

Recognizing the important role national parks and other protected areas play in environmental education by promoting understanding of, and active involvement in, environmental conservation;

The Second World Conference on National Parks, meeting at Grand Teton National Park, U.S.A., in September 1972:

Recommends to all national park authorities:

1. that environmental education programs should be organized, including short-term conservation courses and international, regional, and national study-and-work camps;
2. that assistance be given to help young people interested in environmental studies and conservation to organize themselves to contribute better to this field;
3. that facilities in national parks be made available for youth groups to carry out environmental studies and conservation programs;
4. that attention be given to special exchange programs to stimulate international co-operation and understanding about national parks among the youth of various countries.

DISCUSSION

Chairman Budowski, after moving a vote of thanks for the tremendously hard and self-sacrificing work of the 10 members of the Recommendations Committee, under the chairmanship of Dr. M. E. Duncan Poore, and for the latter's masterly handling of the debate just concluded, said that the time had now come to proceed toward the final stages of the session. However, before doing so, he summarized the contents of a cable just received from the President of the Peruvian Republic: this gave the most welcome news that he will definitely do all he can to get wonderful Manu National Park into full and effective operation—surely an immense contribution to Amazonian conservation, in which interest and concern had so often been expressed during the Conference. The announcement was warmly applauded.

As a mark of appreciation of the deep involvement of local people and of what they have achieved in the superb region in which the meetings of the past week had been held, the Chairman then called on John F. Turner, representative of Teton County in the Wyoming Legislature, to say a few words.

John F. Turner (U.S.A.): It is with a deep sense of the honor accorded to me that I take the opportunity, at this closing session of a remarkable conference, to make a brief statement. Speaking first as an elected official of the State of Wyoming, a State which I guess you could call "undeveloped"—with the same problems many of you face in your own countries—I am sure that all those I represent join with me in their appreciation of the honor of having so many people here as our guests in the great Grand Teton and Yellowstone National Parks, people whose continuing contributions to the safeguarding of wild resources of the world are truly an inspiration to all of us.

Speaking now as a citizen participant in this Conference, I would like to congratulate you for your vision and deep commitment to an idea which promises much for the lasting well-being of our planet, to thank you for your convictions, energy, and, even, bravery. For I think that there is a requirement for bravery in the task ahead, not because of the grizzlies, lions, tigers, or elephants, but because it will be your responsibility in your work to directly and indirectly challenge some of the world's present value systems. These systems have been distorted in favor of consumption, technology, and materialism, and I, as a common citizen, wish you well in your efforts to preserve some of the Earth's remaining quality areas. Through these efforts, humanity will hopefully attain new heights in relationship to the Earth, to the other life forms with which we share the Earth, and, most important, to each other. I wish you well and a pleasant and safe journey to your homes. Come back and visit us here in Wyoming.

After thanking him, Chairman Budowski said that, before calling on the next speaker, he must make one more intervention: an additional recommendation, mentioned but not precisely formulated in earlier discussions. The text, which he then presented and which was adopted unanimously, was as follows:

Recommendation

The Second World Conference on National Parks meeting at Grand Teton National Park, U.S.A., in September 1972, *recommends* that the Third World Conference on National Parks be held within the period 1975-78.

Chairman Budowski next called on Dr. Carvalho, who had been invited by the Steering Committee to speak on behalf of Conference participants.

Dr. José Candido de Melo Carvalho (Brazil): I would like to think I have been chosen for this honor, as a life-long admirer of Darwin for his voyage on the "Beagle," of Louis Agassiz for his saying "study nature not books," and of Marco Polo for his travels to learn of the people of other nations! Starting from my small town of Carmo do Rio Claro in Brazil, I have indeed enjoyed the warmth of human friendship, admired the wonders of nature, and learned about man's achievements and impact on the biosphere in every part of the world, so that it is with a sense of humility and a heart full of gratitude and love that I now address you.

On your behalf, I wish to express our appreciation to the sponsors and cosponsors of the Conference, to our hosts and, in particular, to Cochairmen George B. Hartzog, Jr., and Gerardo Budowski, with whose names I would couple those of Chairman Edmund B. Thornton of the National Parks Centennial Commission, and Assistant Secretary of the Interior Nathaniel P. Reed, and to move the following resolution:

Vote of Thanks

The Second World Conference on National Parks meeting at Grand Teton National Park, U.S.A., in September 1972, *records* its very great appreciation of the sponsors and cosponsors for their splendid contributions to the organization and running of the Conference; *warmly thanks* its hosts, the U.S. National Parks Centennial Commission and the National Park Service of the U.S. Department of the Interior, for their generous hospitality and for helping to make the Conference an outstanding and unforgettable occasion for all those privileged to attend; *and expresses* its great appreciation for the efforts made by the Conference Secretariat and all those who helped to make the meetings run so efficiently. The resolution was adopted with acclamation.

Chairman Budowski next called on Chairman Edmund B. Thornton of the National Parks Centennial Commission, who spoke as follows:

Edmund B. Thornton (U.S.A.): On behalf of all groups in the United States that have been concerned with the Second World Conference on National Parks, I wish to echo the thanks just tendered to IUCN, UNESCO, and FAO for their sponsorship of this Conference.

I wish to recognize the splendid contributions made by the authors of papers, the members of discussion panels, and, especially, the chairmen of sessions who so ably led us through our deliberations. Our thanks are also due to the sessional rapporteurs and the Rapporteur General, Sir Hugh Elliott, for their care in ensuring that these

contributions and those of all other participants will be distilled and incorporated in the permanent record of the meetings.

I wish to mention particularly the secretaries, translators, and documentation staff who worked so hard and late to get the recommendations through in time, and, not least, Dr. Marc J. Dourojeanni for his voluntary service on the Spanish version. The Conference owes, of course, a very special debt to the Recommendations Committee, particularly its chairman, Dr. M. E. Duncan Poore, and its secretary, Frank Nicholls, for the efficient way it provided us with a splendid set of recommendations calling for important action on priority topics connected with the future development of national parks throughout the world.

Finally, I thank all of you, the participants in this Conference, for the wise and wide-ranging interventions that have made our collective thinking so profitable and worthwhile. Personally and on behalf of the Centennial Commission, I extend my warm regards and my hand of friendship, and look forward to meeting you again, perhaps in your own beautiful countries and certainly in the halls of the Third World Conference on National Parks.

Chairman Gerardo Budowski: Two honorable and pleasant duties remain to be fulfilled. First, on behalf of IUCN, of our colleagues in UNESCO and FAO, and I am sure of all participants, I wish to thank the many United States groups who have formed the backbone of the Conference organization: in particular, the National Park Service under its Director, my *simpatico* colleague, George B. Hartzog, Jr. He and his team have not only treated us with every kindness and consideration, but have achieved an outstanding organizational feat, in which I may perhaps pick Assistant Director Ted Swem for special mention for his contribution to the smooth-running of the Conference. In the concept, design, and direction of the Conference, no one could ignore the major role, nor, I would even say, could anyone hope to better the standard of accomplishment, of the National Parks Centennial Commission, under its Chairman, Edmund B. Thornton, Centennial Director William J. Briggie and his deputy, T. Sutton Jett. Their contribution has been the climax of months of hard labor and careful preparation.

We should also record our gratitude to the staffs of Yellowstone and Grand Teton, and their superintendents, Jack Anderson and Gary E. Everhardt, for displaying to us the treasures of their parks, and to the staffs of the Yellowstone Park Company and the Grand Teton Lodge Company, under their managers, John Ammerman and Vern Johnson, respectively for attending so well to our comfort.

Turning to the hub of the Conference, the Secretariat, our thanks are due to Secretary General Roger J. Contor, who has coordinated the whole activity; and to his three deputies, Gordon Fredine, who looked after fund raising, the allocation of financial assistance, and international liaison; Robert I. Standish, who took care of the technical papers and, with Gordon Fredine, organized the sessions; and Cecil Lewis, who was concerned with special staff support. This is also an appropriate point to mention our debt to Glen Sorenson of the U.S. Department of State and, I know with Secretary General Roger J. Contor's blessing, to express our special appreciation of the help given by Mrs. Lenore Smith, of IUCN's Morges staff, in what was meant to be her vacation, toward, among other things, the preparation and checking of the list of participants.

We are indeed most grateful to all those who have worked so hard and long in the supporting Secretariat services: those who looked after the registration, met the constant demand for secretarial help, acted as ushers; the interpreters, whose patience and time schedules we so often abused, not forgetting the field interpreters who helped with the outdoor workshops of Session XII; those who saw to the smooth-running of the intercommunication and sound systems; Jean Henderer and Tom Wilson, who handled publicity and press relations; and many more.

We have received a wonderful lot of generous gifts by which to remember this Conference: I would specially mention Paul Steiner of Chanticleer Press, for the beautiful volume on Yellowstone, and Bill Lane of Lane Magazine and Book Company, for the book on the National Parks of the West; everyone has greatly appreciated these splendid books and the various fine publications presented by the U.S. National Park Service and the Centennial Commission. The Medallion, the movie "Earthbound," and innumerable smaller but important courtesies have also contributed to make our stay an unforgettable experience. We leave Yellowstone and Grand Teton inspired, fortified, and fully prepared to carry on the cause of national parks for the better future of mankind.

And now for my second and final duty: I think you will all agree that there is no one more fitting to make the closing speech than our friend, the man I would refer to again as my *simpatico* Cochairman. I call on George B. Hartzog, Jr.

George B. Hartzog, Jr.: Dr. Budowski, serving as Cochairman of this Conference with you has been a very warm and rewarding experience which I shall always remember. I am deeply touched by the warm expressions of thanks that have been extended to me and my colleagues in the National Park Service. Personally and for all of them, I would tell you that it has indeed been our pleasure; we are delighted you have enjoyed your visit here and we are proud to have had you here.

Despite the great work of our Recommendations Committee, to which several tributes have been made, a missing recommendation has come to my attention through the good offices of Vice-President Zafar Futehally of IUCN, which I feel impelled to present to you. It reads:

Recalling the lovely ladies who have graced this conference, *being aware* of their capacity to enliven the human environment, *recognizing* their stimulating effect on their distinguished consorts,

the Second World Conference on National Park *urges* the need for a world directory of these valuable resources for use in future international conferences, *calls* upon all governments to give the matter urgent consideration and, in particular, *proposes* that special attention be given to these fragile resources in the developing world.

I take it from your applause that the recommendation is unanimously approved and will be so recorded!

Scarcely a week has passed since, largely as strangers to one another, we sat down together to open the Second World Conference on National Parks. We have become almost a family, with warm and personal attachments to the friends each of us has made. Diversity of language has dissolved into a common language of good fellowship and national parks.

Each of us will carry away memories of certain events which were deeply moving and

inspirational. A few that are indelibly impressed on my mind—the evening at Madison Junction, where our First Lady with grace and high good humor, under the severe and trying weather conditions, relighted the campfire at the junction of the Firehole and Gibbon Rivers, to symbolize our continuing commitment to national parks everywhere; the recognition given by the Centennial Commission to the distinguished national and international park leaders who have kept aglow in the world the park idea; and, especially touching, the sight of that great conservation statesman of Japan, Dr. Tsuyoshi Tamura, coming to the platform and the spontaneous standing ovation he received.

Shortly, the Second World Conference on National Parks will join the First World Conference in history. What message shall we carry home as we return to the real world of our daily labors? We have agreed that while there are universal aspirations, there are no universal solutions. We must construct our own decisions to fit differing national needs. We have agreed that park lands are more than physical resources—they are delicate strands of nature and culture that bind together the generations of men; they are the benchmarks by which we may chart a new course of human behavior, using their living legacy to build an environmental ethic of personal and corporate conduct. As we succeed in this effort, we shall bring quality to the daily lives of people everywhere and brotherhood to the community of man. There is no greater challenge and no greater motivation, and it is indeed we, the participants in this Conference, who must do it. Only as we are committed to go forth and use the inspiration and insight from this great gathering to implement park programs worldwide shall this Conference be counted a success and our contribution to the well-being of mankind a lasting one.

Again, I say, it has been a delight to have had you all here. I am personally appreciative of the marvellous opportunities that I have had to get to know those of you who had been just names as we corresponded over the years. It has been a rich and rewarding experience, for all of which I am grateful.

The Second World Conference on National Parks stands ajourned.

APPENDIX A

CONFERENCE ORGANIZATION

Initial steps taken by the U.S. Government to organize the Conference are summarized in the Introduction to the Proceedings. Primary responsibility was vested in the National Parks Centennial Commission, which was given legal authority to provide host services, and the Commission functioned to direct and coordinate all official and cooperative efforts with the full support of the National Park Service and IUCN.

National Parks Centennial Commission

Edmund B. Thornton, Chairman	Illinois
Senator Alan Bible	Nevada
Senator Henry M. Jackson	Washington
Senator Paul J. Fannin	Arizona
Senator Clifford P. Hansen	Wyoming
Representative John Melcher	Montana
Representative John P. Saylor	Pennsylvania
Representative Joe Skubitz	Kansas
Elmer L. Anderson	Minnesota
Henry P. Hoffstot	Pennsylvania
W. W. Keeler	Oklahoma
Mrs. Frank Y. Larkin	Connecticut
Richard P. Mellon	Pennsylvania
Rogers C. B. Morton	Secretary of the Interior
represented by: Laurance S. Rockefeller	
George B. Hartzog, Jr., Executive Director	Director, U.S. National Park Service
Laurence W. Lane, Jr., Consultant	California

Secretariat of the Second World Conference

General Chairmen:	Dr. Gerardo Budowski, Director General, IUCN
	George B. Hartzog, Jr., Director, National Park Service
Secretary General:	Roger J. Contor

Deputy Secretaries General:	C. Gordon Fredine Robert I. Standish Cecil Lewis
Rapporteur General:	Sir Hugh Elliott
Documents Officer:	Jean Packard
Consultant on Publications:	Vincent Gleason

U.S. National Park Service Centennial Staff

Director:	William J. Briggie
Staff Director:	T. Sutton Jett
Staff Director:	Jean C. Henderer
Staff Assistant:	Cornelius W. Heine
Staff Assistant:	John R. Miele

The Centennial Staff and the Conference Secretariat worked as a team in the planning and conduct of the Conference. Certain responsibilities for various basic functions of the Conference were assigned among individuals.

Centennial Director Briggie carried the planning and responsibility for Centennial staff participation and Conference organization.

Staff Director Jett served as the day-to-day liaison between the Commission and the Conference planning group.

Staff Director Henderer was in charge of informational aspects and media relations.

Secretary General Contor coordinated National Park Service assistance and all activities related to the functioning of the Conference.

Deputy Secretary General Fredine handled relationships with participants, especially invitations, travel, and other special assistance, and supervised work with other agencies and sponsors on a day-to-day basis.

Deputy Secretary General Standish coordinated the IUCN effort, including preparation and editing of the background papers, and organizing the technical sessions.

Deputy Secretary General Lewis was in charge of special services at the Conference.

Jean Packard supervised the documents room.

Vincent Gleason supervised the design and production of all Conference publications. Simultaneous interpretation was provided by the U.S. Department of State, with Theodore H. Leon in charge of the translations, A. José De Seabra serving as chief interpreter, and Glen H. Sorenson in charge of the simultaneous interpretation equipment. Manfred M. Palm of the National Park Service was responsible for the tape recording of the proceedings, while Zeb McKinney supervised film and slide showings.

Laurence de Bonneval of IUCN's staff handled written French translations.

Dr. Marc J. Dourojeanni of Peru and Julio Marrero-Nunez of the National Park Service handled Spanish translations.

Frank Nicholls, Deputy Director General of IUCN, served as secretary of the Committee on Recommendations.

Lenore Smith of IUCN's staff prepared the list of participants.

Two documents concerning Conference procedures were adopted at the opening plenary session:

Rules of Procedure for Technical Sessions

1. Sessions will be called to order promptly at the announced times.
 2. The chairman will announce the rules of the session (especially the matter of strict time control) and introduce the authors and panelists. He will then make a brief introduction of the topic of the session including suggestions for the main lines that may be explored—6 minutes.
 3. Each author will make a short statement giving the main thrust of his paper or other appropriate comments—maximum 5 minutes.
 4. Panel members will then make their opening contributions to the discussion in the order determined by the chairman—maximum 3 minutes.
 5. Intermural panel discussion, if considered appropriate, will be at the discretion of the chairman.
 6. Speakers will be invited from the floor either to contribute to the discussion or to pose questions to the authors or panel members—maximum 3 minutes.
 7. Persons intending to speak will be asked to inscribe their names and the topic they want to discuss on a form. The Secretariat will assemble this information for the chairman, who will then decide who will speak and in what order.
 8. When written interventions have been completed, oral questions from the floor will be accepted.
 9. Each person making an intervention will be asked to state his name and affiliation and, at the end of his intervention, to make a written summary of his statement to assist the rapporteur in reporting the discussion.
- (Portable microphones will be available in each aisle for use by speakers from the floor.)

Conference Recommendations

1. A committee on recommendations will be appointed at the opening session.
2. The task of this committee will be to prepare draft recommendations for consideration and adoption by the Conference.
3. The committee will develop draft recommendations through its own deliberations and consideration of drafts submitted to it from participants.
4. Recommendations concerning individual persons cannot be accepted.
5. It is not considered feasible for the committee to consider recommendations concerning individual parks.
6. Draft recommendations should be submitted to the committee before noon on September 24. All draft recommendations submitted to the committee should be typed, double spaced, and the source clearly identified (with an indication of how the person submitting the recommendation may be contacted at the Conference).
7. The committee is expected to limit the number of recommendations submitted to the closing session of the Conference to 25.
8. Any changes or amendments to the draft recommendations as circulated by the committee must be submitted in writing to the Secretariat as early as possible on Tuesday, September 26, so that the committee may prepare revised drafts where necessary.

9. Recommendations will be considered by the Conference at its closing session on Wednesday, September 27. No recommendations will be accepted from the floor nor will substantial changes be accepted. Suggestions for editorial adjustments may be made and, if accepted by the Conference, will be used by the committee in final editing.
10. Voting on the recommendations will be by a show of hands of those present.

Schedule of Meetings at Yellowstone National Park
Tuesday, September 19

Welcome

Superintendent Jack K. Anderson, Yellowstone National Park.
Secretary of the Interior Rogers C. B. Morton.
Chairman Edmund B. Thornton, National Parks Centennial Commission.
Dr. Gerardo Budowski, Director General, IUCN, and Cochairman, Second World Conference.

Introduction of Special Guests

Director George B. Hartzog, National Park Service, and Cochairman, Second World Conference.

Policy and Program Considerations in the Establishment, Preservation, and Use of National Parks in the United States of America

Chairman of the Day: Edmund B. Thornton.

Panel 1: National Parks and Federal Executive Policymaking.

Implications involved in the allocation of resources (scenic, scientific, historical, cultural, and recreational) among national priorities, including authorization and funding for the development and management of national parks.

Assistant Director William A. Morrill, Office of Management and Budget.

Robert Cahn, former member, Council on Environmental Quality.

Assistant Secretary of the Interior Richard S. Bodman, Summarizer and Chairman.

Panel 2: National Parks—Congressional Policymaking and Appropriations.

Policymaking responsibilities for the management and utilization of public lands, allocations of resources and appropriations for scenic, historical, cultural, and recreational uses vis-à-vis consumptive utilization.

Representative John P. Saylor of Pennsylvania.

Representative Joseph M. McDade of Pennsylvania.

The Yellowstone Rededication Program (evening)

Madison Amphitheatre

Invocation: Rev. Arthur Schultz.

Special International Leader Awards: Edmund B. Thornton.

Centennial Address: Rogers C. B. Morton.

Rededication of Yellowstone National Park and Relighting of Campfire
Mrs. Richard Nixon and Secretary Morton.

Wednesday, September 20

Chairman of the day: Assistant Secretary Nathaniel P. Reed, Fish and Wildlife and Parks,

U.S. Department of the Interior.

Panel 3: National Parks in their Regional, State, and Local Environments.

Involvement of national parks with regional, State, and local communities as influenced by economic and legal responsibilities such as social programs, general taxation, and zoning policing.

Governor Cecil E. Andrus of Idaho.

Governor Stanley K. Hathaway of Wyoming.

Ted Schwinden, Director of Lands, Montana.

Representative Joe Skubitz of Kansas.

Representative Orval Hansen of Idaho, Summarizer and Chairman.

Panel 4: National Parks and Related Environmental and Recreation Programs.

Relationship between national parks and other Federal agencies in the construction, development, and management of recreation facilities and environmental programs.

Dr. J. A. Remington, Historian, Corps of Engineers, U.S. Army.

David Dominick, Assistant Administrator for Categorical Programs, U.S. Environmental Agency.

Director James Watt, Bureau of Outdoor Recreation, U.S. Department of the Interior.

Joseph Jaeger, Jr., National Council of State Parks.

Associate Chief Rexford Resler, Forest Service, U.S. Department of Agriculture.

Assistant Secretary Harrison Loesch, Public Land Management, U.S. Department of the Interior, Summarizer and Chairman.

Report, "National Parks for the Future"

Sydney Howe, President, Conservation Foundation.

Acceptance of "National Parks for the Future" Report

Edmund B. Thornton, Chairman, National Parks Centennial Commission.

Report, North America International Regional Conference

Dr. Ernest A. Connally, Associate Director, National Park Service, U.S. Department of the Interior.

Thursday, September 21

Departure from Yellowstone for technical sessions at Grand Teton National Park.

Any meeting of the scope and complexity of a world conference involves the work of many hundreds of individuals. It is not possible to list them all, but two men deserve special mention. They are Superintendent Jack K. Anderson of Yellowstone National Park and Superintendent Gary E. Everhardt of Grand Teton National Park, who were given the responsibility for physical arrangements and delegate services within their parks.

With their park staffs, augmented by a large group of National Park Service personnel drawn from throughout the National Park System, they provided transportation, logistic support of every kind, guides, interpretation, baggage handling, security and protection, duplication of documents and papers, signs, informal language interpretation, and other services.

Special thanks and appreciation are due the two private concessions—Yellowstone Park Company and Grand Teton Lodge Company—which furnished lodging and meals, and myriad other services, to the participants.

Without the smooth functioning of all of these on-the-ground activities the Conference could not have been successful.

APPENDIX B AWARDS

During the Conference, the National Parks Centennial Commission honored three different groups of leaders. Chairman Edmund B. Thornton presented them with Centennial Medallions in recognition of their leadership and contributions to the national park movement.

First honors went to a distinguished group of Americans whose efforts over the years have contributed significantly to national park conservation and operation in the United States. This group received engraved Silver Centennial Medallions.

U.S. Awardee List

Horace M. Albright

Newton B. Drury

Conrad L. Wirth

Laurance S. Rockefeller

Isabel M. Haynes

Paul Mellon *

Alfred Knopf *

Melville Bell Grosvenor

Dr. Ira N. Gabrielson *

Gordon Gray *

Director, National Park Service, 1929-33
Director, National Park Service, 1940-51
Director, National Park Service, 1951-64
Conservationist
Pioneer Yellowstone Concessioner with her late husband, Jack E. Haynes
Conservationist-Philanthropist
Publisher, Author, and Conservationist
Chairman, Board of Trustees, National Geographic Society
Conservation leader
Chairman, National Trust for Historic Preservation; and Member, Advisory Council on Historic Preservation

The second group to be honored were international conservation leaders whose work has advanced the national park movement around the world. This group also received engraved Silver Centennial Medallions.

International Awardees

Dr. Tsuyoshi Tamura, Japan

Vice President, National Parks Association of Japan

* Awards made in absentia.

Harold J. Coolidge, U.S.A.

Prof. Jean-Paul Harroy, Belgium

Dr. Jacques Verschuren, Zaire
Sir Frank Fraser Darling, U.K. *
Enrique Beltran, Mexico *

Honorary President, International Union
for Conservation of Nature and Natural
Resources

Past Chairman, International Commission
on National Parks

Director General, Zaire National Parks
Ecologist and Author

Director, Instituto Mexicano de Recursos
Naturales Renovables

Finally, the Centennial Commission honored five younger national park officials in recognition of their leadership and accomplishments in their own countries. This group received engraved Bronze Centennial Medallions and honorariums of \$500 each.

Jesús B. Alvarez, Jr., Philippines

Mario Andrés Boza, Costa Rica

Zekai Bayer, Turkey

Perez M. Olindo, Kenya

Phairot Suvanakorn, Thailand

Officer in Charge, Parks and Wildlife Office

Director, National Park Service

Head of National Parks

Director, Kenya National Parks

Superintendent, Khao Yai National Park

* Awards made in absentia.

APPENDIX C

SPECIAL EVENTS

The outdoor Dedicatory Ceremony the evening of September 19 at Madison Junction was preceded by an *al fresco* supper for all participants. This featured typical western barbecue fare: beef roasted in preheated earth pits, beans, salad, desert, and coffee.

Official social events at Grand Teton began with an informal reception for all participants on the evening of September 21. The National Parks Centennial Commission was host to this event, which was held in the Explorers' Room at Jackson Lake Lodge.

A significant feature of the Grand Teton National Park portion of the Conference was the banquet which took place Saturday evening, September 23 through the courtesy of the Reader's Digest. Preceding the banquet, a reception was held in the Explorers Room. Chairman of the National Parks Centennial Commission Edmund B. Thornton was the host.

More than 650 persons, including the Conference participants and members of the staff, enjoyed the convivial atmosphere of warm international fellowship and good will. During the dinner, Chairman Thornton acted as Master of Ceremonies, Assistant Secretary of the Interior Nathaniel P. Reed and Director of the National Park Service George B. Hartzog, Jr., shared brief remarks with the assembled guests. IUCN Director General Gerardo Budowski also addressed the group. He noted that 43 countries have no national parks and expressed the hope that by the time the next world conference convenes, all of the countries of the world would have their own national park systems.

The highlight of the evening was the presentation by Chairman Thornton of special park leadership awards to five younger national park leaders from around the world. These awards each took the form of a special bronze Centennial Medallion and a check from the National Parks Centennial Commission in the amount of \$500. (See Appendix B.)

A premier showing of the film, "Earthbound," produced for the National Park Service by Senior Associate William H. Eddy, Jr. of the Conservation Foundation, followed the awards ceremony. A copy of the film was made available to a representative of each country having attendance at the Conference. Each participant also was given a copy of the companion book, "Consider the Process of Living" by William H. Eddy, Jr. and Gonzalo S. Leon of the Conservation Foundation, and Robert C. Milne of the National Park Service. Previously, through the generosity of the Chanticleer Press of New York, all Conference participants had received a copy of Ann and Myron Sutton's book, "Yellowstone, A Century of the Wilderness Idea." Among the other books given to the

participants were "The National Park Service," by William C. Everhart; "The Family Tree of the National Park System," by Ronald F. Lee; Lane Magazine and Book Company's "National Parks of the West," and "National Parks of the Future," a report prepared by the Conservation Foundation for the National Parks Centennial Commission.

An "environmental education center" was established on the balcony overlooking the main lobby at Jackson Lake Lodge. Conferees relaxed in upholstered audio chairs that carried an environmental message in the three Conference languages. A multi-image slide show appeared and dissolved in continuous representation of the myriad interacting elements that make up the total world environment. Illustrations and printed materials used in the U.S. National Park System for promoting environmental awareness among park visitors lined the walls and tables. The Museum and Audiovisual Arts Divisions of the Harpers Ferry Center, working with the National Park Service's Office of Environmental Interpretation, designed and set up this popular exhibit, which functioned as on-going support for the environmental education workshops which were a feature of Session XII.

After the sessions at Grand Teton, a number of the participants took advantage of two post-Conference tours sponsored by the National Park Service. These tours offered the opportunity to see some of the features of America's national parks and to observe various facets of park operations at the field level.

The tour of northern California, sponsored by the National Park Service's Western Region, was organized by Public Affairs Officer Edward Pilley. This tour featured visits to selected natural, historical, and recreational areas in northern California, including Muir Woods National Monument, John Muir National Historic Site, Point Reyes National Seashore, Fort Point National Historic Site, and Yosemite National Park. At Yosemite, the group visited Yosemite Valley, Wawona, Glacier Point, and Tuolumne Meadows among the park's many attractions. Of special interest to the 26 participants on the tour was the tram ride around the Mariposa Grove, led by a member of the park naturalist staff. They saw the giant sequoias and tested the new transportation system designed to enhance visitors' park experience while causing a minimum of impact on the park. A similar tour had been enjoyed prior to and en route to the Conference by six participants.

The second post-Conference tour featured national parks of the Southwestern United States and was organized by Myron Sutton and Bruce Powell of the National Park Service's Division of International Park Affairs. Included on the itinerary were Golden Spike National Historic Site, Timpanagos Cave National Monument, Bryce Canyon National Park, Zion National Park, Walnut Canyon National Monument, and Montezuma Castle National Monument. This tour was arranged primarily for Spanish- and French-speaking participants, but a sprinkling of English-speaking participants also took part—25 in all. The National Park Service staff who led the group included Myron Sutton, Julio Marrero, William Featherstone, Clyde A. Maxey, and J. Michael Daly.

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