

Protected Areas and Demographic Change: Planning for the Future

A Working Report



IVth World Congress on National Parks and Protected Areas
Caracas, Venezuela

**PROTECTED AREAS AND
DEMOGRAPHIC CHANGE:
PLANNING FOR THE FUTURE**

IUCN – THE WORLD CONSERVATION UNION

IUCN – The World Conservation Union brings together States, government agencies and a diverse range of non-governmental organisations in a unique world partnership: some 650 members in all, spread across 120 countries.

As a union, IUCN exists to serve its members – to represent their views on the world stage and to provide them with the concepts, strategies and technical support they need to achieve their goals. Through its six Commissions, IUCN draws together over 5000 expert volunteers in project teams and action groups. A central secretariat coordinates the IUCN Programme and leads initiatives on the conservation and sustainable use of the world's biological diversity and the management of habitats and natural resources, as well as providing a range of services. The Union has helped many countries to prepare National Conservation Strategies, and demonstrates the application of its knowledge through the field projects it supervises. Operations are increasingly decentralised and are carried forward by an expanding network of regional and country offices, located principally in developing countries.

IUCN - The World Conservation Union seeks above all to work with its members to achieve development that is sustainable and that provides a lasting improvement in the quality of life for people all over the world.

THE SOCIAL SCIENCES DIVISION

The IUCN Social Sciences Division emerged out of the initial Population and Sustainable Development Programme established in implementation of resolutions of the General Assembly in 1978, 1981, 1984, 1988 and 1990 on the subject of population and natural resources. The recommendations set out in *Caring for the Earth* provide a further mandate for IUCN in this field. The present wider focus is a result of experiences in the Population and Natural Resources Programme highlighting the complexities of human needs and social behaviour as they relate to the environment.

The Social Sciences Division attempts to assess, at grass-roots level, which conservation activities have a potential of being sustainable in the long run. Its major source of information comes from the analysis through on-site case studies, of field projects addressing various aspects of conservation or sustainable use of particular natural environments. To date, case studies have been carried out in Burkina Faso, Cape Verde, Congo, the Gambia, Kenya, Madagascar, Mali, Brazil, Costa Rica, Honduras, Nepal, Pakistan, Thailand, Russia and Canada/USA.

Experiments with the introduction of relevant demographic variables in National Conservation Strategies have been carried out in Costa Rica, Ghana, Morocco and Pakistan. Findings are reported in two "guidelines" documents; one for policy makers and one for project implementers. Presently the Programme has worldwide multidisciplinary network of advisors, organised in seven different Task Forces, working on the following themes: 1) Population-driven ecological limits to improvements in the quality of life; 2) Interdependencies between human populations and other species; 3) Relationships between average family size and average per capita level of resource consumption; 4) Urbanisation and natural resource management; and 5) Family health and natural resource management; 6) Ethics; 7) Gender.

The Social Sciences Division exists to help IUCN pursue a course of enlightened environmental management based on social policies of care for the earth. Only through profound changes in human behaviour will sustainable use of natural resources be achieved and healthy environment for future generations be preserved.

PROTECTED AREAS AND DEMOGRAPHIC CHANGE: PLANNING FOR THE FUTURE

**A Working Report
of
Workshop 1.6**

**IVTH WORLD CONGRESS ON NATIONAL PARKS
AND PROTECTED AREAS**

**Caracas, Venezuela
10-21 February 1992**

Case Study: The Cabecars of Telire

Isolated communities along the Telire river bordering Costa Rica's famous La Amistad International Park have been studied to determine to what extent indigenous people use and are dependent upon natural resources and forest products.

Ms Rosa Vazquez, of Ecuador, who is studying at the Department of Zoology, Ohio State University, described how she found scattered groups of people known as Cabecars living on both sides of the river, on the edge of the tropical rain forest. They clear the land, practise slash-and-burn agriculture and use the forest for building materials, fuelwood and game.

A census of the population revealed that 366 people were living in an area of 9200ha. Density, at four people per km², was low compared to the national average but the population was estimated to be growing at the rate of 5.7 per cent due to natural increase and in-migration, suggesting serious implications for the future on such inhospitable land, with steep gradients and adverse conditions for agricultural expansion. The communities are entirely self-supporting, with small houses, small farms and almost no products from outside. The exceptions are firearms and ammunition. The use of guns for hunting is already depleting the game reserves.

Productivity of the land is low, reflecting poor soils, lack of modern fertilizers and extreme physical constraints on soil cultivation.

People eat bananas from morning to night and use them to make a fermented drink called *chicha* with which they recruit temporary labour from their neighbours to help at harvest time. Ms Vazquez measured the volume of all products going into the maintenance of the household, as well as hours of labour devoted to it. She concluded that this is vital information for the management of protected areas. Management policies of different agencies are often in contradiction with the practices of local populations. Costa Rican law, for instance, allows people to claim a forest area after burning down the trees – clearing the land entitles them to it. The idea was to improve the landscape and the practice still goes on, despite its obvious antipathy to the policy of rainforest protection.

Included in the analysis were studies on the gender division of labour, including the number of hours worked at different tasks by men and women.

Ms Vazquez concluded by suggesting that modern life would arrive sooner or later in this remote community. She had already had radios and watches and wanted to be part of the Costa Rican society. Meanwhile the local society, it

Case Study: Women's Participation in the Montecristo National Park

Severe population pressure in the smallest and most densely-populated country in the Americas characterizes the efforts to save endangered plant and animal species in El Salvador's Montecristo National Park. The park, bordering on Honduras and Guatemala, is rich in biodiversity, with some rare species only found in El Salvador.

Ms Melany Machado, of the El Salvador National Parks and Wildlife Service, described the problems confronting park managers trying to conserve the protected area while at the same time meeting the needs of human settlements, some of which have existed inside the park for the past 200 years. An experiment in integrating the people and the park began 15 years ago and is likely to provide a model for application elsewhere in the country and the region.

In the project area no special attention has been paid to the role of women. Some 17 per cent of households are headed by women whose unpaid work is undervalued and who lack the means to generate income. Women were found to be excluded from decision-making committees and organizations although their traditional roles were closely associated with the local natural resources and environment. Successful project design, it was found, should take women fully into account and gives credit for their work. It should reflect the fact that parks and protected areas can become important sources of employment and services for women, while at the same time bringing about environmental improvements.

The project began with reforestation and soil conservation and included tree nurseries and the production of medicinal plants for their curative properties and as a source of revenue. A special clinic, specializing in treatment with traditional medicines, was opened in 1990. About ten people per day come for treatment. An area of 44ha was set aside for agriculture and cattle.

Community development was promoted, including schools, a health centre and a housing project. Family planning, maternal and child health care, vaccination and other services were brought in by collaborating agencies.

Ms Machado admitted that it is still a challenge to integrate answers to conservation and the quality of human life. But the experiment in the Montecristo National Park suggests that the key is a diversity of available options. Some people had decided of their own accord to move out of the park onto land more amenable to agriculture and had asked the park manager to help them purchase the land. Another positive factor was the involvement of non-governmental organizations in the provision of training and services.

DISCUSSION

Mr Ayub Qutub asked if these two experiences had thrown any light on the critical balance between the carrying capacity of the protected areas and the needs of the local populations. How many people could these parks actually support?

Ms Dulce Castleton wanted more information on the relations between people, their agriculture and animal predators and about the financial implications for people who make the decision to move elsewhere. Mr Malik Mumtaz commented that there were cases where it was the sheer poverty of the people, rather than their numbers, that was the problem. Ms Patricia Thomas asked whether it was possible to assess the impact on women of a more sustainable pattern of use of natural resources.

Ms Vazquez replied that there had been no opportunity yet to test the carrying capacity of La Amistad; the slash-and-burn agricultural practice, leaving land fallow for five years, was consistent with the recommendations for poor soils. Wildlife damages crops, especially corn, but people have their own traditional methods for dealing with this threat. On the question of relocation, she suggested that this was a difficult issue because the people had lived in the park for a very long time and, in any case, where were they to go?

Ms Machado agreed that carrying capacity was difficult to measure. Her experience with relocation was that it worked as long as the idea came from the villagers themselves; in these cases the bank allowed them to buy land on long-term credit. Their prospects for success were heightened by the fact that they had received training and would take their tools with them. With regard to the position of women, their lack of participation in decision-making committees was still a problem; they needed training in this and other participatory skills.

The Demographic Scenario

Mr James Ypsilantis, Consultant to IUCN Social Sciences Division, used a computer-based presentation model to display the world population situation and illustrate demographic interactions with Parks and Protected Areas (PPA.) He emphasized that while demography is only one of many areas which needs to be taken into consideration by PPA managers, it is necessary to include demographic parameters and their related policy levers to achieve or maintain sustainable PPA. Displaying the United Nations low, medium and high projections of population growth he said that although the medium projection – to a population of 8.5 billion by 2025 – is the most likely scenario, the higher set of figures can not be ruled out.

He suggested that both the difference between the projected population size at a given point in time and also

the time remaining before a population of a given size was reached have implications for PPA management.

He used graphs to show that, even if fertility declines further, world population will continue to grow in coming decades as increasingly large numbers of people age into their prime reproductive years. The structure by age of the populations in more and less developed nations is one of the reasons why most of the coming growth in world population will occur in developing nations. The distribution by age of populations also has economic implications and provides clues about consumption levels and patterns.

He then showed that most of the demographic growth in developing nations will occur in urban settings and be concentrated in broadly defined coastal areas. Urban populations tend to have higher consumption levels than their rural counterparts as well as different consumption patterns. This can result in accelerated deforestation around urban centres due to the use of charcoal instead of fuelwood as well as direct pressure on wetlands created by urban demand for freshwater.

To meet the demand for food of an increasingly urban population living in more and bigger cities, productivity per agricultural worker has to increase. This occurs while urban areas are often located on, and grow onto, prime agricultural land. This dilemma is often resolved by an increased reliance on fertilizers, pesticides and irrigated crops.

The growth in urban populations has significant implications for PPA management. Many of the impacts of urbanization on PPA are indirect and are related to changes in the water cycle. Deforestation, soil erosion, crop irrigation and agricultural runoff are often associated with urbanization in developing nations. This picture is complicated by increased demand for drinking water and sewage contamination problems.

Mr Ypsilantis used data summarizing pressures on mangroves and coral reefs to illustrate that urbanization, either directly or through water diversion, mining, contamination (including through increased sediment loads and silting) and eutrophication could pose significant threats to downstream, coastal and nearshore, as well as urban and peri-urban, PPA.

Mr Ypsilantis then examined linkages between migration and PPA. He suggested that PPA are increasingly situated in comparatively resource-rich areas which often become poles of attraction for migrants. He noted that the population of Guatemala's natural growth rate of 2.9%, meaning a doubling time of just under 25 years, fuelled by large numbers of immigrants results in a reported total growth rate reaching 5.5% for the Peten province, implying a population doubling time of just over 12 years.

Migration from Mexico and from other parts of Guatemala itself, is sending more and more people into the Peten's fragile Maya Biosphere Reserve, where

IUCN has a project located in a multiple use/buffer zone. In the long term, it will be necessary to address not only local problems but also, at least at a policy level, the demographic and socio-economic "push" factors in other provinces which contribute to the high in-migration rates of the Peten.

Madagascar, where most of the deforestation has occurred in recent decades, offers a lesson to policy-makers: A policy to limit population growth would do little on its own to halt deforestation; agriculture and energy policies together would only temporarily arrest the loss of forest cover, but it is only if a whole range of policies and measures, including population, agriculture and energy; are implemented that the forest and its high levels of biodiversity might be saved.

Mr Ypsilantis concluded by underscoring the inevitability of the continued growth of world population – not always where it is wanted. PPA are not islands which can be isolated from events outside them.

There are three levels at which the incorporation of demographic considerations would be beneficial: i) socio-demographic variables needs to be fully integrated into the conceptual framework used in selecting and managing PPA, ii) more support is needed for sound population policies, and park managers need to better utilize communication and education tools widely used in the demographic field; and iii) increased popular participation in project design and implementation, and improved cooperation with socio-demographic organisation active on the field.

DISCUSSION

Mr Paul Symonds, until recently IUCN Technical Adviser to the Serengeti Regional Conservation Strategy in Tanzania, asked how population growth could be estimated. His experience was that changes in policy and changes in the availability of forest resources and revenue could lead to dramatic local changes in human numbers that park managers needed to know about. Mr Ypsilantis replied by acknowledging that United Nations data and even local government figures did not meet this need at the local level.

Dr van den Oever suggested that a new methodology is needed to measure local population changes over short periods of time. Census data are not adequate for this purpose; it is taken only every 10 years and ignores what happens in local situations. Population changes in buffer zones, for instance, could be critical for park managers. Buffer zones could have quite the opposite effect than was intended if they simply attracted more people from other areas, creating very rapid in-migration for which no provision had been made. It would be important, as well, to go beyond demographic data and collect data on the social and economic variables that influence them. She paid tribute to the population division of the National

Audubon Society for not only exploring how this could be done but also gaining acceptance of the importance of doing so. Funds should be sought to gather such data locally and to monitor subsequent changes over time.

Comparative Case Studies: The Indus and Platte River Ecosystems

1. Saving the cranes along the Indus

The Indus River is one of the largest and longest in the world. Rising in Tibet, it flows 3308km to the Arabian Sea, 2253km of its course lying in Pakistan. Mr Mumtaz Malik, Conservator of Wildlife in the North West Frontier Province of Pakistan, used slides to illustrate its breadth. The river has been host to ancient civilizations of which archaeological ruins bear witness. It has always been Pakistan's lifeline, but today increasing numbers of people are dependent on it for their livelihoods, hunting, fishing, collecting firewood and timber, rearing livestock and taking their drinking water from it. It is also a prime habitat for migrating birds, including rare Siberian cranes.

But the river is changing. Some 800 people per km² crowd its banks and tributaries, developing new industries thirsty for water and electricity and increasing the irrigation systems used for agriculture. Two large dams have been constructed and are changing the ecology of the river. The first victim was the mangrove forest, killed by the increasing salinity, changing water table and pollution from the cities. Further damage is done by upstream logging, over-grazing and attempts at agricultural production on unsuitable lands.

The birds are squeezed into ever-diminishing habitats. They are also hunted. Trucks with huge cages camp along the water courses, trap the cranes, clip their wings and take them home as pets or for sale. It is a popular sport.

Faced with the need to take emergency measures, the government of the North West Frontier Province has declared the Siberian crane a protected species and prohibited its capture. Other measures are being put into force to protect other species. An area of 810km² of the Indus River has been declared a crane reserve. A site at the confluence of the Kurram and Gambeela rivers in Lakki Tehsil of Bannu district was established as a crane refuge in January this year. The cranes had not previously used the site but they have come to it. A conservation education programme has been launched by the provincial wildlife department to reach the hunters and the schools. Wildlife clubs are being encouraged among young people. Various steps are being taken to increase the slow reproduction rate of the cranes and artificial insemination is under consideration.

Mr Malik concluded by pointing out that the Indus River Ecosystem is essential for the quality of human life and people's demands on it will have to be met. What is

needed, however, is a balance between conservation goals and resource demands and reduction or elimination of the damaging technologies that put such a high cost on river protection.

2. Saving the cranes along the Platte

The Platte River Ecosystem is quite different from the Indus in scale, social structure and economy but it shares two critical factors – the pressure of human settlements and the diminishing habitats for endangered cranes. The National Audubon Society has studied the two sites together, to see what lessons can be learned and what measures of protection might have the best chance of success.

Dr Kenneth Strom, who manages a bird sanctuary on the Platte River, explained that, unlike the Indus, the damage in Nebraska is caused by the downstream impact of a small but affluent population living at the headwaters, in the city of Denver, Colorado, which has the same population as the entire state of Nebraska. The ecology of the river has already changed drastically and is further threatened by the plan for the Two Forks dam, intended to increase the water supply for the city, and a dam to meet the future water needs of the city of Casper, Wyoming. On the river as a whole, more than a dozen new water project proposals are under consideration, some to meet irrigation needs for the American breadbasket. There is increasing conflict between water users.

The crane, he suggested, is more than just another endangered species; its plight is visible evidence of what humans are doing to the planet that they share with all other species and to the water resources on which all forms of life depend. If the water is drawn off from the river before it can get downstream, both the waterfowl and the people living along the river suffer.

Cranes are a flagship species; of the 15 known species, half are in danger, including the sandhill cranes (*Grus canadensis*) that are totally dependent on the river wetlands as they move annually from Latin America and the southern United States northward to their nesting grounds in Canada, Alaska and Russia. Some half a million sandhill cranes visit an area of 130km of the river. They are attracted by the shifting sands scoured free of vegetation by the action of the water and by the food they find in the surrounding wet meadows. But as reduced water flow encourages the growth of brush, the habitats diminish and the river shrinks.

Today about 70 per cent of the river's flow is removed before it reaches the critical habitats for the migratory birds. The Platte used to look like the Indus, a very broad river sweeping through the grasslands of the American prairies.

In 1974, the National Audubon Society established the Lillian Annette Rowe Sanctuary on lands along the Platte purchased from local farmers. The sanctuary

protects 890ha of critical habitat along 6.4km of the Platte, in the heart of the staging area for sandhill cranes and other waterfalls. Audubon is also working at the policy level to prevent the new dams and to encourage government action to protect the habitats. The sanctuary is also intended to stimulate local interest in protecting wildlife and to foster community education, especially among young people, about the shared resource and the causes of its deterioration.

DISCUSSION

Participants wanted more information on the damaging upstream activities and the extent to which this was a problem of over-consumption of resources rather than population pressure *per se*. And since these large rivers often flow through other states and other countries, what happens when reduced water flow affects downstream quality in another country? What were the possibilities of reducing water extraction?

Mr Malik replied that, in the case of the Indus, the government was sensitive to the problem and had embarked on reforestation where possible. The demand for hydroelectric power was very high, however, and if no better alternatives could be found, dams would have to be constructed. With regard to other countries, Pakistan has had no problem with China and has an accord with India whereby India can take an agreed quantity of water from the Indus and its tributaries. A long-standing dispute between provinces in Pakistan has recently been settled.

Dr Strom agreed that the central issue was reduction of demand. If it could not be reduced, at least it might be held to present levels by better management and by policies which support the most efficient technologies. Changes in agricultural practices would also help, particularly by ceasing to produce crops already in surplus in the world. The city of Denver has inadequate measures to conserve water. As for conflict, some states were already suing each other over water.

Mr Qutub, who lives on a tributary of the Indus and recently made a five-state study tour in the United States, suggested that what seemed to be emerging from these two case studies was that some population growth could be accommodated on major waterways if water usage could be better planned and over-consumption avoided. He and others commented that Denver, from a self-interested point of view, considered its water management to be a success, having chosen high technology over simpler alternatives and having failed to introduce adequate penalties for profligate water use.

Dr Adiwoyo brought the session to a close and suggested the following conclusions:

As the demographic configurations have changed, the question arises whether human populations can be excluded and whether it is feasible and realistic to plan

for management of parks and protected areas without incorporating the demographic scenarios and population-driven activities within and surrounding these areas. The first session of the workshop addressed these questions, presenting cases as empirical evidence that people are living within many protected areas while others are dependent on the resources within the protected areas for livelihood. The cases also indicate the complex nature of the relationship between population characteristics and the protected areas.

Thus the results could be summarised as follows:

1. Many of the protected and surrounding areas are inhabited by people whose livelihood and life depends on the resources in the protected areas. The present conditions signal already possible future problems of increased population and aspirations for better life that may occur unless an integrated management planning is conducted in which the population trends and characteristics of the area are taken into account.
 2. Degradation of the physical landscape conditions, resulting from population growth, increasing consumption, or both, will ultimately threaten human life. Comprehensive planning, taking into account the pattern of livelihood and consumption, tenure system of the people in the area and interaction between the social and physical landscape where the protected area is located, is urgently needed to sustain the people and the parks and protected areas.
 3. Participation of people living within and surrounding the protected areas can only be successful if the management planning takes into account their socio-cultural values and traditions.
 4. Population trends and characteristics, not only of the people within the protected areas but also of those located nearby and using the common resources (such as the upstream and downstream areas of rivers), need to be incorporated in the planning as they directly impact on the physical landscape and the availability of resources in the protected areas.
-

CHAPTER II

Session 2

PROTECTED AREAS, ECOLOGICAL AND ADMINISTRATIVE BOUNDARIES AND POPULATION GROWTH AND MOVEMENT

The Chair was taken by Dr H.W.O. Okoth-Ogendo, Director of the Centre for African Family Studies in Kenya and Professor of Public Law at the University of Nairobi. He introduced the session by describing it as a continuation of the process begun with Session 1 and initiated consideration of the sessional topic with the following remarks:

A. PROTECTED AREAS

1. The Principle of Nature Protection

The principle of nature protection is one that occupies centre stage in public policy throughout the world. The concerns are not only ecological or environmental, even though these are clearly the most important. For a number of countries, nature protection is a serious economic concern. Indeed, there are countries in which protected areas account for a substantial proportion of foreign exchange earnings. The issue, therefore, is no longer whether biodiversity is worth protecting and which species are worth saving. Rather, it is about how such protection can be effected in a manner that is socially sustainable.

2. The Techniques of Protection

A number of nature management techniques have been devised to deal with these concerns. The best known is the designation, through legislative instruments, of certain areas as exclusive nature zones. Such areas are usually ecologically defined, although this is not always the case. This is the "national parks" concept that has become so well developed in Africa and elsewhere, especially as a technique for wildlife protection. Outside national parks, other techniques have been used to deal with the dispersal of migratory species in human habitats, or with the presence of certain nature categories in quantities too small or habitats too complex geographically to warrant exclusive zoning. Such techniques have included the development of nature reserves, sanctuaries and, in the case of wildlife, orphanages. Indeed, in a number of countries, protection has even included the absolute ban on any form of interference with particular species wherever they may be found.

B. DEMOGRAPHIC PRESSURES

1. The Nature of the Challenge

It is becoming increasingly obvious that some of the techniques outlined above may be affording more than adequate protection to particular species in nature and that more balanced nature-human management strategies must be sought.

Indeed, there are countries where it is already being argued that the protection of certain species of wildlife may be in direct conflict with human demands for land resources. The reason for this concern lies in the tremendous growth in human populations during this century, especially in the Third World where most of the unique natural species are still to be found. The challenge posed by demographic phenomena is one which is likely to persist well into the 21st century. In fact, as nature protection strategies themselves become more successful, areas of conflict will intensify rather than abate.

2. Its implications

The potential for actual conflict between nature protection and human needs and activities has important implications especially for the Third World. An obvious one is the opportunity cost to human investment of protection of certain natural species. There is evidence, for example, that wildlife is becoming fairly destructive of agricultural land uses in certain countries. Through the spread of bovine diseases, wildlife have been known to infect livestock in large numbers in some African countries. Their destruction of crops and woodlands is also well-known. These costs are likely to increase as a result of the marginalization of exclusive wildlife zones through the rapid disappearance of foliage, which often leads to largescale seasonal migrations to the inter-face between parks and reserves, and areas of intensive cultivation and settlement.

Another is increased land pressure arising from rapid population growth itself; a factor which in turn leads to encroachment on previously uncultivated or on land previously thought to be unfit for cultivation. The effect of this is to further intensify the conflict between the need for nature protection and human demands, especially if technologies of dryland farming through irrigation are

available. Further, increased land pressure has led in many countries not merely to the destruction of unique habitats and natural species but also to rapid desertification through the destruction of watersheds, catchment areas and woodlands. This is one reason that explains the sorry state in which the African environment finds itself today.

Finally, it is important to emphasize that whether or not a given society can afford the burden of nature protection depends, as everything else does, on its level of development. For most Third World societies this means a number of things. First, much will depend on the extent to which they are able to afford the high cost of the technology required, *inter alia*, for the surveillance, monitoring and implementation of specific protection mechanisms. Second, and perhaps more important, poverty reduction remains a more urgent issue than nature protection. The issue that must be resolved is whether Third World countries have the means and the courage to divert resources away from human development to nature protection.

Dr Okoth-Ogendo introduced the speakers and invited Professor Marcos Peña Franjul, of the Department of Natural Resources, National University Pedro Henriquez Ureña, Dominican Republic, to make his presentation.

Los Haitises – In Urgent Need of Protection

Dr Peña said the Dominican Republic has established 15 national parks and scientific reserves, covering about 4216km² or almost 10 per cent of the country, but the economic problems facing the country have made it difficult to develop and protect them. He referred to the area of Los Haitises National Park and the coast of the Bahia de Samana as the last frontier; its protection is now urgent. This land had long been isolated from major economic activity because of the difficult terrain. It began to be populated in the 1930s, following the expansion of the sugar industry and the natural disasters – Hurricane David and Tropical Storm Frederick – which affected Santo Domingo and other cities in 1949. Today, many people are searching there for new lands to farm.

The Government first declared Los Haitises a protected area as early as 1968 and has modified its proposals several times, taking in large parts of the coast around the bay. Finally, in 1990, a buffer zone was established. The park remains uninhabited but population pressure on the buffer zone has accelerated. For the last three years work has been going on to define this area and its people. The population is not homogeneous, being migratory people of different origins, with different agricultural practices and different relations with other population centres in the country. This makes programme implementation very difficult.

Dr Peña said the challenge is to develop a park management plan which preserves the most important areas of biodiversity. In some cases the people might need to be removed. People living in the buffer zone depend mainly on fish, livestock production and agriculture, but some of their crops are ecologically destructive. It is government policy to encourage out-migration from the area, especially of young people. The result is that many of those who remain are women, who become very isolated.

A plan for the management of the buffer zone and the integration of its people in the conservation and sustainable use of the protected area is now emerging, following a workshop held last year at Sabana de la Mar under the joint auspices of the National University Pedro Henriquez Ureña and Cornell University of Ithaca, New York. The workshop, which brought together Dominican and American experts, produced a series of recommendations for developing an efficient knowledge base and integrated strategies which take account of the social and economic characteristics of the local people and engage them directly in conservation activities.

Case Study: Villagers in the Buffer Zone of the Taï National Park

Ms Dulce Castleton, Consultant to the IUCN Social Sciences Division, and Ms Léonie Bonnehin, specialist in agro-forestry in Côte d'Ivoire, began their presentation by pointing out that the situation in Côte d'Ivoire is not dissimilar to that described by Dr Peña in the Dominican Republic. One of the measures to protect the Taï Forest had also been to increase the buffer zone. The village of Zaipobly is like many of the communities the IUCN Social Sciences Division has looked at over the past few years in order to find out the perceptions of local people, how they feel about conservation, how they react to conservation measures and how they cope with the problems of population growth.

The Taï National Park is, at 438,000ha, one of the largest in the country. It is one of the last extensive tracts of pristine rain forest in the Guinean forest zone of West Africa and has been declared a World Heritage site. The government has tried without much success to protect it by regulations and punitive measures but has now concluded that the active involvement of the local human populations must be engaged in the management plan and they must benefit from conservation activities.

The population of the Taï region has multiplied five times in less than 10 years, and 48 per cent of the estimated 57,087 people are refugees from the war in Liberia who have come in since 1989.

The village of Zaipobly, where a resource regeneration project is under way, illustrates the problems. It is only seven kilometres from the edge of the park. The definition of the area is very unclear and, in any case, local people cannot read the demarcation signs. Population pressure is accelerating on the area. Fertility

is high, with five or six children being common, but, in addition, there is heavy migration from outside, including the Liberian refugees and farmers from other parts of Côte d'Ivoire and from Burkina Faso who are attracted by the rich natural resources of the area and the promise of lucrative cash crops of coffee and cocoa. There is conflict between resource users as newcomers reject the traditional sustainable practices of indigenous people. Migrants do not invest in the community, returning frequently to their villages of origin and taking their earnings with them. They consider themselves temporary residents. They use the forest products but are not interested in the long-term development of alternative resources which will take years to mature. The need for more and more housing puts a heavy demand on wood.

Zaipobly lacks basic health and social services. Women would be interested in family planning but no information and services have been available. Although Zaipobly is supposed to be part of the scheme to involve local people in buffer zone management, they have so far not been consulted. They remain antagonistic to the government's restrictive measures and resent the tourists and scientists who are allowed into the park.

Women are overburdened with work and any involvement they may have in land restoration, for example, tree planting, only increases that burden. Nevertheless, it is the women who express the greatest interest in tree planting, especially fruit trees for domestic use.

The experience in the Taï Forest illustrates the importance of understanding the underlying sociological and demographic situation in order to identify what conservation activities are likely to attract the participation of the whole community.

DISCUSSION

Paul Symonds raised the question of land rights and tenure, pointing out that although a great deal had been said about the problems of migration, no one had mentioned the right of indigenous populations to the land on which they live.

Natural resources seemed to be regarded as free. Mr Qutub asked how it was possible to get short-term residents interested in creating a sustainable local resource base.

Dr Judy Messer, a sociologist who chairs the Nature Conservation Council of New South Wales, Australia, commented that the participation of local people in environmental management was just as important in sparsely populated areas and that there is an emerging movement of people rebelling at having decisions taken about their environment without their involvement.

Dr van den Oever asked professor Peña how the age-sex structures are related to the traditional division of labour in agriculture and to age-sex structures in larger cities. Patricia Thomas added that knowledge of what men do in the harvesting of natural resources is as important as the roles of women; both need to be understood, as well as the complementarity between their roles.

Professor Peña replied that in the Dominican Republic most of the land is owned by the government, but people gain rights to land they have worked. In the national park, people who were already there were given rights by the Parks Department to stay there and to work there. But a land reform programme is under consideration which would help people move to less degraded lands and give them compensation for doing so.

Léonie Bonnehin explained that in Côte d'Ivoire there are two contradictory pieces of legislation. Under colonial law, the land is owned by the state, but after independence, the government encouraged people to develop their land in exchange for title to it, although this is not actually enshrined in law. It is causing problems for the park management which gives licences to forestry companies who ignore the rights of the farmers and give no compensation for cutting down their trees. Some 80 per cent of the land is at present under litigation. She added that, with regard to the creation of resources, there are several different processes, some of which are addressed to the problem of recreating resources in areas where people have moved away.

On the question of the sexual division of labour, Professor Peña said that in Los Haitises, the population is still growing due to migration and there is a need to understand the physical and biological limits to the resources of the area and strengthen protection measures, diversify the economy and change agricultural practices. Some people are leaving the area while many more are still coming in. Traditional patterns of gender division of labour had been upset by the expansion of the sugar cane industry and the hurricane and tropical storms in 1949. Where fishing is the main occupation, division of labour tends to follow urban patterns, but elsewhere almost all the population is under the age of 40. He added that a family planning survey has shown that about six per cent of the population in the older areas is practising contraception.

The Chairman invited Paul Symonds to expand his remarks on the problems of land tenure, as experienced in the Serengeti National Park in Tanzania.

Mr Symonds explained that when the park had been established in the early 1950s, the people, Maasai pastoralists, who lived in it were moved out. The Maasai, who had also been moved off further traditional lands in northern Tanzania to allow the formation of other national parks, were forbidden to use the park's resources. The National Parks Authorities wanted to create a 10km buffer zone, intended to protect the integrity of the park's borders from development, but

this was viewed by the Maasai as a further land alienation and as such was unacceptable.

The situation for the pastoralists was exacerbated by national economic designs. Due to its rich volcanic soil, climate and topography, and despite its remoteness, the Loliondo area was viewed with intense interest by many agricultural concerns. Outside parties had requested so much land for large-scale cereal development that, by 1989, proposed land claims covered 140 per cent of the total area.

A land use study undertaken by the National Land Use Planning Commission in 1987 revealed the agricultural bias of the planning team when they found that only one per cent of the population was "meaningfully employed" (i.e. salaried) and that only two per cent of the area was inhabited. Animal husbandry was not considered meaningful. The desire to change the land use in the area also arose from the fact that Loliondo is perceived as a negative income area in that the local government relied on regional allocations and had no or little return from economic activity in the district. Whereas it is true that no significant amount of the income generated in the district returned to the community, the money generated from the present land use is considerable. Industries (parastatal companies) operating in the area took all revenues for themselves. The wildlife wealth from tourism and hunting went to the central government as the area is game-controlled; as no markets exist for livestock, they are sold in Kenya or Arusha and the income from cattle sold in Arusha is counted as generated in Arusha.

Thus a very rich area was regarded as having no wealth and the traditional land users and owners were in danger of being displaced and losing viable and sustainable land use practices. Land tenure emerged as a critical issue. It had long been the government's plan to demarcate the land of registered villages and help the local authorities to develop land use plans for the villages. However, due to financial constraint, this programme was drastically delayed nationally and had not been started in this area. Under a 1990 Investment Protection Act, no one can give away land that belongs to the village. People wanting to farm must either sub-lease the land or form a joint venture with the village. Under these conditions, investors pay for the resources they use and manage those resources properly. Working with the local council, the village elders, and the regional surveyors, the villages in the area were demarcated and land title duly awarded by the government. All the land is now owned by the villages. Individuals have to apply to the village councils. Land use can be zoned and planned with due consideration for all parties, reducing the risk of conflict. Development is done with the people who use the land, rather than by outsiders.

Mr Symonds concluded by stating that land tenure, invoking a sense of ownership, permanence, protection and responsibility, is absolutely fundamental to good resource management.

Conflict over Marine Resources: Comparative Case Studies

1. The Kuril Islands

Conflict between Russia and Japan over the sovereignty of the Kuril Islands could put at risk the opportunity to preserve one of the most unusual marine ecosystems in the world – where the warm waters of the Pacific meet the cold waters of the north to create a unique marine ecosystem.

Mr Sergei Sheveiko, of the World Waters Project, presenting the case study, said the changes that have taken place in the former Soviet Union now offer a chance which had not existed before, to take far-sighted measures to protect the Kuril Islands ecosystem before it is too late. An international marine park, under United Nations or other suitable international auspices, should be the goal.

Mr Sheveiko gave a detailed description of the geographic and ecological characteristics of the island, using maps and slides, and described the rich marine life of rare sea animals. The total annual fish catch in the Southern Kurils is 1.52 million tonnes and the rivers account for landings of 25400t of salmon per year.

The islands are also rich in mineral resources. The real extent of biodiversity is still uncharted. The islands have been the source of conflict between Japan and Russia for many years and ownership has switched back and forth about every fifty years. The management of the islands during the present century has resulted in clearing of forests, including the near eradication of the yew trees. The fishery has been under great pressure and some fishing and dredging techniques have destroyed spawning areas and put rare mammals at risk of extinction.

There has been no investment in infrastructure and the standard of living of the population, which numbers 28,700, is low. The land is generally inhospitable to human life and productivity is highly seasonal. Since the inhabitants benefit so little from the natural resources of the area they are disinterested in what happens. With economic stabilization and demilitarization of the area, this negative attitude could be changed

The World Waters Project, which has drawn up detailed proposals for the future management of the islands, envisages a sustainable mixture of scientific research, ecotourism and controlled fisheries and marine resource management. Political uncertainty over the future sovereignty of the islands, however, surrounds the planning process.

2. United States and Canada: Population, Economy and the Fishery

Increasing numbers of people, high consumption by affluent populations and advancing technology all serve

to reduce marine resources below sustainable levels and demonstrate a modern hunter-gatherer approach to marine resource depletion.

Introducing his study of the Gulf of Maine, Dr John Williams, of the IUCN Social Sciences Division, observed that marine areas differ from agriculture in that the application of improved technologies, far from increasing the yield, actually increases the rate of depletion of the fish beyond sustainable levels and enables outsiders to take resources away from local people. Changes in fishing practices in the Gulf of Maine over time and international negotiation between the United States and Canada over a shared resource demonstrate important socio-economic aspects of coastal reserves. The area provides food, income, employment and recreation.

The Gulf of Maine is bordered on the south by Cape Cod, on the west by Massachusetts and Maine, on the north by the Canadian provinces of New Brunswick and Nova Scotia and on the east by Browns Bank and Georges Bank. The fishery has been beset by problems resulting from technological advances in the mechanisms of fishing, increased consumption of fish products and adverse environmental impacts upon the resource. Before 1960 the waters were fished by local people – Americans and Canadians – using small boats to catch herring, haddock, cod and shellfish. After World War II the number of boats increased and by 1950 over-fishing of haddock was depleting the stock. An International Commission on the Northwest Atlantic Fishery introduced measures to stabilize the fishery but met intense

pressure by modern fishing fleets from the Soviet Union, Iceland, Japan and Europe. By 1965, nearly 60 per cent of the catch was made by foreign vessels.

In 1976-77, the United States and Canada implemented a 200-mile limit for the fishery but the two countries became locked in a boundary dispute over the Georges Bank which had to be resolved in the World Court. Although much scientific work has been done to establish a Man and the Biosphere reserve for the area, the two countries have different management systems and have failed to resolve their differences.

Dr Williams described how the resources of the area are used, Per capita consumption has increased, although population growth has been fairly slow, with the result that the fishery is unable to meet the demand. Over-fishing makes the resource unsustainable. The previously stable canning industry, which provided local employment, declined after 1955 and has never been revived. Ecotourism is now the main activity.

DISCUSSION

Interest was expressed in the idea of shared coastal resources and in encouraging the sharing of the resources

of the global oceans (this point raised by Carlos de Paco of Costa Rica). Dr Messer suggested that the idea of international zones to preserve marine resources could perhaps be drawn to the attention of Congress Workshops which were discussing legal issues.

Mr Sheveiko commented that ecotourism is becoming popular in the Kuril Islands, where people from the former Baltic Republics are calling the area the new Crimea.

It is very popular for camping and companies are interested in establishing tourist facilities. It shows the urgency of agreeing on a management plan.

The question of land tenure was raised again by Miriam Abramovay, this time, with regard to the position of women, who, in many countries, are not legally entitled to hold land. Mr Symonds responded by suggesting that the first essential is to establish the principle of land tenure and decide who gives land rights and how they are protected from migrants. Then other issues, including the rights of women, can be discussed. Patricia Thomas suggested that if the sexual division of labour has not been studied it would be difficult to decide who uses the land and who should therefore have the rights to it.

The Chairman, Dr Okoth-Ogendo, suggested that the whole question of land tenure is such an important issue that the IUCN Social Sciences Division should study it in relation to the management of parks and protected areas.

People And Protected Areas: Conflict or Complementarity

Dr Malin Falkenmark, Professor of Applied and International Hydrology at the Swedish Natural Science Research Council, illustrated with graphs and tables the catastrophic effect of upstream human activities on downstream wetland habitats because of water pathway linkages. Protected downstream habitats are under siege from upstream land use, exacerbated by population growth and migration. In these circumstances, conventional conservation tools will not work. As long as upstream activities cannot be controlled, protection of downstream wetlands is virtually impossible.

Realistic management guidelines must be based on a thorough understanding of the direct and indirect effects on water quality and availability, as well as the future trends. What will happen, for example, if population doubles and agricultural production trebles in just a few decades?

Dr Falkenmark illustrated how human activities, motivated by human aspirations and ambitious technology, change the landscape of rivers and their watersheds. The effects will differ according to region and will not be just a question of water flow but also of quality. Pollution of groundwater aquifers inevitably

accompanied increased human numbers and activity and where aquifers are very deep, the consequences may not be felt in the aquatic system of the river for a very long time.

Vegetation-related upstream-downstream linkages also needed to be understood. The demands of water for vegetation will determine what is left to replenish aquifers and to flow downstream. This is an important factor for conservationists to take into account when siting parks and protected areas. If there is a choice, it might be preferable to select the area for the park upstream and the population downstream, rather than the other way around.

DISCUSSION

Mr Qutub related an experience in Pakistan where upstream villagers had altered the watershed by terracing and then had deserted the area to migrate to the cities, leaving the whole system to collapse. Dr Messer said Australia offered good examples of how intensive agriculture, even where population density is low, can have serious impacts up and down stream in river systems.

Ms Jane Lyons, of the National Audubon Society, asked about different tree species and the different results of reforestation on the amount of water returning to the atmosphere.

It was noted that reforestation was being used in some places to make areas drier, rather than wetter. Reforestation can cause changes both in rainfall patterns and water availability and in some countries a permit is required before it can be done.

Dr Okoth-Ogendo brought the session to a close and suggested the following conclusions:

The case studies and the presentation on water issues carry several messages. The first is that the protection

imperative remains crucial to the survival of human as well as nature species. The two are inextricably inter-twined. And while mechanisms of protection may differ from one particular species to another, attempts must always be made to provide a regulatory framework for human/nature interactions. Indeed, the studies on the Gulf of Maine and Kuril Islands indicate that the era of social Darwinism is clearly over. If, therefore, domestic legislation or administrative regimes are not able to provide that framework, international intervention may be necessary.

The second is that indigenous knowledge, information and techniques are clearly more relevant to the design of nature protection policies, plans and programmes than are the exogenous concepts and ideas that often characterize existing activities. Nature protection programmes that ignore this factor are unlikely to succeed as the case studies from Côte d'Ivoire, Tanzania and the Dominican Republic show. People's participation in nature policy formulation and management decision-making is therefore the key to sustainable programmes. This is especially the case if account is taken of the people's own culture, tenure relations, and institutions and management regimes.

The trend is that successful nature protection programmes are usually those that are cost effective, not only for nature but also for human populations, which may have to forgo some of the benefits they receive for areas designated as parks, reserves and sanctuaries. Any compensatory schemes must therefore be designed on the basis of a "no net-loss principle".

Finally, it should always be remembered that the survival of any form of biodiversity depends ultimately on water availability. Water quantity and quality planning on a long-term basis must therefore be built into the siting, use characteristics and management dynamics of nature parks, reserves and sanctuaries.

CHAPTER III

Session 3

HUMAN POPULATIONS, AND POLICIES AND STRATEGIES FOR PLANNING AND MAINTENANCE OF PROTECTED AREAS: AN INTEGRATED APPROACH

The sessional Chairman, Mr Ayub Qutub, Director of the Pakistan Institute for Environment Development Action Research (PIEDAR), introduced the topic by emphasizing that the session should focus on human populations from the perspective of policies and strategies for integrating human and conservation interests in and around protected areas. The case studies and presentations would bring out the principal issues with which planners must deal and suggest some approaches that appear to work. Following the presentations, the session should attempt to reach some conclusions and make recommendations.

Case Study: Proyecto Nakum-Yaaxjá-Naranjo

A demonstration project has been underway for 18 months in a section of the buffer zone around the Maya Biosphere Reserve in the Peten in Guatemala in the south of the Yucatan Peninsula. It is beginning to show that by nurturing the interests and the confidence of local people, attitudes toward the use of natural resources can be changed and people's participation can be engaged in sustainable development.

Ms Paula del Cid, a psychologist who works at the project site, showed a map of the Peten, where there are important archaeological sites of the remnants of Mayan temples, national parks, extensive forest regions and a buffer zone around the Tikal National Park. The project zone of 3600km² takes in about 20,000 inhabitants of 26 villages along the main routes of access to the area. The rate of population growth, at 5.5 per cent, is higher than the national average of 3.2 per cent, mainly due to an influx of migrants from degraded land in the southeast of the country.

The people practice slash-and-burn agriculture and extract the forest products. Men carry out the main economically productive activities while women are engaged mainly in domestic activities. Children join the family labour force from the age of seven. Uncontrolled colonization of the area, subsistence agriculture and degradation of the forest has steadily reduced the capacity of the land to meet the basic needs of the people.

Ms del Cid explained that the approaches taken by the project vary from place to place according to the local circumstances but include community self-help as a central theme.

In one community the support of local institutions, school teachers and education authorities was sought. With their help, the people were invited to participate in workshops where the project objectives were explained to them and where they, in turn, had the opportunity to describe their own local situations and the problems they had in farming their land, obtaining credit and getting technical advice. Once communication had been established, alternative methods could be explained and practical examples could be given.

In another area, communication was opened up by talking to individuals who were engaged in agroforestry. Groups were formed to discuss the results. By introducing the skill of bread-making, from which a small income could be derived, women were brought together to discuss their own problems and to learn about alternative solutions.

By building on what was already happening in another community, the project has also experimented with helping villagers who want to make use of abandoned logs left by lumber companies who had previously worked in the area. Contact with the villagers was made through a neighbourhoods committee. Training was given in measuring and cutting the lumber so that a community hall could be built with the wood. The project personnel thus became accepted by the local community.

Later, the local leaders demonstrated their interest of being able to manage a piece of land. Training was given in registering the forest resources as a first phase of a pilot project in a communal forest management plan. Young people are also involved and are encouraged to research their local history and culture and to communicate the results through a village newspaper, radio and theatre.

Ms del Cid concluded by suggesting that the experience in this project up to the present time showed the importance of building coordination between the project's technical personnel and the local people, allowing the communities to identify their own problems and alternative solutions and engaging them in the planning and feasibility studies. Small-scale field activities providing training in skills they themselves have identified as useful, ensure that local realities are taken into account, particularly the dynamics of the relationship between the people and the natural resources on which they depend.

Case Study: People and Wild Game: Can They Co-exist?

A truce between large wild animals and the people whose lives they put at risk may be negotiated on communal lands in Zimbabwe if recent experiments in sustainable wildlife use succeed. But promising initiatives under the government's Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) could be put at risk by rapid population growth, uncontrolled migration and conflict over benefits between producer communities and local authorities.

In a tripartite presentation, Ms Dorothy Musokotwane, who undertook a case study in the Zambezi Valley, Ms Elizabeth Rihoy, of the Zimbabwe Trust, and Mr Elliott Nobula, a district manager, described the development of the CAMPFIRE programme and its pilot projects.

Nyami Nyami, the case study district, is on the shores of Lake Kariba, bordering Matusadona National Park. It demonstrates the plight of very poor people whose crops, livestock and even their own lives are destroyed by marauding elephants and other large wild animals which are totally protected by law.

They have traditionally regarded the animals as an economic asset, as well as an occasional nuisance and have poached in the park to get food to eat and products to sell. Migrants, who include those displaced when the Kariba Dam was built 30 years ago, have been coming into the area in increasing numbers and degrading the already fragile ecosystem. The indigenous people, the Tonga, have been unable to practise their traditional sustainable resource management, based on spiritual respect for sacred places. Other natural resources, including water, are abundant in the park but unavailable to those who live on its fringes. Revenue from the park, through hunting, safaris, photo-safaris etc., has not, until now, brought any benefit to the people. The people, therefore, have been extremely antagonistic to conservation measures.

The CAMPFIRE programme is seeking to change all that; to engage local people in wildlife management from which they directly benefit. The programme is part of the National Conservation Strategy of Zimbabwe and was initiated by the government after legislation was introduced in 1982 under which authority was granted to district councils to enable rural peasant communities to control the wildlife resources in their area. Wildlife management by local communities is being regarded as a viable alternative land use, particularly suitable to infertile, semi-arid zones.

Nyami Nyami is an example of how people's lives can be changed by this process. A suitable institutional framework has been developed, which includes financial control and revenue distribution on the principle of "differential inputs resulting in differential benefits". Regular censuses are taken of animal populations, quotas

are established for culling, game corridors are demarcated and electric fencing has been put in place to keep the animals away from the villagers and their crops. With better nutrition has come better health and the participation of non-governmental organizations in the provision of social and health services, including family planning.

There is no single model for a CAMPFIRE project. The design depends on the local people, their environment, their traditions and current practices and their perceptions of the problems and how they can be overcome. They are considered likely to succeed best if they are small and if migration into the area can be strictly controlled. People who receive direct benefits from the wildlife resources are unlikely to want to see it divided into more and smaller portions. However, there are two demographic features that tend to contribute to the subdivision of land into increasingly smaller plots. The first one is the unequal distribution of land, and, consequently, the uneven distribution of people; two per cent of the population owns 50 per cent of the best lands for commercial farming. Furthermore, the population of Zimbabwe increases at a rate of around 3 per cent annually, thus adding each year over 300,000 people to the existing population

DISCUSSION

Participants sought clarification on a number of points. Electric fences could be troublesome, it was suggested, and not entirely effective for protection of people from elephants, because ivory does not react to electricity. How are the game corridors established and how is the revenue from the wildlife resources distributed? How are the members of the management committee selected and what proportion of them are women.

Mr Nobula replied that the fences were designed for elephants and buffaloes; the electricity was provided by solar power and the animals do get a shock.

The game corridors are determined partly by the tracks the elephants have traditionally taken and partly by consultation with the community. Revenue comes from hunting and tourism; 50 per cent goes to the community and is divided according to the decisions taken jointly on its expenditure – on schools and other amenities. The money is distributed to individuals but used communally. The rest is used for salaries of those employed in the project and on administration. Committee membership is decided locally and the participation of women is largely determined by the social culture, varying from one project area to another. Ms Rihoy added that area managers were now being trained in gender issues.

The question of CITES and its effect on CAMPFIRE projects was raised and it was noted that contradictions arise between local realities and decisions taken in another part of the world. In Zimbabwe the elephant

populations were being managed sustainably. A major reason for that was, that local populations derived benefits from trade of products such as ivory and a variety of items made of elephant skin. Therefore it was in their own interest to protect the elephant herds from declining. Prohibition of all trade in products derived from elephants will certainly diminish the motivation of local people to manage the elephants well, especially since they often cause damage in cultivated fields, which are now no longer offset by revenues from other sources. Local plans could be upset by changes in international regulations. Pakistan also has a programme for the sustainable use of wildlife. CITES should take into account how each country is managing its natural resources. The situations were not always the same.

Dr Okoth-Ogendo drew attention to the land reform bill at present before the Zimbabwe parliament which is intended to deal with conflict arising from population pressure.

How would this affect the policy on management of wildlife reserves? Tabeth Matiza, of the IUCN Regional Office in Harare, said the government's intentions on land reform were still not clear; there were many conflicting interests. It was not just a question of land distribution but also of land use, as the population increased.

Returning to the case study from Guatemala, Mr Ypsilantis asked whether any policy initiatives were being taken to deal with the problems of migration. Ms del Cid replied that although IUCN did not deal directly with this subject, migration is more or less dealt with in land use planning.

Sharing the Earth: Case Studies on Population, Wildlife and Environment

The National Audubon Society in the United States, with nearly a century of experience in protecting wildlife and its habitat, has long recognized the impact of human population growth on the natural environment. It has had a population programme for the past 10 years, with the goal of ensuring that sound population policies are established in the United States and overseas that contribute to the health, well-being and dignity of the individual human while protecting non-human species and their habitat.

Introducing her presentation, Ms Patricia Waak, Director of the Society's Population Program, said Audubon's work was based on the principle that wildlife has an intrinsic value and right to exist in and of itself. The greatest threat to wildlife is human beings. Yet, humans and wildlife are interdependent; if the one is lost, the other will ultimately be lost as well. In the United States, with affluence far beyond the norm, research shows that most people understand that population and environment are linked; they see it as a numbers of people problem and a resource consumption problem.

The debate over the cause and effect of environmental degradation is complex. There is no one cause and effect. Instead, the cyclical nature of the problem must be recognized. In the context of the developing world, environmentalists must understand that people do not choose to be poor and natural resources may be their only wealth. Demographers must understand that addressing poverty and environmental concerns are a part of the answer in the search for a decrease in the growth of human numbers. And economists must understand that overly rapid population growth and environmental degradation will undermine development efforts. It is clear that rapid population growth, economic instability and a degrading environment are part of one cycle, just as affluence, resource consumption and environmental degradation are part of the other cycle.

Ms Waak warned that the efforts to preserve wildlife habitats were failing. In the United States alone, more than 50 per cent of wetland habitat has been lost to shopping centres, housing developments and other modern landscapes in a little over 200 years. Humans are encroaching upon and overtaking areas surrounding parks and protected areas, with consequent loss of species. Redistribution of water for industry, agriculture and recreation has caused depletion of water needed by plants and animals.

In 1988 Audubon's Population Program and Sanctuary Department began to develop a project to look at the issues of human population growth and wildlife management. Selected sites in the United States were compared with similar ecosystems in several developing countries with high population growth rates. Sites in Mexico, Guatemala, Brazil, Pakistan, Thailand, Kenya and Zimbabwe, all water-related, were chosen. The goal was to explore examples of human population pressures through a review of the issues, aimed at understanding each case in the broadest terms and learning from one another's experiences in protecting the environment.

It was found that wildlife managers everywhere had common problems and much to learn from each other; more meetings between them and exchange of experiences are needed. The rate of habitat loss is accelerating. In many cases, human technology and affluence have led to more rapid and extensive environmental degradation than have masses of humans living in poverty.

Ms Waak drew attention to the descriptions of each case study contained in her paper. She concluded by announcing that Audubon will hold a population and wildlife convention in 1994 in Florida. In addition, over the next four years, the Society will set up four centres of expertise based in Nebraska, Texas, California and Florida, to continue exploration of human population, wildlife and environment interrelationships. Partnerships with the countries of Russia, Pakistan, Nepal, Mexico and Guatemala will continue comparative studies and actions to find solutions to these complex issues.

Land Use Policy, Economics and Maintenance of Protected Areas

Explaining that his work was at an early stage, Mr Joseph Alper, of the Conservation Biology Program at the University of Minnesota, said he was studying economic activity and trends in the Platte River ecosystem in Colorado, Nebraska and Wyoming, with a view to making recommendations on how economic development and species conservation can be reconciled.

In particular, the study will focus on past and projected economic trends and their relationship to human population growth; water use and water quality and the projected effects of water-saving agricultural and industrial technologies on water demand; the ability of land, water and

agricultural policies to benefit both human and wildlife inhabitants of the area, and the perceptions, beliefs and goals on the many constituencies that live there.

With slides and maps, Mr Alper illustrated some of the problems. The growing cities of Denver, in Colorado, and Casper, in Wyoming, already consume far more water than the national average. It is important to find out why this is occurring and what changes in economic activity could be introduced to reduce water demand.

He postulated that changes are already occurring which are not reflected in policy responses. People tend to think that Nebraska will be forever dependent on agriculture, but this is not so. Many people are retiring to this area because they think it is a nice place to live, and they bring their money with them. There is growth in the service sector and in the number of newcomers who start their own businesses. But if resources become scarce and the environment deteriorates, these people can leave just as easily as they came.

Mr Alper described the model he has developed for his study and his plans for testing his findings through communication with Platte River residents. He concluded by acknowledging that some of his colleagues have criticized the project because it will use economic arguments to justify efforts to protect wildlife habitat, but he hoped to make a convincing case that economic development and habitat protection can occur simultaneously.

DISCUSSION

Workshop participants wanted to know if any comparison had been made of population data in the Platte River ecosystem with other parts of the United States; what was the explanation of variations in extractive activities, and what communication strategies did the Audubon Society use to reach the general public. Dr Falkenmark pointed out that the high water consumption of the city of Denver was not a one-way

flow; the city borrowed the water and had to address the technologies for efficiently giving it back.

Mr Alper replied that there were other similar demographic patterns in the United States, but he had not investigated this. The ups and downs of the extractive industry reflect international demand. He agreed that Denver only borrowed its water, but said that the city also impounds water to be able to meet future demand as a result of population growth; consequently some 20 to 40 per cent is not returned.

In answer to a further question, he said the water quality in Denver was good and was being measured by efficient new tests which were, however, difficult to apply to moving water.

Responding to the question about Audubon's communication strategy, Ms Waak said there were three targets – policymaker, the self-identified citizen and the general public. They all had to be informed and involved so that they, in turn, could implement improved policies and actions. The educational materials designed by Audubon had to be useable by them all, book, slide shows, videotapes, papers and brochures. A recent video had become required material for the schools. Television material is being developed and tool kits on specific topics such as wetlands. Policy papers are formulated on such topics as energy, water and forests.

Dr Adiwoso asked what can be done about population growth on the edge of parks and protected areas. Ms Waak replied that 1. The need to stabilize population growth and balance resource consumption is fundamental. 2. It must be recognized that there are certain biologically sensitive ecosystems which can never be inhabited. 3. Governments must continue to establish those zones, legally protect them, and promote economic development that is not dependent on destruction of the parks and protected areas. 4. Through an understanding of their importance and a sense of ownership, local people must be consulted and involved in the protection of the protected areas. Currently, over-consumption of resources has much more impact than over-population on the global environment. At present, industrialized countries are contributing the most to global pollution. This will change as populations in developing countries continue to grow rapidly while also developing their own industries, and an improved economy. Populations in industrialized countries have very low, or even negative growth rates, and are trying to curb excessive wastes.

Bringing the session to a close, Mr Qutub regretted that there had not been time for participants to formulate conclusions and policy statements. More thought would have to be given to this. Meanwhile he offered the following impressions of the session:

1. The impacts of rapid growth of poor populations on protected areas are intense, but they are local compared to the impacts of overconsumption by

affluent populations, which tend to affect the global environment.

2. Programmes and projects for protected areas and buffer zones which are made and operated with the participation of local people have a greater chance of lasting success. Asset distribution, particularly land tenure systems, play a major role in helping or hindering people in sustaining ecosystems in and around protected areas. In so far as equity in access to natural resources and participation in development also influence the desired family size, there may be advantage in integrating population and environment programmes. For example, this could entail involving resource sector extension agents in disseminating the goals of family limitation.
 3. International and national economic, social and sector policies strongly condition the viability of programmes and projects for protected areas. Yet the impacts being multiple and complex, with second and third order consequences, they are seldom holistically addressed. Improved analysis of population-environment inter-linkages could help devise more sensible policies.
 4. In the post-industrial era, the existence and non-consumptive use of natural resources are likely to become more important to a stable and ageing population. Education of policy-makers in changing population composition and their consumptive preferences will be important. Policy-makers often have a narrow and limited vision of a region's long-term economic interests in natural resource exploitation and maintenance.
-

CHAPTER IV

Session 4

AN ACTION PLAN: HOW CAN OUR NETWORK CONCRETELY ADDRESS THE BIOLOGICAL AND HUMAN ASPECTS OF PARKS AND PROTECTED AREAS?

Dr Pietronella van den Oever took the chair for the final session of the Workshop. She reminded participants of some of the key points which had emerged so far.

From Session 1, she identified four points: 1) protected areas are not necessarily uninhabited and are likely to be more and more inhabited in the future, given the future world demographic scenario; 2) even where people do not actually live within the park, many of them depend on the park's resources and thus their presence has an impact on those resources; 3) the participation of local people in the sustainable use and conservation of parks can be enhanced by local policy, especially where cultural values and traditions are respected; 4) over-exploitation of natural resources by human populations, as a result of population growth and/or in-migration, threatens ecosystems, disturbs habitats and impacts on the quality of human life – if nature is degraded, nature loses and, in the end, people lose as well.

In Session 2 four points had also emerged: 1) the importance of the protection of nature was reaffirmed not in the traditional way of excluding people from protected areas but rather by ensuring that people can use the resources sustainably; 2) local people have much to contribute; their knowledge and participation should be sought and measures for the management of parks and protected areas should be adapted accordingly; 3) demographic pressures will alter natural resources and it is necessary to initiate proper legal instruments to take this into account; 4) water is a vital resource for life and its quality and quantity is a vital part of planning for the management of protected areas.

In Session 3 the Workshop had discussed concrete examples of integrated approaches that enhance the involvement of local people in the conservation and sustainable use of protected areas and how current experience, ideas and activities is shaping ideas for the future. This debate continues in Session 4.

Grassroots Coping Strategies

Linking Biological and Human Aspects

Dr Joseph Matowanyika, Chief Planning Officer at the Agricultural Development Authority, Zimbabwe began by explaining that he would draw his ideas mainly from Africa and from Zimbabwe in particular. He drew

attention to the theme of the Congress "parks for life" and asked: Whose life? If, as seems likely, the intention is life in general, then it is important to look at what the emphasis has been. It is no longer proper or useful to look at just the biological aspects. Parks and protected areas are human institutions to meet human objectives; they represent human icons, human visions and because of the valid nature of human visions, valid visions emerge. There is a wide array of human institutions thinking about protected areas. Are they providing the basis for a properly shared vision or should we try to force ourselves to have other visions? The question must be answered from a human ecological perspective and the answers will differ. So the question arises whether there is a basis for believing that there are shared visions.

A new study in Zimbabwe, he said, which had not been published in time for the Congress, had looked at the relationship of human populations to parks and protected areas. In it the economic, physical and material resource benefits that flow between protected areas and people was emphasized. This means that it is not sufficient to look at only one aspect – for instance, economic or physical – but there must be an overall human ecology perspective.

Dr Matowanyika pointed to the indigenous systems that prevailed in Africa as an example. It was not just a question of local populations *per se* but of the traditions and cultures in rural areas that are centuries old and which, if they encroach on each other, complicate the issues. It is necessary to break down the components. Local knowledge systems, social networks, daily routines and rituals, learning processes, gender relations, kinship roles, distributive systems, religious perspectives, customs and beliefs. All these components make up a human ecology. The wide acceptance of Christianity in Africa is a significant factor. Religious leadership and spirit mediums are important in examining ecological relationships. Democracy at the local level offers a means of discussing local problems and of reconciling the relationships that exist between people. In addition, there are articulated rules and regulations and attendant enforcement processes.

In Zimbabwe there are sacred places – individual trees, well points, rock outcrops – strewn all over the local landscapes. They are usually small but are very significant in relating people to their local environment. Some tree species are sacred, a certain type

of palm for instance. The sites of graves can occur in critical habitats. The concept of spirit mediumship is very important in the Shona culture and in other countries of Africa.

Therefore it is important to realize that when parks and protected areas are created or land use plans introduced, it is local social spaces – local histories – that are affected. In non-literate societies these histories are handed down orally and it can come as a surprise to an outsider that a certain clump of forest is protected for some historical reason. There is a sense of violation when people are moved from their lands. They no longer have access to the burial grounds of their ancestors.

All this, he suggested, needs to be understood before common visions can emerge. If some of these factors are understood then there is a basis on which to begin building a common vision, and a realistic process of development.

Can these systems be used, for example, to preserve biodiversity? If people regard a certain species, a python for example, as a sacred animal, they are surely contributing to conservation. To what extent do outsiders have the right to determine what biodiversity is? The important process is to create bridges, convince local people about what actions are needed and avoid violating their places and traditions.

He concluded by recommending that there should be fuller, open-minded studies, an emphasis on bridge-building with local communities, continued observation of social changes and much more involvement of social scientists.

Human Activities and Agro-forestry in Bangladesh

The rapid growth of human population in Bangladesh has made it necessary to take unique measures to try to preserve what is left of the forested land in the country.

Mr Ali Akbar Bhuiyan, Conservator for Forests in the Bangladesh Forest Department, began his presentation by pointing out that although Bangladesh is an old habitation, it is a new country. Demographic pressure on protected areas is intense. The population has grown from 43 million in 1947 to 110 million to date and is still growing at the rate of 2.2 per cent a year, despite a massive family planning programme. Population density is 800 per km² and urbanisation is increasing rapidly.

He described the country situation and where special attempts are being made to protect the forests. There are four sites in mangrove areas, four in the hills and three on the plains, making up 102,462ha or 4.16 per cent of the country. Before the 1950s there was little or no encroachment on forest lands, but, with the annulment of the feudal system, migration because of international disturbances and river erosion, people are finding their way to the cities and the forests.

Traditionally, the forests belonged to the government and to the feudal landlords. People had no right to the land and had an unfriendly attitude to forests. In the post-colonial period there has been little change, but the administration has been more relaxed and people have been living in the forests without land title even after the declaration of protected areas. Since they resist all attempts to evict them, it is necessary to look for alternative strategies.

Since the basic problem is the low socio-economic situation of the people, a policy of "live and let live" is the only viable alternative, making it necessary to give appropriate reorientation to park managers. Bangladesh has the advantages of a rich alluvial soil and high rainfall but this cannot offset the country's overpopulation. In such a densely populated country it is not possible to think of parks without people in and around them.

It is this situation that is the rationale for agro-forestry. It responds to the needs of the people, including forest squatters and forest neighbours – and their cooperation is obtained. A special alley cropping agro-forestry technique is introduced in which perennial trees and seasonal agricultural crops are grown on alternate strips in a permanent cropping situation. Each family is allocated some land and the scheme is financed by the government with a loan from the Asian Development Bank. Participants are given legal guarantee of benefits at the rate of 50 per cent on forestry products and 100 per cent of agricultural returns, thus giving hard-working families a comfortable income of about 20,000-24,000 Taka a year (US\$550-650).

Since park managers have had a reputation for harassing the people, the future work of introducing the scheme is sought to be done by associating non-governmental organizations. Mr Bhuiyan illustrated with slides the different techniques that are being tried. He concluded by commenting that Bangladesh is a glaring example of the fact that parks and protected areas are not islands; human populations are always present.

The Gender Variable

The relevance of social issues in general, and of the gender variable in particular, to conservation and sustainable development efforts is becoming widely acknowledged. Policy-makers are finding that if the differential impact of the intervention planned – on women and men, young and old, privileged and underprivileged – is not taken into account, the programme will succeed with great difficulty.

Ms Patricia Thomas, consultant to IUCN's gender programme, explained the importance of gathering knowledge of gender and other social variables in the context of parks and protected areas in order to understand how different social groups can become catalysts for change.

To achieve the goals of the Congress, more must be known about human behaviour and the social and economic systems and groups that constitute human communities. The case studies presented at the Workshop emphasize the role of demographic phenomena – population growth, movement, distribution, age and sex structure and consumption patterns. Information of a different kind is also needed. A thorough analysis of different social groups and their differential access to, and use of natural resources is needed to understand the dynamics of sustainable – or non sustainable use of natural resources. Conservation programmes cannot be effectively implemented if the precise target groups and main decision makers and actors are not known.

Gender is a cross-cutting issue that must be considered in all plans for natural resource management, since in many societies access to and control over resources are determined by gender. People structure their work according to their roles; access to and control over resources are in many societies determined by gender. Several case studies presented at the Workshop show that the gender variable has been overlooked, resulting in a less than optimal outcome of the conservation effort.

Ms Thomas went on to describe methodologies for gender analysis. She pointed out that many so-called social analyses do little more than observe and describe the roles played by women and men, missing entirely the human dynamics that give relevance to these roles in the context of conservation, sustainable development and environmental change. It is necessary to look not only at women's and men's roles in natural resource management, but also at the dynamics of relationships between the men and women working together in the society, and to determine how these respective roles will need to change, if sustainable development is to be achieved.

Gender analysis was first developed as a response to the failure of a decade of "Women in Development" policies to improve women's lives through income-generating projects or increased educational opportunities. These types of solutions were not effective as long as basic inequalities between men and women continued to exist.

Gender analysis, instead of focusing uniquely on women, first gathers information on the sexual/gender division of labour, gender-differentiated access to and control over resources and benefits and then analyzes the reasons for existing inequalities that influence opportunities open to men *and* women, and the options open for improvement of the existing situation.

The need for gender analysis in the context of natural resource management is based on the supposition that throughout the world men and women have different responsibilities, opportunities and constraints

governing their use of nature resources, on both the household and community level and that, in order to understand the way in which resources are used, the collection and analysis of gender-differentiated information is essential. Gender analysis provides a dynamic framework within which the search for information may be organized and the results analyzed. It enables measurement and analysis of the constantly changing but always interdependent relationships between women and men, as well as the social, political and economic structures which have a direct bearing on the way they exploit their natural environment.

DISCUSSION

Questions were raised about how both men and women could be empowered to meet not only their practical daily needs but also their longer term strategic needs, including, for instance, access to land and protective legislation. How are gender issues related to traditional belief systems?

Dr Messer warned again that declining populations also have serious impacts on the environment; there are fewer people to manage the land. Women, who sometimes appear powerless, have a good deal of social power in many communities. She added that IUCN would do well to monitor the unintended consequences of some so-called beneficial actions.

Dr Matowanyika said traditional systems do address gender issues; this is a very important perspective in indigenous systems. Mr Bhuiyan added that in indigenous societies in Bangladesh, women participate equally with men, but in other communities women mainly work indoors, while men do outdoor work and make all the decisions.

Ms Thomas suggested that the transition from the "women in development" approach to the gender and development approach had been a dynamic process. Before it began women were not considered at all. It should be an evolving process toward full societal participation. Social inequality tends to keep women from participating and from having an impact in their societies.

Mr Symonds commented that he had never liked the WID approach because it created problems between men and women. Gender is a much better idea because it also takes men's roles into account. He gave an example from Eastern Uganda where cultivation of crops was done by women and livestock managed by men. With mechanisation, the men turned to ploughing, leaving women to sow seeds over an even greater area. Both men and women should have been brought into the discussions and their different roles taken fully into consideration.

Planning Parks and Protected Areas in an IUCN Regional Programme

Mr Oscar Lücke, Deputy Director of the IUCN Regional Office for Central America (ORCA), prefaced his remarks by noting the diversity and complexity of his region, which stretches from Belize to Panama. The cultural, ethnic, historical and economic differences between the seven countries are great, making conservation activities very complicated. Living conditions, levels of income and political conditions differ widely. Some countries are in a post-war situation; some have young democracies, some older ones. Social behaviour, and even the food, differs between countries. In such circumstances the institutional and legal framework for the protection of the environment will also differ.

He gave Costa Rica and El Salvador as examples. El Salvador defines the management of its areas individually. A set of objectives is established for each area according to a management category, without grouping them geographically and without including buffer zones. Well-known political and socio-economic reasons have motivated this decision. The process of peace and national reconstruction may be an important condition for the evolution of the system of protected areas in this country.

Costa Rica, on the other hand, has a bill before the National Congress which, when approved, will give official endorsement to practices already in operation, although without specifying how the concept of buffer zones should work. In general terms what is being sought, with the system of conservation areas, is to group geographically different categories of management of protected areas and their buffer zones. The system proposes seven conservation areas for the whole country.

At the same time, in spite of these differences between countries, IUCN sets out, in its thematic programmes, to define the methodological principles of a regional programme, for example, in its programme on biodiversity and protected areas. IUCN seeks to facilitate and promote the active participation of other agencies, non-governmental organizations and individuals in the planning and implementation of its activities.

The regulating of the natural environment in general, and the management of the protected areas and their buffer zones in particular, have much to do with conflicts and competition over the use of natural resources. The programme of biodiversity and protected areas seeks to facilitate the basic technical and scientific processes which contribute to the resolution of conflicts over the use of natural resources on the basis of consensus.

Mr Lücke cited the project "Local Strategy of Conservation and Sustainable Development in the Conservation Area Lanuras del Tortuguero" in Costa Rica as an example of how the methodological principles are applied in the field. The project includes three

categories: a national park, a wildlife reserve and a protective zone that functions like a biological corridor. Also included in this project are buffer zones around these protected areas.

The first phase of planning ended in October 1991 after a duration of seven months. The second phase was initiated in the field, with pilot projects developed in selected critical areas. These critical areas were defined on the basis of analysis of the biophysical, socio-economic and institutional and legal situation. In the buffer zones, the participation of both men and women has been sought. Originally the attitude was to protect the areas against human intrusion but the whole approach is now more participatory and directed to improving the quality of life of the local people.

Mr Lücke concluded by commenting that the work is not easy. There are many problems to contend with, including the emphasis on cash crops for export because of the debt crisis and structural adjustment programmes. The effects of these economic measures on efforts to protect biodiversity need to be better understood.

DISCUSSION

Dr van den Oever asked participants to first address their questions and comments to Mr Lücke, before turning to gender issues.

Ms Miriam Abramovay welcomed Mr Lücke's remarks on the economic problems for conservation. She referred in particular to the consequences of structural adjustment measures. The link with parks and protected areas was obvious but the impacts were not clearly understood by the persons who invented these measures. A working group should study these issues and bring their potentially negative effects to the attention of the initiators of structural adjustment policies.

Mr Lücke replied that at the regional level ORCA was searching for answers to these questions but there was no magic solution to poverty. Countries are having to return to past economic policies which cannot give satisfactory results. The pressure for export crops affects the quality of life of people. El Salvador, for example, is one of the most densely populated countries; the consequences would be serious if those who have gone to the United States should decide to return. The same could be true in other countries where issues of land tenure and migration to urban centres are all having negative effects.

Mr Malik, referring to the different management systems of El Salvador and Costa Rica, asked which approach was showing the best results. Mr Ypsilantis, recalling Professor Richard Bilsborrow's data on population growth in Latin America and the pressure on land that it would create, suggested that the next 10 to 20 years

would be critical for the region. What does ORCA think should be done about population growth?

Mr Lücke replied to the first question by commenting on the concept of buffer zones. These are not just extensions to the parks, but are a way of working with the people already occupying the areas and of getting their cooperation and participation in managing the wildlife in the buffer zones. Some results are known and they coincide with the experience in Africa and Asia; exclusion of local people from the management plan does not work. On population growth, he said ORCA could not solve this problem but had to work for sustainability and self-sufficiency and promote an ethic of shared responsibility.

Ms Alison Meares referred to a project in Kenya which demonstrated what happens when women's needs and ideas are not heard. Social analysis is important to reveal men's and women's roles and identify how they differ in their relations with wildlife. Ms Rihoy added that it is not just relations between genders that is important, but also between young and old.

Welcoming the emphasis on gender analysis, Ms Musokotwane said that in the IUCN Southern Africa Region (ROSA) there were examples in rural areas where men had been targeted for skill training in development programmes that failed to take account of the fact that the men were not there – they had gone to the cities; it was the women who needed help. Another mistake, she suggested, is to use outsiders to promote family planning in rural areas. Such people do not understand the local social structure and local attitudes toward family size. They are often insensitive to the point of discussing sexual matters in the presence of children. Several other participants agreed with these observations.

Ms Thomas commented that the tools of social analysis must be developed in the field, with the participation of local people. A start could be made in the Central America and Southern Africa regions.

Mr Qutub reminded participants of the previous day's session on policies and strategies. He said it was clear that the impacts of rapid population growth on parks and protected areas can be very intense but nevertheless they are local compared to the impact of overconsumption by affluent countries. All the evidence suggests that programmes which involve local people have a greater chance of lasting success. There may be advantages in integrating population and environment programmes. International and national economic and social policies and sector programmes strongly influence parks and protected areas but the impacts are multiple and complex and have not been addressed. Improved analysis of the linkages could lead to more sensible policies.

Dr van den Oever brought the discussion to a close and invited Dr David Munro, architect of the strategy *Caring for the Earth*, to give his personal observations of the Workshop.

Discussant: Dr David Munro

Dr Munro said he had been very impressed with the information that had been brought forward at the Workshop. This was predictable, of course, given the calibre of the participants, who demonstrated good insights into what is actually happening. The more we hear, however, the less sanguine we feel about our future which underlines that the operational problem of conservation is to bring about changes of attitudes and practices to help us toward more equitable patterns of living in harmony with the Earth.

He drew attention to the table of contents of *Caring for the Earth*, pointing out that almost all the principles stated there are concerned with the social and economic aspects of life, dealing with questions of ethics, the quality of life, diversity, keeping within the carrying capacity of the planet, changing personal attitudes, enabling communities to care for their own environments and taking actions to empower them to do so. It also covers national actions and, finally, global alliances at the international level. Thus *Caring for the Earth* provides the context in which the experiences presented at the Workshop could be assessed.

Dr Munro said that if there was not much about parks in his remarks, it was because nothing that had been discussed in the Workshop was limited to parks. Parks may not be in the front line of the battles to bring about sustainable development, but they are important and might save genetic diversity. They provide laboratories where the interaction between people and natural resources can be studied. Where there is an intimate relationship between the two, people become caretakers of their environment; this is what we are looking for globally.

Turning more specifically to the Workshop presentations, Dr Munro said that case studies like those presented here must go on and be expanded. It is important to keep looking at the people/resources linkages in a variety of settings and to go back to the same places to find out what changes there might have been in response to local situations; this should be done over a time span of five or 10 years. In fact, it would seem necessary to design a monitoring system for IUCN field operations in which critical linkages could be followed and experiences could be extracted as part of a learning process underlying the development of IUCN's overall programmes.

Joseph Matowanyika had talked about building bridges. It would be important to maintain the bridges that had been built at this Workshop, to maintain the network and strengthen it because it increases our understanding and experience.

The question of carrying capacity had come up. It may be impossible to define carrying capacity but it is obvious that there must be an ultimate limit as human numbers and resource consumption press on resources.

It appears likely that the impact of small affluent populations is greater than that of large numbers of poor people. The emphasis in this Workshop had been on bringing human numbers under control; little had been said about bringing consumption under control. Chapter 5 of *Caring for the Earth* recognizes this need; but in developed countries there is still more emphasis on reducing waste than on changing attitudes and practices actually to reduce consumption. This might be a channel to pursue in future; it would be wrong to ignore it.

The two river studies were illuminating; it is surprising that no institutions exist in the United States that could bring together the people at different ends of the watershed. Yet the ways of doing this are well-known; water management commissions can negotiate agreements that are mutually beneficial.

This suggests that more attention needs to be given to institutions and institution-building, and to the need for working in *partnerships*, rather than just alongside each other.

Concluding Remarks

Dr van den Oever, bringing the Workshop to a close, suggested that the main conclusions could be summarized as follows:

1. Parks and protected areas are designed to conserve the earth's biological diversity for future generations.
2. By definition, parks and protected areas are established in places with rare and precious species.
3. The greatest biological diversity is found in countries in which demographic scenarios are rapidly changing.
4. The most significant demographic change during the last two centuries has been the dramatic reduction in mortality.
5. In all instances and all countries, the reduction of mortality has preceded the reduction in fertility. The transition from high mortality and high fertility to low mortality and low fertility is known as 'the demographic transition'. Significant population growth virtually always occurs during this process.
6. The *most* rapid reductions in mortality and *least* rapid reductions in fertility, and therefore the most rapid population growth, have occurred in countries which are overwhelmingly dependent upon their natural resources for their livelihood.
7. It is plain, therefore, that human populations grow rapidly in these countries and that the potential for conflict between human populations and natural resources increases during the demographic transition.
8. At the same time, modern technology and overconsumption in industrial societies have unprecedented impacts upon natural resources.
9. A major dilemma, then, becomes how natural resources can be protected while demand and impact increase, and how persons involved in the planning and management of parks and protected areas can safeguard these areas against over-exploitation *while* contributing to the betterment of the lives of the people whose livelihoods depend on the resources contained in the protected areas.
10. *The first step to a possible solution is to gather knowledge.* The steps to be taken in gathering this vital information are set out in the Recommendations submitted by Workshop I.6 to be included in the *Caracas Recommendations* (attached to this report as Appendix A)

Action Plan Tasks

The concrete steps that can be taken immediately after the Congress are the following:

1. Pull together existing information on demographic change and protected areas, analyze and synthesize this information and integrate it into the final report of this Workshop.
2. Establish guidelines for parks managers on the full integration of population-related variables into parks management.
3. "Package" the workshop results and the guidelines and distribute them to the appropriate persons.
4. Build alliances and partnerships at global, regional and local levels with organizations whose mandate it is to address population and related socio-economic issues, for instance with the UN Population Fund (UNFPA), the International Planned Parenthood Federation (IPPF) and NGOs, universities etc... These agencies must be provided with the arguments on *why* it is necessary for the survival of nature to decelerate the rate of growth of world population and keep consumption within sustainable limits. Strategies for interdisciplinary cooperation must be developed at grassroots level, policy level and international negotiation level. These strategies must include actions which address both demographic and socio-economic issues pertaining to sustainable use of natural resources.
5. The significance of demographic change and its consequences for the survival of biological diversity must be brought to the attention of the 1992 UNCED and the 1994 World Population Conference.

6. Inform donor agencies and other key players of the relationships between demographic trends and the conservation of biological diversity in parks and protected areas, and initiate concrete field experiments which are carefully monitored as test cases, and communicate the findings of these experiments to the appropriate audiences. Adapt strategies according to the findings from the fields.
 7. Build up a network of people who can advise the international community, as well as governments and regional and local organizations, on possibilities to safeguard natural resources in parks and protected areas whilst using the resources from the parks in a sustainable way.
-

APPENDIX A

IVth World Congress on Parks and Protected Areas

CONGRESS RECOMMENDATIONS 1

Submitted to the Recommendations Committee by Workshop 1.6 on Protected Areas and Demographic Change: Planning For The Future

Over-arching Issues

Global Change, Demographic Trends and Protected Areas

The IVth World Congress recognizes that parks and protected areas are intended to bring lasting benefits to humanity. It follows, therefore, that detailed knowledge of the people whose lives are affected by the processes of park creation, planning and management is as important as an inventory of the plant and animal species to be conserved. Population size, age-sex structure, distribution and movement all influence the likely interaction between people and parks both positive and negative. Specific knowledge of the social and economic characteristics of local households, including the age and sexual division of labour, is the basis on which measures can be put in place to promote sustainable use of natural resources, alleviate poverty, raise the quality of human life and create positive support for protected areas. These people may be park dwellers or those whose livelihoods are directly affected by the natural resources contained in parks and protected areas.

Therefore the IV World Congress recommends that protected area agencies take the following actions:

1. Undertake, as an essential element of the design and planning of parks and protected areas, social and demographic analyses of the local human populations to determine the present situation and future trends in:
 - a) population size;
 - b) age and sex structure
 - c) distribution
 - d) movement (e.g. migration)
 - e) age and sexual division of labour
 - f) the quality of human life and its dependence on local resources
 - g) household economics and capacity for income generation
2. Make impact assessments to determine present and future population-driven threats to the sustainability of protected areas, particularly from:
 - a) water supply to agriculture, industry and settlements
 - b) waste management and disposal
 - c) changes in land use, including clearing, deforestation and fuelwood harvesting
3. Incorporate into the implementation process the means to periodically monitor changes in the variables listed above.
4. Examine the interaction between local populations and existing and proposed parks and protected areas to determine:
 - a) the likely effects, both negative and positive, on the quality of human life
 - b) the potential for sustainable use of parks and protected areas for social and economic development of local communities and the consequent improvement in the quality of their lives
 - c) the prospects for maintaining or creating socio-economic environment in which sustainable resource consumption can be achieved
5. Undertake social groups analysis in order to identify the differentiated roles played by women, men, young and old in the management of natural resources, and in order to understand the interplay between human activities and the natural resources base, thus suggesting ways in which society's members may contribute to conservation and protected areas management.
6. Apply the findings of these analyses to the design and implementation of plans for parks and protected areas. Ensure that local people are involved in all stages of this process and that their unique insights and indigenous knowledge are taken fully into account.

CONGRESS RECOMMENDATIONS 2

Amended by the Recommendations Committee

Global Change and Protected Areas

Protected areas in many parts of the world are affected by increases in human numbers and changes in resource use. In many developing countries, protected areas are under pressure because of the need for land and natural products as essential bases for development. Major changes outside boundaries of protected areas can affect their ecological and institutional integrity. Changes in human population, climate and pollution are particularly significant. Trends in all these factors must be taken into account when policies for protected areas are formulated.

Protected areas and demographic change

Protected areas are intended to bring lasting benefits to the human race. [However, many protected areas face the problem of pressures from increasing populations whose economic well-being has suffered from cumulative neglect of *sustainable* use of land and other resources]. Detailed knowledge of the people whose lives are affected by the creation and management of parks is as important as that of the plant and animal species to be conserved. Specific knowledge of the socio-economic characteristics of locals including the age and gender division of labour and other trends is the basis for measures to promote sustainable use of natural resources, alleviate poverty, raise the quality of human life and create positive support for protected areas.

The IV World Congress on National Parks and Protected Areas **RECOMMENDS** that *governments, protected area agencies and cooperating agencies:*

- a) undertake, as an essential element of the design and management of protected areas, social and demographic analyses of the local human populations to determine the present situation and future trends in population size, distribution, movement (e.g. migration), age and sex structure, division of labour, and the dependence of communities on local resources;
- b) identify present and future threats to the sustainability of protected areas, particularly from agricultural, industrial and other developments and changes in land use; and periodically monitor changes in these;
- c) examine the interaction between local people and protected areas to determine: the likely effects of protected areas on the quality of human life; the potential for sustainable use of protected areas for socio-economic development; and the unique insights and knowledge of local communities which can be incorporated so as to secure the integrity of protected areas;
- d) undertake social group analyses to identify: the differential roles played by women, men, young and old, in the management of natural resources; the interplay between human activities and the natural resource base; and how [local communities] can contribute to the design, implementation and management of protected areas; and
- e) *URGES all governments to address more rigorously the major issues of population growth, which threatens the stability of the whole world.*

APPENDIX B

IVth World Congress on National Parks and Protected Areas

PARKS, PROTECTED AREAS AND THE HUMAN FUTURE THE CARACAS DECLARATION

WE, over fifteen hundred leaders and participants deeply committed to world conservation, brought together by the World Conservation Union for the IVth World Congress on National Parks and Protected Areas in Caracas, Venezuela, between 10 and 21 February 1992, ADOPT this Declaration of our belief in the vital importance of well-managed national parks and protected areas to all people.

WE RECOGNIZE THAT:

- nature has intrinsic worth and warrants respect regardless of its usefulness to humanity;
- the future of human societies depends upon people living in peace among themselves, and in harmony within nature;
- development depends on the maintenance of the diversity and productivity of life on Earth;
- this natural wealth is being eroded at an unprecedented rate, because of the rapid growth in human numbers, the uneven and often excessive consumption of natural resources, mistaken and socially harmful styles of development, global pollution and defective economic regimes, so that the future of humanity is now threatened;
- this threat will not be averted until these problems have been redressed, the economies of many countries have been strengthened, and poverty has been conquered through processes of sustainable development;
- many people must modify their styles of living and the world community must adopt new and equitable styles of development, based on the care and sustainable use of the environment, and the safeguarding of global life-supporting systems.

WE CONSIDER THAT the establishment and effective management of networks of national parks and other areas in which critical natural habitats, fauna and flora are protected must have high priority and must be carried out in a manner sensitive to the needs and concerns of local people. These areas are of crucial, and growing, importance because:

- they safeguard many of the world's outstanding areas of living richness, natural beauty and cultural significance, are a source of inspiration and are an

irreplaceable asset of the countries to which they belong;

- they help to maintain the diversity of ecosystems, species, genetic varieties and ecological processes (including the regulation of water flow and climate) which are vital for the support of all life on Earth and for the improvement of human social and economic conditions;
- they protect genetic varieties and species, which are vital in meeting human needs, for example in agriculture and medicine, and are the basis for human social and cultural adaptation in an uncertain and changing world;
- they may be home to communities of people with traditional cultures and irreplaceable knowledge of nature;
- they may contain landscapes which reflect a long history of interaction between people and their environment;
- they have immense scientific, educational, cultural, recreational and spiritual value;
- they provide major direct and indirect benefits to local and national economies and models for sustainable conservation which may be applied elsewhere in the world.

ACCORDINGLY, and bearing in mind the message of *Caring for the Earth: A Strategy for Sustainable Living*, the *Global Biodiversity Strategy* launched at this Congress, and the earlier messages of the *World Conservation Strategy*, the *World Charter for Nature* and the *World Commission on Environment and Development*, WE, the PARTICIPANTS OF THE CARACAS CONGRESS:

1. **Reaffirm** the responsibility of humanity to safeguard the living world;
2. **Emphasize** the spiritual, social, economic, scientific and cultural importance of national parks and other kinds of protected area;
3. **Stress** that the conservation of global biological diversity and the achievement of sustainable development depends upon effective and vigorous international action to reform the world's

Protected Areas and Demographic Change: Planning for the Future

- economic and trading systems, and to halt the global pollution that threatens to bring about climate change;
4. **Strongly urge** all governments, regional and local authorities and international institutions to include protected areas as integral elements in development policies, programmes, plans and projects;
5. **Encourage** communities, non-governmental organizations, and private sector institutions to participate actively in the establishment and management of national parks and protected areas;
6. **Urge** all governments, local authorities, international institutions and non-governmental organizations to inform and educate all sectors of society about the importance of protected areas, and the economic, social and environmental benefits they provide, and so make the public active partners and supporters in their protection;
7. **Insist that** industry (including tourism, agriculture, forestry and the extraction of oil and minerals) must adopt the highest standards of environmental protection and eliminate damaging impacts on protected areas;
8. **Strongly urge** industry, especially multi-national corporations, and governments, to ensure that any exploitation of biodiversity conforms with rigorous controls established by the sovereign State concerned;
9. **Emphasize** the vital role of environmental education and urge all governments to strengthen their programmes, especially in and relating to national parks and protected areas, constituting appropriate national organizations to develop and coordinate this process;
10. **Emphasize** that although national parks and other protected areas are of special importance, all lands and seas should be managed so as to maintain (or restore) the highest environmental quality;
11. **Stress** the need for international cooperation and assistance to place the latest knowledge and best available technology at the disposal of all governments and especially their protected area managers.
2. To ensure that the environmental and economic benefits which protected areas provide are fully recognized in national development strategies and national accounting systems;
3. To support the development of national protected area policies which are sensitive to customs and traditions, safeguard the interests of indigenous people, take full account of the roles and interests of both men and women, and respect the interests of children of this and future generations;
4. To ensure that effective international, national, regional and local administrative, legal, accounting and financial mechanisms for supporting protected areas are established as a matter of priority and regularly reviewed;
5. To allocate adequate financial and other resources so that, once designated, protected areas are managed effectively, to achieve their intended objectives;
6. To strengthen environmental education, and to provide training that will improve professionalism in the management of protected areas;
7. To facilitate the establishment of effective and efficient networks of NGOs cooperating at a local, national and international level to further national park and protected area objectives;
8. To recognize the significance of demographic change and its consequences for the survival of biological diversity and to take appropriate actions to reduce this threat;
9. To foster publically funded scientific research and monitoring that will improve the planning and management of protected areas, and to use such areas as sites for studies that will improve understanding of the environment;
10. To develop mechanisms that will allow all sectors of society, especially long-standing local populations, to be partners in the planning, establishment, and management of protected areas, and will ensure they share equitably in the associated costs and benefits;
11. To participate actively in global and regional Conventions and other legal instruments, action programmes, and procedures to promote protected terrestrial, coastal and marine areas and the conservation of biological diversity;
12. To work energetically to safeguard the world's tropical forests, particularly those of Amazonia which are reservoirs of outstanding biological diversity and under severe pressure;
13. To strengthen international technical and financial cooperation that will assist developing countries to

TO THESE ENDS WE STRONGLY URGE ALL GOVERNMENTS AND APPROPRIATE NATIONAL AND INTERNATIONAL BODIES:

1. To take urgent action to consolidate and enlarge national systems of well-managed protected areas with buffer zones and corridors, so that by the year 2000 they safeguard the full representative range of land, freshwater, coastal and marine ecosystems of each country and allow these ecosystems space to adapt to climate change;

establish and manage protected areas and to safeguard biological diversity;

14. To cooperate to safeguard species, ecosystems and landscapes that extend across national borders and therefore require protection through the collaboration of neighbouring countries.

RECOGNIZING that action to safeguard the living riches and natural beauty of the Earth depends on the commitment of all people, WE PLEDGE OURSELVES to work wholeheartedly to implement the provisions of this Declaration.

EMPHASIZING that the establishment and maintenance of protected areas is essential to sustaining human society and conserving global biological diversity, WE INVITE THE PRESIDENT OF THE REPUBLIC OF VENEZUELA to convey this Declaration to the Earth Summit, to be held at Rio de Janeiro, Brazil, in June 1992 with the purpose of ensuring that its conclusions are incorporated in Agenda 21, the agreed world action plan for the next century.

APPENDIX C

HUMAN DEMOGRAPHY AND NATURAL RESOURCES: TRENDS AND INFLUENCES ON PARKS AND PROTECTED AREAS

By

Dr Pietronella van den Oever

IUCN, The World Conservation Union

and

Dr Riga Adiwoso Suprpto

University of Indonesia, Faculty of Economics

1. INTRODUCTION

Among conservationists, including those responsible for creating and managing protected areas, population dynamics – changes in birth rates, death rates, population movement, distribution, and structure – are usually not considered as major contributing factors in the degradation of natural resources. But the reality is that increasingly significant population movements and the expected increase in the world's population will tax the resources of the earth as never before. At the same time high per capita resource consumption and waste production in industrial countries has an impact as great, if not greater, as that of population growth and related phenomena on the depletion of natural resources. For these reasons, the survival of many unique ecosystems and species will be at stake in the near future. Thus it is essential, in the context of *Parks for Life*, to review recent trends in population growth, the complexity in population changes and the impact these have on the planet as a whole. These phenomena are likely to have critical significance for the maintenance, management and further creation of areas protected in varying degrees from human exploitation.

The purpose of this paper is to describe recent population trends, and to analyse their impact on environmental phenomena such as the decrease in biological diversity and the disturbance of certain ecosystems.

The growth of the world population during the last few centuries is taken as a point of departure. The elements of population growth are introduced, followed by a discussion of differential population growth patterns in different regions of the world and their underlying causes. In the subsequent section the possible negative consequences of population growth on natural resources are discussed, followed by a brief overview of population-development-environment linkages in industrial countries, and their environmental impacts. The paper concludes with a discussion of the contrast between demographic momentum and policy options; the former being a demographic "fait-accompli" while

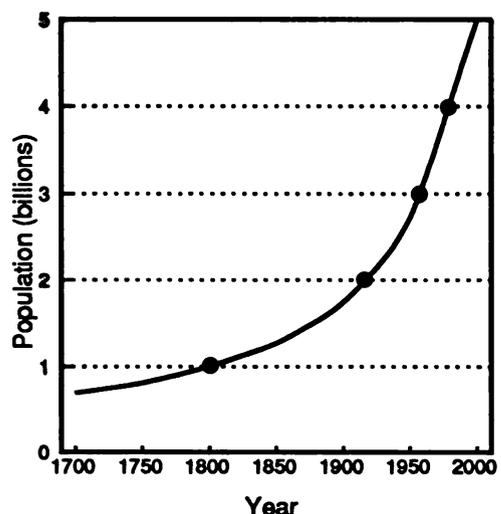
the latter can be used to influence future demographic trends.

2. RECENT TRENDS IN POPULATION GROWTH

2.1. Growth of the World Population since 1700 AD

Explosive population growth, due to a large excess of births over deaths, has occurred during the last two or three centuries. As illustrated in Figure 1 below, in the year 1700 around 679 million humans inhabited the earth (Demeny, 1985). A century and a half later, in 1850, the number had risen to approximately 1.24 billion. Another century later, this figure had reached 2.5 billion, hence a

**Figure 1: World population growth
1700-1985**



Source: The World Demographic Situation. *The Population Council, Center for Policy Studies. Working Paper No.121, December 1985.*

doubling time of one hundred years. (The black dots on the curve of Figure 1 indicate points at which four successive billion marks were passed).

The remainder of the story is well-known; one day in the middle of 1987, media around the globe announced that the world's population had now past its 5 billion mark. While in the not so distant past, from 1850 to 1950, it took the world population one hundred years to double, in the most recent past the doubling time had been reduced to 37 years. According to United Nations "medium variant" projections, the world population will amount to about 6.26 billion by the year 2000 (United Nations, 1991). More speculatively, a global population of 8.5 billion is expected to inhabit the earth by the year 2025.

2.2. The Elements of Population Growth

There are three basic demographic variables, namely birth, death and migration. All demographic phenomena such as population size, age and sex structure ("population pyramid"), and the spatial distribution of people are a consequence of past trends in birth rates, death rates, and population movement. Fluctuations in *global* population size are obviously a consequence of past trends in birth rates and death rates only.

The world population increased rapidly during the last two centuries, due to a sustained high "Crude Rate of Natural Increase" (births minus deaths, without considering migration) resulting from significant decreases in mortality rather than a rise in fertility. In all societies experiencing fertility decline it has been

observed that a decrease of mortality systematically *preceded* significant declines in fertility, with a resultant period of accelerated population growth.

2.3. Differential Population Growth: Magnitude and Causes

Population growth has been unequally distributed in space and time. The industrial countries experienced their highest rate of population growth in the earlier part of the twentieth century. In the developing countries, on the contrary, population growth, in absolute terms, accelerated especially since the 1960s. Apart from these qualitative differences, there are quantitative differences as well. While the industrial countries experienced maximum population growth rates of just over 2 percent, many developing countries' population growth rates have at some point reached between 3 and 4 percent.

As a consequence of differential growth rates, the population of developing countries is increasing more rapidly than its fellow humans in industrial nations. For instance, between 1950 and 1980 the population of the developing countries increased from 1.684 billion to 3.312 billion; a 97 percent increase. During that same period the population of the industrial countries increased from 832 million to 1.137 billion. This is a 32 percent increase.

Table 1, below, illustrates the results of differential population growth rates. In 1950 67% of the world population was living in developing countries. By 1980, the proportion had gone up to 74%. A further increase is expected.

Table 1: Proportion of the world's population living in developing regions and industrial regions, 1950, 1980, and projections for 2000

Region	1950		1980		2000	
	Number	%	Number	%	Number	%
	(000's)		(000's)		(000's)	
Developing	1,684,018	67%	3,311,537	74%	4,996,722	80%
Industrialised	832,425	33%	1,136,500	26%	1,264,078	20%
TOTAL	2,516,443	100%	4,448,037	100%	6,260,800	100%

Source: United Nations: World Population Prospects 1990, New York, Population Studies 120, 1991.

According to United Nations estimates, by the year 2000 approximately 79% of the world's population will live in developing countries. Extrapolating this trend still further into the future, it is expected that by the year 2025 the population of the developing countries will represent 83% of the total world population, while the population of industrial countries will represent 17%.

In Figure 2 the populations of Sweden and those of the Sahel region are selected as proto-typical representatives of industrial countries and developing countries respectively. A comparison is made between fertility and mortality trends from 1950 to the early 1980s and projected trends until 2020 among an aggregate population of 9 Sahel countries and observed trends in Sweden since its early stage of industrial development.

The differential patterns of *mortality decline* observed in Figure 2 occur due to different causal factors. Dramatic decreases in mortality in the Sahel and generally in many developing countries can in particular be attributed to successes in reducing infant and child mortality rates.

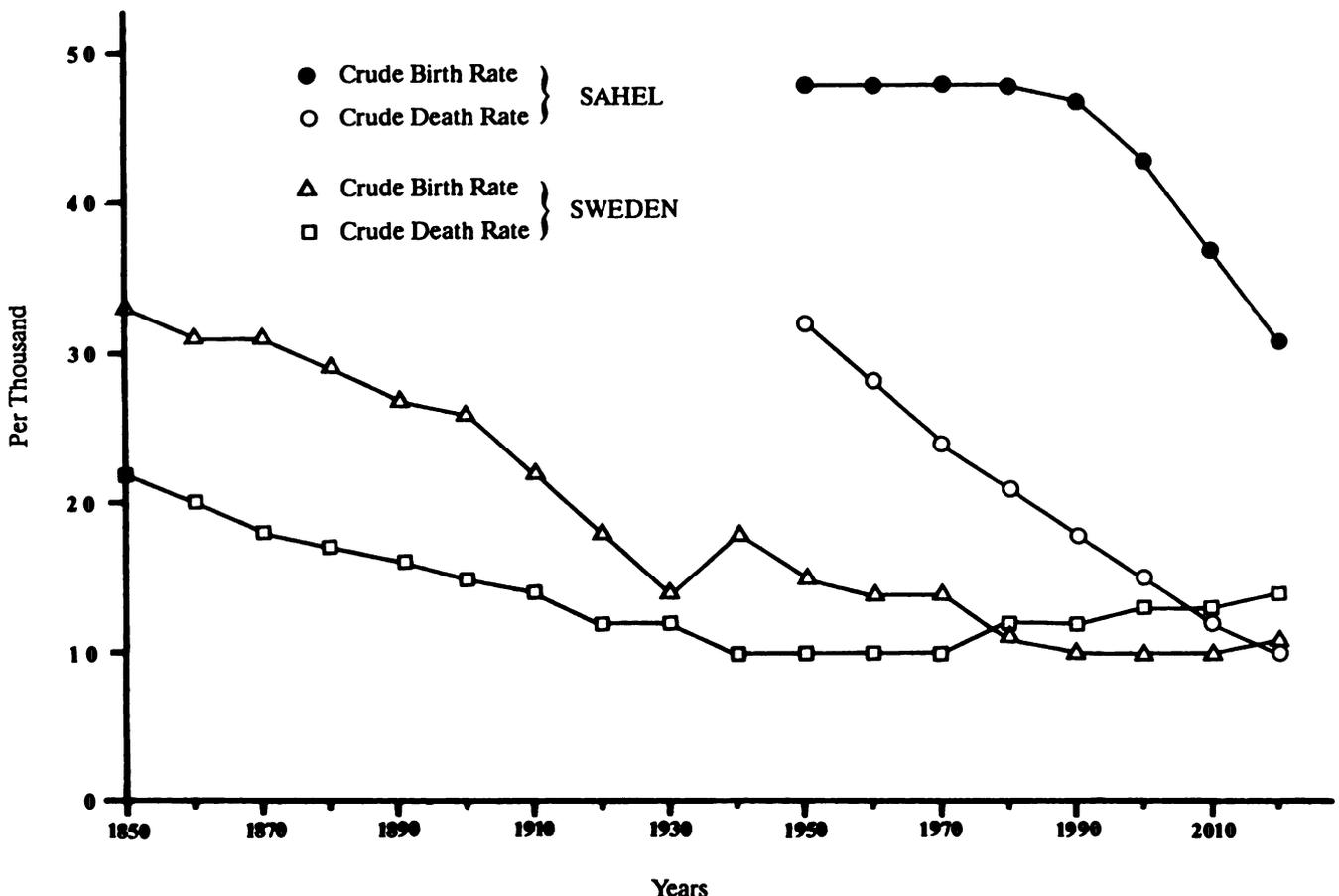
The application of modern medical knowledge and practices such as vaccination against infection, administration of antibiotics, rehydration therapy, and

the use of anti-malarials have been among the leading causes of these reductions. This is in contrast with the experience of the industrial countries where the rate of mortality started to decline before antibiotics became available. Instead, early mortality decline in these countries came about because of improvements in nutrition, better clothing and housing, and generally improved knowledge of health habits among the population at large. These improvements were promoted by a process of education, especially among women, and changing behaviour.

It is plain that education and behaviour changes are long-term processes. Therefore their full results will be observed much later than the instant successes of large-scale vaccination campaigns and administration of drugs.

As for the differential pattern of *fertility decline*, the most plausible explanation for our Sahelian example is that the speed of mortality decline has been such that fertility behaviour has not yet become adapted to the improved chances of infant and child survival. As illustrated in Figure 2, a substantial decline in fertility is not expected to occur until the second part of the 1990s. Fertility was traditionally high because mortality was high, and

Figure 2: Natural increase in the Sahel region, 1950-2020, compared with early industrial Sweden



couples had to have a large number of children in order to perpetuate their families. Social institutions were also conducive to maximise fertility (Davis, 1968) For instance, virtually all women got married, they married young, and they continued childbearing until the end of their reproductive period. Once widowed, they remarried soon after the husband died. In the case of Sweden, fertility decline followed mortality decline with a short time lag. The gap between fertility and mortality was considerably smaller than the one observed in the Sahel countries, for several reasons. First of all, fertility in Sweden, even in the pre-industrial period, has never been as high as it is now in the Sahel, thus facilitating the achievement of a low level of fertility. Secondly, mortality declined much more slowly than in the Sahel, allowing a longer period of adaptation of fertility behaviour to observed mortality decline. Thirdly, mother-and-child care and rudimentary child-spacing methods and practices have been widely applied in Sweden since the onset of mortality decline.

3. POPULATION GROWTH AND DEGRADATION OF NATURAL RESOURCES

The volume and speed of recent population growth are a threat to the maintenance of the world's natural resource base. At an aggregate global level it is clearly taxing on natural resources to provide the basic requirements of food, fuel, clothing and shelter of the additional 2.5 billion humans which were added to the

world's population from 1950 to 1987. Among conservationists, however, population growth is often still ignored as a contributing factor to degradation of natural resources. For instance, in a 1988 article in *The Economist* (Mittelmeier, 1988) problems of conservation were discussed, without referring to population growth, in the world's seven species-richest "mega-diversity" countries: Brazil, Colombia, Mexico, Zaire, Madagascar, Indonesia and Australia. Between them, these countries contain over 54 percent of the species on the globe.

To analyse whether population growth may exercise pressure on natural resources in the mega-diversity countries, a few relevant demographic statistics are provided in Table 2, below. This Table illustrates, first of all, that the mega-diversity countries contain at present only about one tenth of the total world population, although they contain 54 percent of the globe's species. Hence there seems to be no reason to worry.

However, the Table also brings out that in six out of the seven countries the rate of population growth exceeded by far the world population's growth rate during the period 1950-1980, and is expected to do so during the 1980-2000 period.

As a result of demographic trends in the individual countries, the aggregate populations of the mega-diversity countries are growing more rapidly than the total world population. Hence they will represent an increasingly large *proportion* of the world population.

Table 2: Recent population trends in mega-diversity countries

Country	1950	1980		2000	
	Pop. (000s)	annual Growth rate	pop. (000s)	annual Growth rate	pop. (000s)
Brazil	53,444	2.7%	121,286	2.0%	179,487
Colombia	11,946	2.7%	26,906	1.9%	39,397
Mexico	28,012	3.1%	70,416	2.1%	107,233
Zaire	12,184	2.6%	26,225	3.2%	49,190
Madagascar	4,230	2.4%	8,785	3.2%	16,627
Indonesia	79,538	2.1%	150,958	1.9%	218,661
Australia	8,219	1.9%	14,695	1.2%	18,855
TOTAL	197,573	2.5%	419,271	2.0%	629,450
% of W.POP.	7.8%		9.4%		10.1%
WORLD	2,516,443	1.9%	4,448,037	1.7%	6,260,800

Source: *United Nations: World Population Prospects, New York, Population Studies No. 120, 1991.*

While the mega-diversity countries increase as a proportion of the world population, they may have a decreasing proportion of the globe's species. The *volume* of people added in these countries in recent decades, as well as the expected future population increase, will inevitably lead, to some extent, to clearance of forests, degradation of water resources and marginalisation of over-cultivated land, thereby extinguishing a certain number of species.

The question of why and how these differential patterns of population growth came about is discussed in the following section. Qualitative and quantitative differences in population growth patterns are graphically represented in Figure 2.

Even if these seven countries' natural resources could eventually accommodate their total volume of people, the *speed* of the increase makes it difficult to expand the sustainable use of natural resources sufficiently and rapidly to cater adequately to people's needs. Countries like Mexico and Brazil are good examples of such a situation. If their present rates of population growth were to continue, their populations would double in 29 and 34 years respectively. This means that in the coming three decades 83.5 million people would be added to the present population in Mexico, and 144.4 million in Brazil. Just to find a suitable habitat for this volume of people requires clearing large areas now covered by natural vegetation, and will inevitably result in clashes between people and other living species. Indeed, both Mexico and Brazil already experience annual deforestation rates of 1.3 percent and 0.5 percent respectively, representing 615,000 hectares for Mexico and more than 3 million hectares for Brazil (World Resources Institute, 1988).

What was said about population increase and potential degradation of natural resources in the mega-diversity countries is even more applicable to other countries with somewhat lesser diversified natural resources. For instance, in Sub-Saharan Africa, which is at present the region with highest population growth in the world, (around 3 per cent per year, implying a population doubling time of 23 years) there are 10 countries with a deforestation rate of more than 1.6 per cent per year (World Resources Institute, 1988).

It is, of course, dangerous to blame volume and speed of recent population growth as the direct cause of deforestation. Nevertheless, it has been observed in many countries that large-scale clearing of forest takes place when the population increases at a rapid pace and room has to be made for additional housing, infrastructure, and areas for cultivation.

Pressure on natural resources is exacerbated in countries in which the rate of population growth exceeds the rate of economic growth. These countries fail to generate the wealth needed to absorb all people in a society which guarantees a basic level of existence for all. As a result, the over-exploitation of the natural resource base may

and will be used to compensate for a lack of other resources. Examples of this situation are found in Zaire and Madagascar, for instance, where annual rates of population growth are 3.0 and 2.8 percent respectively. Both countries have a GNP per capita of approximately US\$200 per year. Not surprisingly, both countries rely heavily on harvests from their woodlands for fuelwood and charcoal. During the period 1984-1986 the average annual production of fuelwood and charcoal was almost 28 million cubic meters for Zaire and around 6 million cubic meters for Madagascar (World Bank, 1988).

Large population increases may make it more and more difficult to single out particularly species-rich areas or sites with rare natural resources. As a result, parks and protected areas may become institutions of the past, unless human populations are allowed to inhabit them. This clearly represents an additional threat to the survival of undisturbed ecosystems and rare species.

So far the discussion centred around degradation of natural resources in areas with (still) abundant biological diversity. It is important as well to consider relationships between rapid population growth and the ensuing increased rate of population movement, and the depletion of natural resources in fragile ecosystems with a mediocre or rather poor resource base. One such relationship is identified in the following quotation from a study on water scarcity in Africa (Falkenmark, 1989):

"Two basic phenomena characterise the present "hunger crescent" in Sub-Saharan Africa (Falkenmark 1986): (a) scarce rainfall limits the wetting of the soils so that crop growth is possible only during a very limited growing season (b) only very limited amounts of rain water remain after evaporation, even during an average year to recharge the terrestrial water systems in aquifers and rivers (figure x). There is, in other words, lack of water both for bio-mass production and for the support of human life and societal growth. Land degradation adds to the environmental stress in densely populated or overexploited areas, and the land fertility deterioration caused indeed produces an additional form of water penury: a man-induced lack of water both in the root zone and in local wells."

The phenomenon referred to in the above quotation is illustrated in Figure 3, below. Most of the countries concerned are located in the Sahel region. As illustrated before in Figure 2, this region has experienced a high rate of population growth in the recent past.

The Sahel population increased at a rate of 2.6 percent per year during the 1970-1980 period and is now growing at an annual rate of approximately 2.7 percent, implying a population doubling time of 25 years. However, limits to water, the most essential source of life, might eventually halt population growth by generating widespread famine, eventually leading to

Figure 3: Vulnerable belt in Africa with marginal hydrological conditions in both short and long branches of the terrestrial water cycle

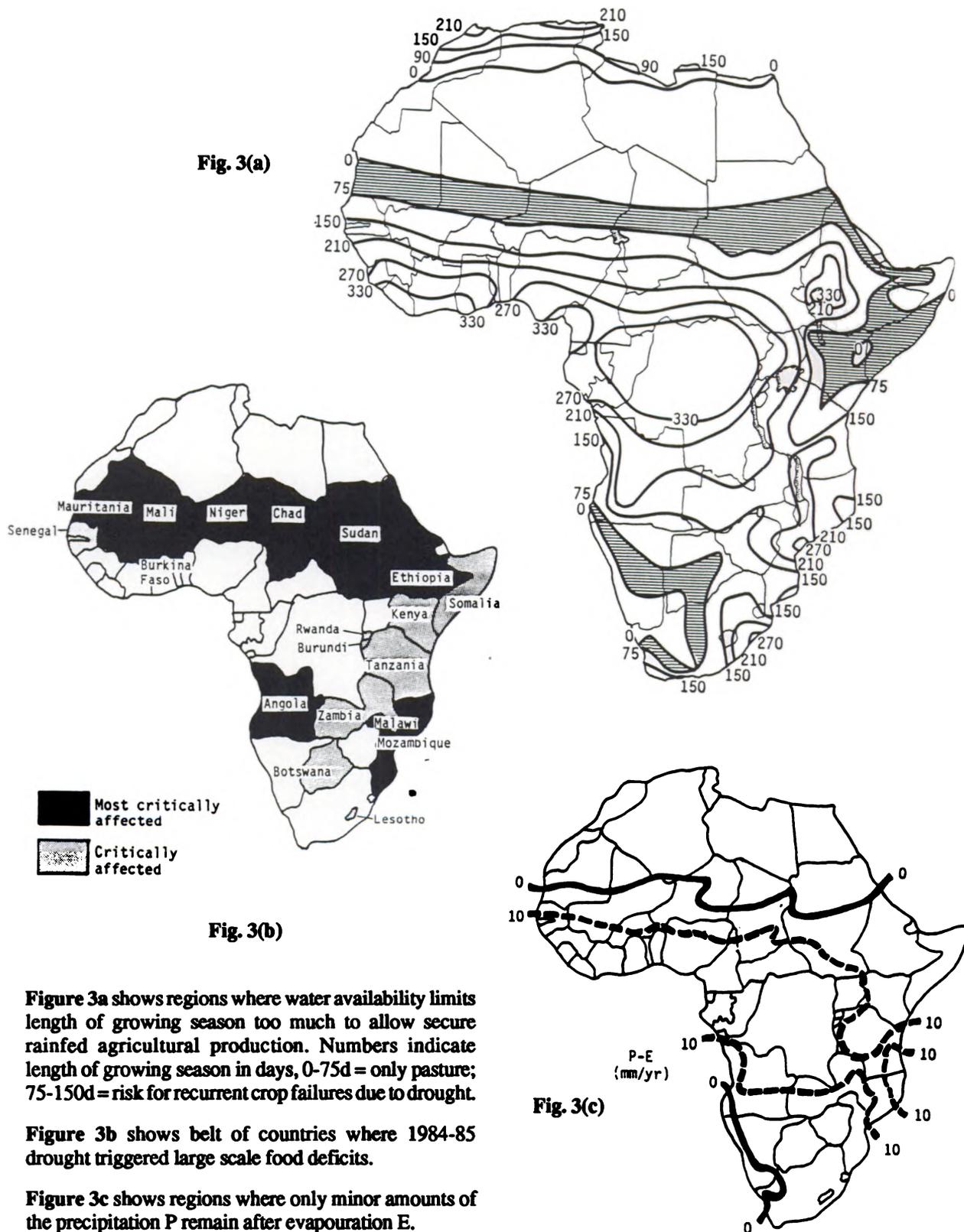


Figure 3a shows regions where water availability limits length of growing season too much to allow secure rainfed agricultural production. Numbers indicate length of growing season in days, 0-75d = only pasture; 75-150d = risk for recurrent crop failures due to drought.

Figure 3b shows belt of countries where 1984-85 drought triggered large scale food deficits.

Figure 3c shows regions where only minor amounts of the precipitation P remain after evaporation E.

mass starvation and large-scale population movement to areas with more abundant natural resources. As in the case of depletion of tropical forests, it is dangerous to blame population growth as the direct and only cause of a diminishing water supply in the Sahel. Indeed, gradual climatic changes may adversely affect ecosystems.

In addition, changes in resource management practices by local populations often contribute significantly to degradation of natural resources. However, in many instances climatic changes as well as natural resource management practices are themselves, at least partially a consequence of increasing population density.

With regard to climate it is worthwhile to extract the main message from the following quotation (Glantz, 1989).

"The overgrazing by livestock of the vegetative cover and the collecting of wood, one of the few available sources of fuel in the area, aggravated the degradation of environmental conditions in the Sahel. Suggesting a belief in the notion that rain follows the plow, the United Nations and ALESCO (The Arab League Economic, Scientific and Cultural Organisation) some years ago proposed that tree belts be developed along the northern and southern edges of the Sahara desert to arrest sand and dune encroachment, and put moisture back into the air, thereby bringing rainfall back to desiccated areas. However, as agriculture moves into increasingly marginal areas, drought, not rain, often follows the plow."

The study from which the above quotation is taken suggests that, although climatic changes usually have some unexplained random component, they often have a human-induced component as well, sometimes caused, directly or indirectly, by rapid increase in human populations.

As for resource management practices we can analyse the example of shifting cultivation, in which land is allowed to lie fallow for several years until it regains its natural fertility. This system of cultivation is most often abandoned when population density increases. At first, when the population is still overwhelmingly rural and living off the land, rural population increase underlies land scarcity. When the process of urbanisation picks up speed, population growth as well as population distribution are contributing factors to environmental degradation. Yearly cultivation of marketable crops on the best plots becomes a common practice, since, as pointed out already a long time ago by Boserup (1968), food crops can be sold for cash to the urban population and some crops can be sold for export.

As a consequence, food production for the local population itself is pushed onto the more marginal plots of land with fragile and infertile soils, thus further deteriorating the quality of soil and vegetation of those areas. At present, this phenomenon occurs all over Africa, and in many parts of Asia, for example.

Since especially in Africa it is mainly the village women who cultivate the food crops for family consumption, it is they who are cultivating the poorest plots. This sexual division of labour has itself a negative impact on natural resources. First, because women usually do not have easy access to knowledge of appropriate modern agricultural practices that could enhance soil conservation. Therefore they will most likely continue to eke out some meagre existence from overexploited areas, using traditional methods that are no longer appropriate. Secondly, they usually neither have access to financial nor to technological resources which could help diminish soil degradation by preserving the soil's water retention capacity and in general lead to more ecologically sound practices.

New resources, or different customs in the place of destination, will virtually always result in a different structure of the household economy, and may be accompanied by changes in the division of labour and the allocation of resources within and between families. For instance, new migrants may be predominantly hired as labourers, while cultivating small plots of their own. Or work previously performed exclusively by one sex or age group or by group with other social characteristics such as age or ethnicity may now be performed by all, or by other groups than was the case previously. It follows that population movement tends to have a significant influence on the fabric of society, in the place of destination, as well as in the place of origin, where the age-sex structure may become entirely distorted as migration tends to be selective by age and sex.

Population movement and related changes in land use create a climate par excellence for conflicts. These conflicts may be between people and other species, or between two different groups of people, but the result will most likely be the same in both cases; competition for resources will lead to overexploitation and environmental degradation. Apart from the potential for conflict and competition over resources, significant population movements involving changes in land use are often accompanied by other phenomena that jeopardize sustainable development. For instance, people may move into hitherto sparsely populated areas, thus altering the physical environment. They may also move from one ecosystem to another, without knowledge of the proper methods and techniques for sustainable use of unfamiliar natural systems in their new area. Population movement in search of land is inextricably linked to a number of interrelated political/legal, physical, social, and economic questions which must be addressed by policies for sustainable development, if they are to achieve the intended result.

4. POPULATION-DEVELOPMENT-ENVIRONMENT INTERACTIONS

Thus far the discussion focused on the increasing volume of people on earth as a threat to natural resources.

Although the absolute volume of people is of great importance in the increased use (and abuse) of natural resources, the *intensity of per capita resource consumption* is important as well. Therefore, societies with zero or negative population growth but high and increasing standards of living, such as the industrial economies of North America, Japan and Western Europe, may have as much if not more impact on degradation and destruction of natural resources globally, than fast-growing demands emerging from rapid population growth in developing countries.

What does the increasingly large impact of the population of industrial societies on their environment have to do with human demography? There is a complex network of interactions between development, population growth, distribution, and environment. Ultimately, it is a combination of demographic, economic and environmental interactions that reinforce each other in environmental degradation caused by the developed countries. We shall try to somewhat disentangle these interactions in the following explanation.

At the onset of the industrial revolution, somewhere in the 18th century, machines started to replace human muscle, thereby laying the foundations of modern industrial society with advanced technology. This technology replaced traditional agricultural techniques and allowed the production of food for all through the labour of a few. Industry allowed the large-scale manufacturing of products for basic needs such as clothing and building materials, as well as the production of many consumer items not essential to daily life, but pleasant to have. The process of manufacturing goods brought together people in dense settlements – cities – in which producers and consumers exchanged their increasingly sophisticated goods and services in an increasing flow of money. In this course of events, the average standard of living increased, bringing with it a decrease in mortality and, as explained in an earlier section of this paper, a rapid increase in population, hence an escalating number of potential consumers.

Patterns of socio-economic development in the industrial countries in the past centuries were thus accompanied by two major demographic processes, namely rapid population growth (although not as rapid as experienced today in the developing countries) and an accelerating rate of urbanisation. As a consequence, most of the highly developed countries of today have large populations in relation to the size of their territories, and hence a large population density. In addition, these populations are overwhelmingly urban, living in clusters of extremely dense population concentrations.

Why do the industrial societies, with their large economic and technological resources and their advanced scientific knowledge have such a potentially harmful impact on their environment? One explanation is that the geographical distribution of people in these

societies inevitably leads to the permanent alteration of the natural environment because of the sheer density of the entire socio-economic network. For instance, to manage a technologically advanced society properly, its urban areas require a densely constructed infrastructure of housing, office and industrial buildings, hospitals, schools, roads, common areas, etc. This requires the clearing of virtually all vegetation in the area, leading to a permanent alteration of the ecosystem. In addition, urban areas need to dispose of their industrial and household wastes, which often constitute a major environmental problem. A well-known example of this is the disposal of chemical wastes into the Rhine river by the large industrial cities of the highly developed Ruhr area in Germany. As a consequence, the biological diversity of living species in the Rhine has been severely reduced and its biological equilibrium has been permanently disturbed and altered.

Urban life-styles in developed societies constitute a second environmental hazard, because they come with highly diversified demands for consumer items and services. These demands are enhanced by the availability of modern technology which allows people to have a far-reaching impact on their natural environment. Exacerbated by the availability of abundant economic means, modern technology is, understandably, used by populations in the industrial countries to their own wants and needs, whether essential to daily life or pure luxury. For instance, modern technology and science allow the manufacturing of products which leave toxic wastes that are harmful to the natural environment. Modern technology also facilitates the cutting of tropical rain forests, which would otherwise be difficult to master. Demands for paper products and tropical hardwoods are generated by people in the industrial countries. Or, as in the case of the well-documented "hamburger connection", forests in developing countries are chopped down simply to make place for cattle grazing areas to provide cheap beef for consumers from the industrial countries (Myers, 1989). Hence the so-called progress in technologically advanced countries is virtually always accompanied by a deterioration of their own natural resource base, *and* an increasingly large impact on natural resources of those countries which have abundant ecological riches not found, or found at larger cost, in these countries themselves.

Another factor in modern man's negative impact on natural resources may be inherent to his unwarranted confidence in modern technology, which is supposed to ultimately solve any emerging problem. The sustainable use of natural resources, on the contrary, most often requires a change in human behaviour rather than a new technological invention. For instance, to avoid excessive air pollution, cars could be smaller than they are now and they could be shared by more persons, *in addition to* having catalytic converters to minimise air pollution. The former two require adaptations of people's perception of status, comfort, ownership, societal sharing etc. while only the third factor requires improved

technology. Behavioral changes can only be achieved over some period of time, however, while technology can often be developed quite rapidly.

5. THE FUTURE: DEMOGRAPHIC MOMENTUM AND POLICY CHOICES

The demographic future of mankind will be of great importance in the future sustainability and survival of the earth's living resources. This demographic future will be shaped by two major factors; one inevitable, the other one according to mankind's own choice. The inevitable factor is the built-in "demographic momentum" of the present world population. The choice element consists of mankind's willingness to set demographic targets and pursue these without compromise. We shall briefly deal with both issues.

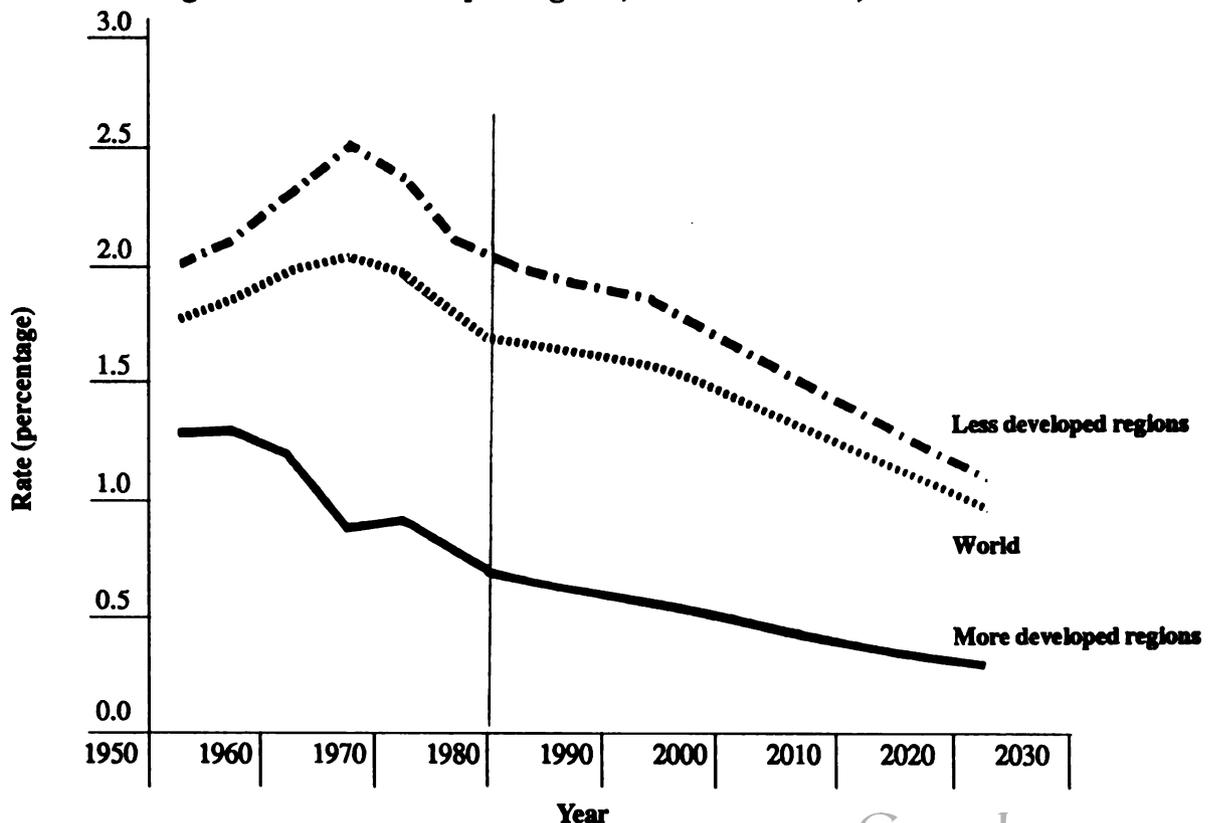
Due to rapidly declining mortality in recent times and the time lag and quantitative gap between mortality and fertility decline, about one third of the world population is now under 15 years of age. This proportion is more pronounced in the world's regions where the "demographic transition" had its onset most recently. Differential growth rates are illustrated in Figure 4, below.

In Africa as a whole, for instance, 45 percent of the total population, representing approximately 292 million youngsters, is under 15 years of age. In the coming decades this group will move into the age group 15-29; the prime reproductive ages. Even if we consider a certain level of mortality in this group, by the year 2005 there still will be around 250 million young adults – 125 million potential couples – in the peak of family formation and reproduction. This cohort of 15 year groups is only 25 per cent less, in absolute numbers, than the entire cohort of 50 year groups in Africa aged 15 to 64, which counts around 339 million people at present.

The African situation provides an excellent example of demographic momentum. Even if fertility in Africa were to change today and drop to "replacement level" where a couple produce just enough children to replace themselves in the next generation, the population would still increase enormously, due to the sheer *number of couples in the reproductive ages*. This pattern will be echoed in the future, ("baby booms" and "baby busts"). If fertility remains at replacement level, the effect will be less pronounced with each subsequent generation, until the effects of past high population growth rates are entirely cancelled out and a zero population growth rate is achieved.

According to the United Nations "medium variant" estimates, the aggregate world population is expected to grow at a rate between 1.6 and 1.5 per cent annually

Figure 4: Average annual rate of population growth for the world, more developed regions and less developed regions, medium variant, 1950-2025



Source: United Nations: Population Prospects. New York, Population Studies No. 98, 1986

during the 1990s, falling to 1.4 per cent and 1.2 per cent respectively during the periods 2000-2010 and 2010-2020. At this projected rate of growth, the world population will have past the 8 billion mark, 3 billion more than its present size, by the year 2025.

Given differential rates of population increase in the recent past, future population increase will especially occur in the developing countries. For instance, Asia is expected to add 1.5 billion additional earthlings to its present 3 billion inhabitants. Africa's population is expected to more than double during that same period (increase from 645 million to 1.6 billion). On the other hand, slow population growth is expected in Europe, where the population is projected to increase from 498 million at the present time to 515 million by 2025.

Clearly, the expected increase of the world's population will tax its resources as never before in history. The largest volume of population growth will be added to populations living in areas which now hold most of the earth's species and the most abundant natural resources. As a result, the survival of many unique ecosystems and species will be at stake in the near future.

The ultimate result of the present demographic momentum is very well illustrated in Figure 5, below, in which the growth of the world population throughout history is traced. Figure 5 brings out that it took the entire history of humanity until around 1800 to reach the first billion, while in the subsequent two centuries this

number multiplied seven-fold, and will supposedly continue to increase for one more century, due to the built-in demographic momentum. The challenges for policymakers to cope effectively with this phenomenon are clearly formidable!

The demographic momentum of the world population is a given, and has to be treated by policy makers as such. However, choices *can* be made and probably *have* to be made if mankind is going to survive at all. The *speed* of fertility decline can be accelerated by effective policies. Significant immediate decreases in fertility will affect the size of the ultimate stationary world population. However, as discussed in Chapter I, policies for rapid fertility decline can only be effective, if they are designed to alleviate poverty and bring about improvements in the quality of life. Hence a strong case can be made for integration of actions which address questions of maintenance of a healthy natural resource base, while at the same time addressing basic needs such as health care, including family planning, as well as education, sanitation, housing and other basic needs.

5.1 Prospects of Urbanisation

Although in previous sections repeated reference was made to changes in distribution of the world population, only those changes that come about through differential population growth rates were addressed. However, as indicated in the basic equation of population change,

Figure 5: World population growth through history

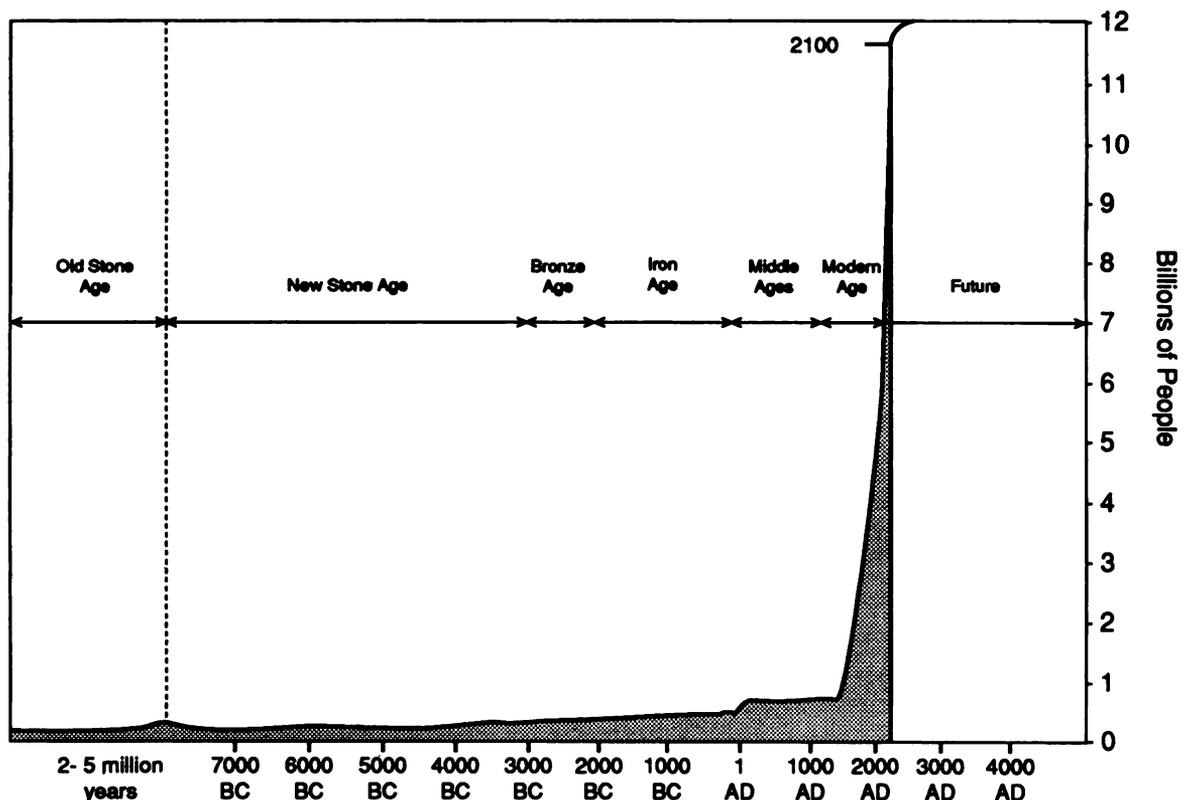


Figure 6: Percentage of total population living in urban areas, 1990

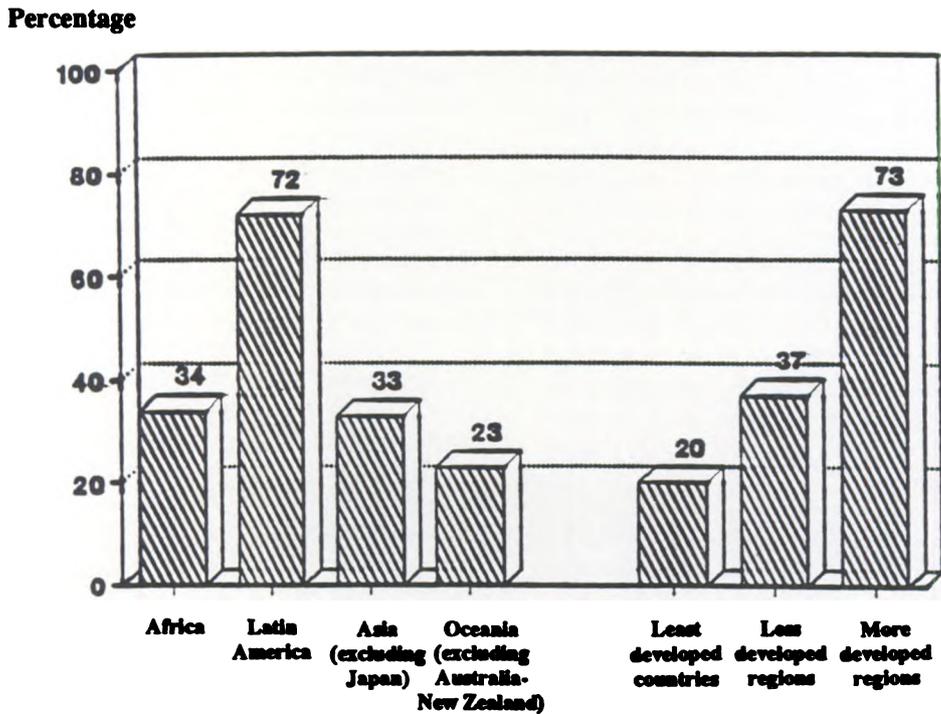


Figure 7: Population by area, 1990-2025 (in millions)

Fig. 7(a): Niger

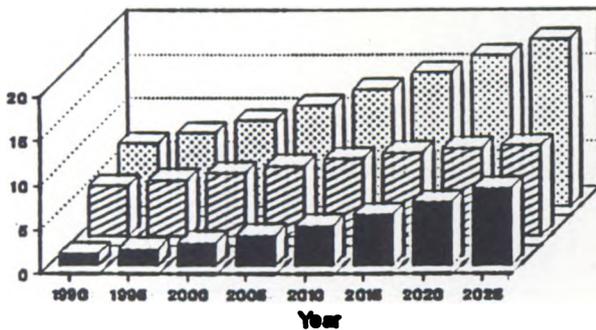


Fig. 7(b): Zambia

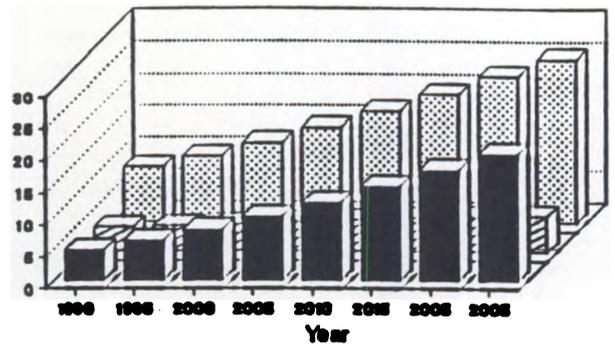


Fig. 7(c): India

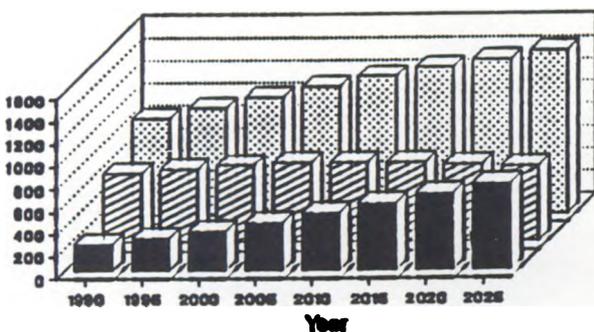
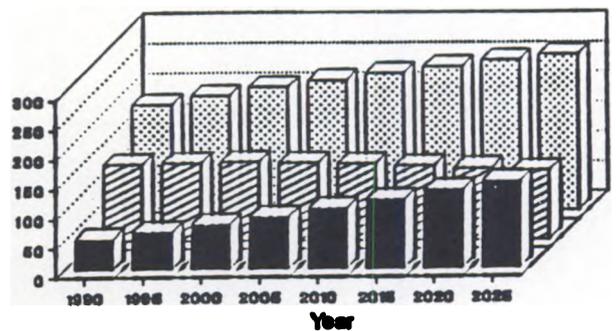


Fig. 7(c): Indonesia



Urban
 Rural
 Total

provided in the first page of this Chapter, population changes come about through *migration*, as well as through fertility and mortality. One of the most significant migratory streams during the 20th century has been the exodus from rural areas to cities. According to United Nations estimates, at mid 1990 45 per cent (2.4 billion) of the world's population lived in urban areas. Further increases in numbers as well as proportion, are expected. The UN projects that, by the year 2025, 65 per cent of the world population will live in cities.

As illustrated in Figure 6, above, the level of urbanization is not evenly distributed across continents. In Latin America, for instance, more than 70 per cent of the population is living in urban areas, while for Asia and Africa the proportion is just above 30. Furthermore, the proportion of people living in urban areas in more developed countries is almost four times higher than in least developed countries.

Nevertheless, in most developing countries the proportion of people living in urban areas is expected to increase in coming decades. this phenomenon is illustrated in Figure 7, above.

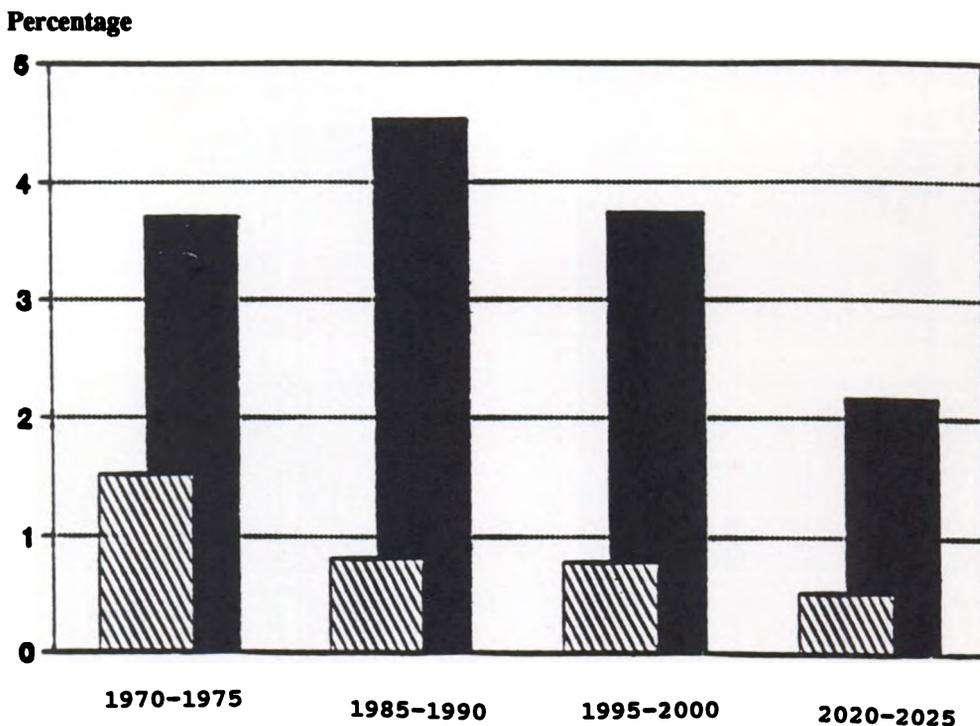
Projected increases in total, rural and urban populations are given for four countries: Niger, Zambia, India and Indonesia. These countries, except Zambia, were still overwhelmingly rural in 1990. However, in all four the

urban population is expected to grow more rapidly than the rural population.

In general, a rapid rate of urbanization is expected to occur in less developed regions. This is illustrated in Figure 8, below, in which annual percentages are given for less developed countries (black bars) and for more developed countries (striped bars). According to Figure 8, annual urban growth rates for developing countries are expected to be almost 4 per cent until the early 21st century, when they are expected to taper off. At the same time, annual urban growth rates in more developed regions are supposed to fall below 1 per cent in the near future.

Some negative side-effects of urbanisation on natural environments were discussed in the previous Chapter. These negative effects will supposedly be amplified in the coming decades, as urbanization increases rapidly, especially in those countries in which most people are heavily dependent, until the present time, upon their natural resource base for survival. One could consider that urbanisation has some positive impact as well, by alleviating excessive demographic pressures in rural areas. However, given the demographic momentum of many countries, population growth in rural areas will still be considerable as well, even after a good deal of young people have left for the cities.

Figure 8: Average annual urban growth rate, less developed regions and more developed regions



As in the case of demographic momentum, urbanisation must in part be considered as a given, as an inevitable process which must be addressed and regulated by effective policies, designed to minimise negative impacts on natural resources, rather than on measures to counteract rural-urban migration.

6. CONCLUSION

The interrelations between human populations and protected areas are complex. Nevertheless, they need to be known and understood before protected areas managers can effectively incorporate demographic scenarios into their planning. The magnitude of population increases in coming decades, and the related phenomena such as migratory movements and changing age-sex distributions, need to be anticipated and taken into account in any management plan, in order to have a realistic chance of achievement and success in the long

run. In addition, economic activities and consumption patterns in the four areas concerned will need to be examined and addressed in management plans.

Humanity and nature are interdependent. Changes in one lead to changes in the other. Human populations are rapidly changing in numbers, structure and distribution. The impact of these changes is felt in parks and protected areas. Although parks and protected areas tended to be in sparsely populated or uninhabited regions, the future will be one of protected areas *with* people, given the sheer magnitude of human numbers added to the world population every year, especially in those countries generously endowed with natural resources. Planning for the maintenance of parks and protected areas must take into account a balanced interest in the physical requirements for conservation of biological diversity, on the one hand, and the needs of human populations on the other. Since exclusion of human populations from protected areas may become increasingly difficult, a sustainable balance between the two should be the goal.

NOTES

1. Boserup, Ester, 1968: *Woman's Role in Economic Development*
2. Davis, K. and Blake J. 1968: *Social Structure and Fertility: An Analytic Framework* in: *Population and Society*. Charles B. Nam, ed.. New York, Houghton Mifflin Co.
3. Demeny, Paul: *The World Demographic Situation*. The Population Council, Center for Policy Studies. Working Paper No. 121, December 1985.
4. The Economist, June 4 1988: *The Other Group of Seven*. Pp. 89-90.
5. Falkenmark, Malin, 1989: *Water Scarcity Much More Than Drought*. Paper prepared for the Hoover Institute Meeting on Human Demography and Natural Resources. Stanford. (February)
6. Glantz, Michael H., 1989: *An Essay on the Interactions Between Climate and Society*. Paper prepared for the Hoover institute Meeting on Human Demography and Natural Resources. Stanford. (February)
7. Myers, Norman, 1989: "Population, Environment, and Conflict" in: Davis, Kingsley, Mikhail Bernstam and Helen M. Sellers *Population and Resources in a Changing World*. Morrison Institute for Population and Resource Studies, Stanford University, and: *The Hamburger Connection*. *Ambio* 10: pp. 3-8.
8. Population Reference Bureau, 1988: *World Population Data Sheet*. Washington, D.C.
9. United Nations: *World Population Prospects 1990*, New York, Population Studies No. 120, 1991.
10. World Bank, 1988: *World Development Report*, p. 222.
11. World Resources Institute, 1988: *World Resources 1988-89*. New York, Basic Books Inc.

APPENDIX D

DEMOGRAPHIC CHANGE AND PROTECTED AREAS: PLANNING FOR THE FUTURE

By James N. Ypsilantis

1. INTRODUCTION

This paper provides a demographic backdrop for the "Protected Areas and Demographic Change: Planning for the Future" workshop sponsored by the Social Sciences Division of IUCN – The World Conservation Union, held during the IVth World Congress on Parks and Protected Areas in Caracas, Venezuela. United Nations and World Bank statistics and projections are used to raise issues and stimulate discussion. However, when data were originally used in presentations targeted at governmental audiences (such as decision-makers in Madagascar) government-approved figures were used.

Linkages between demographic change and protected areas are the focus of this paper. Although the body of evidence linking demographic factors with environmental change has become quite substantial, comparatively little literature exists on the linkages between demographic parameters and protected areas, or on the vulnerability of different ecosystems to population-related threats.

Recent evidence demonstrates that population driven pressures on protected areas are already reaching critical levels in a number of countries. The current drought in southern Africa has led the Namibian government to consider permitting game-hunting and food production within the boundaries of Itosha National Park to alleviate severe food shortages. In numerous areas experiencing rapid population growth, pressures to reduce the size of protected areas are growing while reports of illegal hunting, or other extractive activities; and encroachment upon, or cultivation within; protected areas are increasing.

Rapid demographic changes are usually associated with less developed countries (LDC.) However, conflicts between conservation interests and the needs of an increasing population are not limited to LDC. Recent reports from Texas indicate that demographic pressures on protected areas can also lead to political pressures and legislative changes in the context of More Developed Countries (MDC.) While a recent economic upturn prompted Texas' in-migration, the actual conflict between the nature conservation lobby and the "rational use" movement was catalyzed by the need to construct new housing units and provide sufficient water for the community.

While there are significant cross-linkages between economic parameters on the one hand and demographic or environmental changes on the other, a full economic analysis is beyond the scope of this paper. Terms of international trade, the foreign debt, income or land distribution and poverty; consumption patterns and other macro or micro-economic issues would provide ample material for a paper on their linkages to environmental (and demographic) change but are not analyzed in depth here.

Although it will at times be necessary to refer back to the overall population / natural resource base relationships and provide the economic context and constraints, this paper will remain focused on the relationships between demographic variables such as population growth, settlement patterns and population density, structure by age/sex, and migration on the one hand; and pressures on, or threats to, protected areas on the other.

The primary goal of this paper is to raise issues and provide a framework for discussions about the implications of demographic changes for protected area management. A secondary goal is to explore how demographic dimensions can be incorporated into vulnerability assessment of both existing and potential protected areas.

The presentation is divided into three sections. In the first section, United Nations demographic data and projections are presented. The second section examines how demographic parameters can affect protected areas, thus providing indications on how to assess quantitatively the vulnerability of protected areas to anthropic pressures.

The final section comprises a review of the evidence presented, which concludes that in coming decades demographic parameters will underlie some of the most serious threats to, and fundamental global issues affecting; protected areas. A framework for discussing issues or questions raised during the workshop, and to formulate appropriate responses, is then provided.

The demographic threats to protected areas are likely to grow substantially in coming decades. Additionally, many of the ills which affect societies can have potentially serious repercussions on protected areas. Fortunately, timely and carefully considered policy

responses can be implemented to defuse much of the threat.

The long-term sustainability of protected areas is contingent on raising the right questions and developing appropriate responses at the conceptual, project and policy levels. These responses will need to take into account socio-demographic and economic parameters as well as ecological considerations.

2. DEMOGRAPHIC BACKGROUND

2.1 Total Population

World population, which stood at 2.515 billion in 1950, had doubled to 5.025 billion by 1987, and stands at 5.478 billion in 1992. The growth rates for world population implied by these numbers are at historically high levels. Annual rates of population growth hardly ever, and then only briefly, exceeded 1.5% until the end of World War I.

Since the end of World War II this growth rate trend has remained over 1.5%. The world population annual rate of growth averaged 1.8% during the 1950-1955 period, and was still increasing. The average annual growth rate peaked at 2.06% during the 1965-1970 period, and had slowed to 1.74% by the 1980-1985 period. The base year for the projections used in this presentation and paper is 1985. The 1990-1995 average annual growth rate stands between 1.53% and 1.81% (under the Low and High

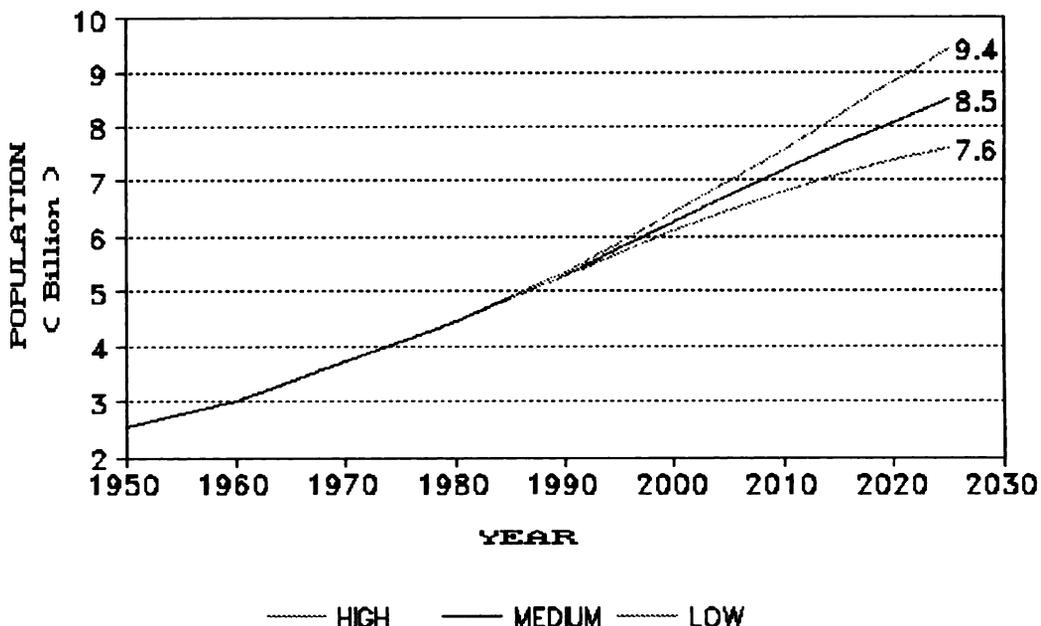
Projections) with the Medium Projection, or most likely estimate, at 1.73%.

The demographic projections used reflect three different sets of assumptions, thus producing three distinct projection variants, as illustrated in Figure I. The medium variant represents the most likely (or expected) progression, while the High and Low variants represent the outer bounds within which the projected variable (in this case total population) is expected to evolve. It should be noted that these projections are based strictly on demographic factors and, as such, are limited by neither economic nor environmental constraints.

The annual percentage growth rate of world population is projected to fall under both the Low and Medium Projection, but to increase slightly under the High projection¹. Furthermore, the annual increase in absolute population (the number of births exceeding the number of deaths in a given year) is greater than at any time in the past. Under the Low Projection, absolute population growth occurs during the 1990-1995 period, when the increase averages 84 million/year. Under the Medium Projection, absolute population growth will peak at 97 million/year on average over the 1995-2000 period. Under the High Projection, absolute population growth reaches continues to grow through 2020-2025, when it reaches 126 million/year!

As can be seen in Figure I, world population continues to grow under all three projections from 1985, the base year, through 2025, the time-horizon. Under the Medium (or most likely) variant/projection, world population is

Figure I: World population, 1950-2025



1 World population growth rates are based on the difference between crude birth and death rates. Under the High variant, death rates are assumed to decrease more rapidly than birth rates from 1980-1985 through the 1990-1995 period, culminating in a 1.89% annual growth rate over this latter period, prior to slowing down.

expected to grow by 3.613 billion from 1985 to 2025, reaching 8.467 billion in 2025. While the High and Low variants remain close to the medium variant at first, the difference between the High and Low variants (spanning only 68 million in 1990 and 150 million in the year 2000) grows rapidly next century.

By the year 2025, world population will stand at between 9.423 billion (High Projection) and 7.590 billion (Low Projection,) a difference of 1.833 billion! This difference is equivalent to Earth's total population as our planet emerged from World War II.

Increased poaching or illegal use of protected natural resources combines with political pressures to permit the exploitation of protected areas where the surrounding resource base becomes degraded or less productive. Such a situation has now developed in southern Africa due to the drought conditions prevailing there. We should remember that droughts have always occurred in this region, and recognize that recent imbalances between demand and sustainable production are potentially harbingers of things to come.

Figure II: World population growth
Time remaining until a population of 7.6 billion is reached

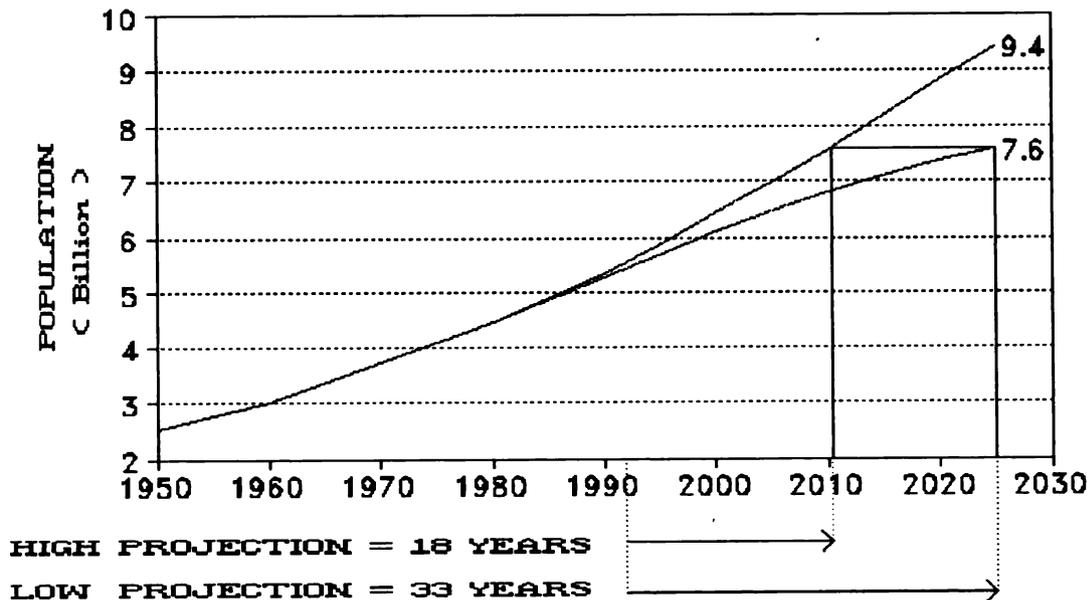


Figure II indicates that the time remaining until the demands of a population of 7.59 billion needs to be sustainably met varies with the projection considered. A number of programs in many various different sectors (food and water, energy, housing, health and social services, etc...) will need to be defined and implemented to sustainably support a population of 7.59 billion. Under the High Projection, the production techniques needed to sustainably support a population of 7.59 billion will need to be developed and fully implemented in the coming 20 years, while there would be 35 years to attain the same results under the Low Projection.

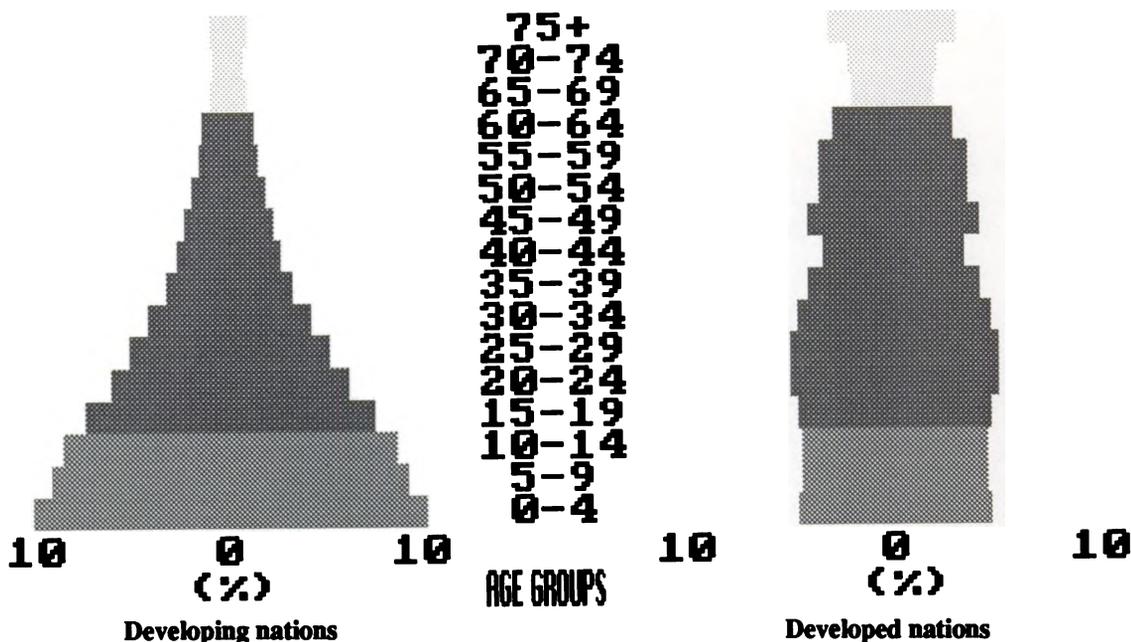
When the demands of a population can not be met through sustainable production, the tendency is to "mine" the natural resource base to satisfy demand. As the natural resource base is mined, it's sustainable production levels decrease, thus compounding the already increasing population-driven pressures on remaining resources. While sustainable production exceeds or equals demand, the pressure to exploit protected areas may be minimal. However, once demand exceeds sustainable production levels, pressures to bring protected areas into production mounts extremely rapidly.

2.2 Population by Age and Sex

Differences in distributions by age and sex of the population of more developed countries (MDC) and less developed countries (LDC), as illustrated in Figure III, are striking. Although these differences in structure have many implications in terms of household size, number of dependents, consumption patterns and, to a lesser degree, disposable income; this section will only focus on two areas: population momentum and growth in the labor-force.

In LDC, 13% of total population is currently under age 5 and 36% under age 15, while in MDC 7% is under age 5 and 21% under age 15. In coming decades the population in these younger age groups will age into the prime years for couple-formation and child-bearing. The age structure of LDC results in strong population momentum: even if the Total Fertility Rate (currently estimated to be about 3.7 in LDC) were to fall overnight to levels where each cohort of women had only enough daughters to "replace" themselves in the population (this replacement fertility level is affected by mortality rates and is estimated to be 2.1 in MDC,) population would continue to increase because of the growing number of

Figure III: Structure by age of the population



women aging into (and through) their reproductive years.

It should be noted that there is also population momentum in MDC, although it is a much weaker force than in LDC. The Total Fertility Rate (TFR) in MDC is currently estimated at 1.9, below replacement level, but the population of MDC continues to grow due to the "baby-boom" generation aging into, and through, their reproductive years.

It is a foregone conclusion that world population will continue to grow for decades yet. In fact, under the Medium Projection, world population is expected to continue growing through 11.5 billion in the year 2150, and to stabilize at 11.6 billion shortly thereafter. Under this projection, fertility is projected to eventually stabilize at replacement levels in all regions of the world.

The power of population momentum is illustrated by the fact that even in the unlikely hypothesis that fertility dropped overnight to replacement levels, world population would continue growing through the year 2150 when world population would reach 8.4 billion, stabilizing shortly thereafter at around 8.5 billion. Under the equally unlikely constant fertility scenario, world population would reach 694.2 billion in 2150 ... and would never stabilize.

Future growth in the labor force is largely a function of past demographic trends. By making adjustments (particularly for education and training) it is possible to forecast with remarkable accuracy the number of new entrants in, and overall size of, the labor force for the next 15 years, and with great confidence the boundaries

within which the size of the labor force will evolve through the year 2025.

The future labor force in MDC, apart from being at an advantage through better access to education and training, will also grow much more slowly in decades to come than in LDC. On the other hand LDC economies, already plagued by high rates of unemployment and underemployment (illustrating the difficulties experienced in absorbing new entrants in the labor market,) face large increases in the annual growth of the labor force.

The future costs for education and job-creation alone will create a large burden for LDC economies, and the growth rates associated with these costs will reflect the overall population growth rates of the previous decade. The more rapidly these costs rise, along with those for social services delivery, the more difficult it will be to free financial resources for nature conservation and protected areas.

The growth in the labor force will mostly be concentrated in LDC urban areas (see the segment on urbanization and protected areas in the next section.) This will most likely result in rapid growth of the informal sector. This sector of the economy is poorly regulated and, through a heavy reliance on natural resources (such as charcoal making) and its potential for water contamination (such as in leather tanneries and soap-making,) can be hazardous to peri-urban and downstream protected areas.

The future growth in total population and in the labor force implied by LDC's current structure by age pose serious challenges to the sustainable development of these nations. Sustainable development is predicated on

overall economic growth at least matching the combined growth of the labor force and increases in the average worker's productivity; without diminishing the natural resources capital.

Most LDC are situated in the tropics, where the highest concentrations of biodiversity are found. Imbalances between demographic and economic growth combine with mining of the resource base present the most significant threats to a sustainable development of LDC. Although most of the impacts are indirect, degradation in the natural resource base combined with a rapidly expanding labor pool can be expected to have repercussions on protected areas.

2.3 Changing Patterns of Population Distribution: World Urbanization

Most of the growth in world population from 1990 to 2025 will occur in LDC where, as shown in Figure IV, most of the growth will be in urban populations.

The definition *urban* varies from nation to nation but is usually based on size of locality (commonly considering cities, town and villages with more than 1,000-2,000 inhabitants.) However, administrative boundaries or density of housing units are also sometimes used in defining urban areas. *Urbanization* not only refers to the growth in urban areas, but also to the increase in the proportion (or percentage) of a country's population living in urban settings.

In the mid-1700s, only 3% of the world's population was estimated to be living in urban areas. This percentage had

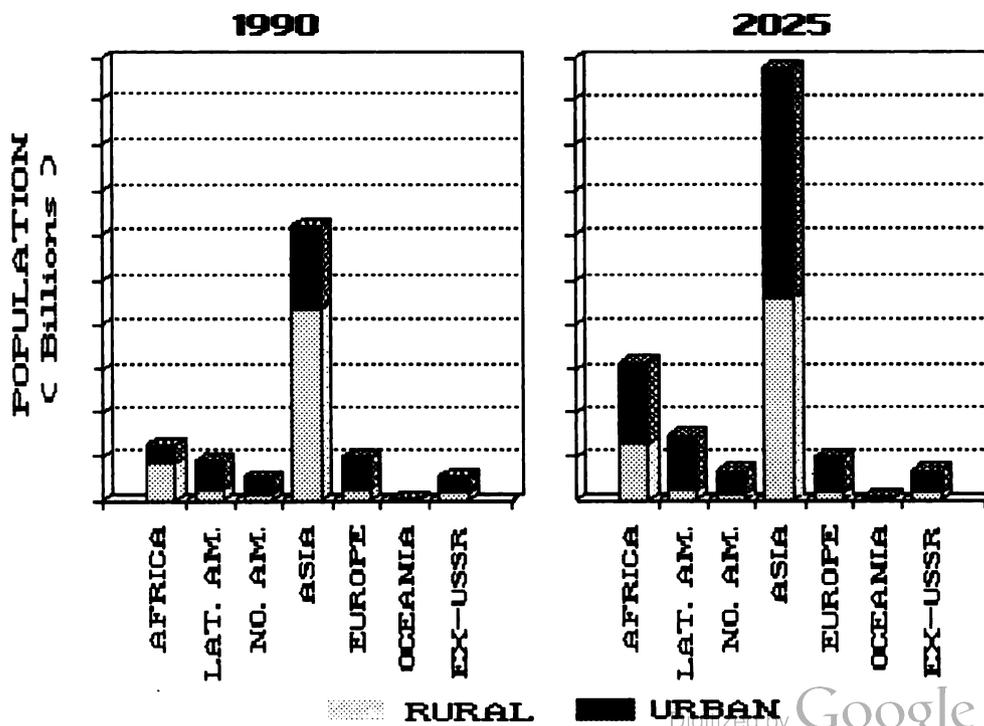
grown to 29% by 1950, and to 43% by 1990. In 2025, it is estimated that 61% of the world's population will live in urban areas. The growth in urban population from 1990 to the year 2025 is part of a trend stretching back centuries. In 1755 there were little over 20 million people living in urban areas, out of a world population of about 730 million. By 1950, there were 733 million people living in urban areas alone, and urban population was growing by over 22 million inhabitants per year. In 1990 the world's urban population stood at 2.260 billion, nearly as much as the world's total population in 1950 (2.515 billion,) and was growing by over 60 million per year.

From 1990 to 2025, the world's population is expected to grow by 3.174 billion to 8.467 billion (Medium Projection.) As illustrated in Figure IV, most of that growth will occur in the urban areas of developing nations. From 1990 to 2025, urban populations will account for over 90% of overall population growth and 93% of this urban growth will take place in developing nations.

The urban population of developing nations, will grow by 2.666 billion from 1990 to 2025, accounting for 84% of the growth in world population over that period. The urban population of LDC is expected to grow more than 14-fold from 1950 to 2025, with 71% of that growth taking place between 1990 and 2025. In absolute terms, by the year 2025 there will be nearly as many people in LDC urban areas (4.051 billion) as there were in all LDC in 1990 (4.087 billion.)

Worldwide and using the Medium Projection, most of the absolute growth in urban population from 1950 to

Figure IV: World population by region, urban and rural



2025 is yet to take place. The annual rates of growth for urban populations steadily decreases from the 1950-1955 period, when it averaged 3.17%, to 2.41% for 1980-1985. However, under the medium variant, the urban rate of growth then accelerates to 2.55% through the 1990 before steadily declining to 1.92% for 2020-2025.

In MDC, the urban annual growth rates stood at 2.43% in 1950-1955 and 2.45% in 1955-1960, and then steadily declined to 1.01% in 1980-1985. Under the Medium Projection, this growth rate continues to steadily decrease to 0.34% in 2020-2025.

In LDC, the urban annual growth rate stood at 4.27% in 1950-1955 and 5.26% in 1955-1960, and then steadily declined to 3.51% in 1980-1985. Under the Medium Projection, this growth rate then increases to 3.58 in 1990-1995 before steadily decrease to 2.36% in 2020-2025.

The LDC urban growth rates above are extremely rapid. It should be further kept in mind that they represent averages: individual countries have urban growth rates average as high as 8-9% for given 5-year periods, and individual cities, usually capitals or the main urban agglomerations in LDC have reported average annual growth rates of over 10%!

While urban areas will absorb most of the growth in world population, rural populations will continue to grow for some time. World-wide, and using the Medium Projection, negative average growth rates for rural populations (at -0.02%) are first projected to occur in 2010-2015. By 2020-2025, this rate is projected to reach -0.39%. Rural population have been shrinking in MDC since 1950-1955 and will maintain this trend through 2020-2025.

The rural population of LDC, under the Medium Projection, grew most rapidly in 1965-1970 when it averaged 2.12%. By 1980-1985, the average growth rate had slowed to 1.48%. Under the Medium Projection, the average growth rate for rural population falls to 0.96% in 1995-2000 and 0.003% in 2010-2015. The rural population then starts to decrease, reaching an average rate of -0.38% in 2020-2025.

The rate of growth of urban and rural populations are proportional to the total growth rate: the higher the total growth rate at any given point in time, the higher the rates of urban and rural growth at that time. As a result, the percentage of population living in urban (or rural) areas at any given point in time remains constant. Although the rate of urban growth varies with the projection used, the percentage of the population living in urban areas is 47% in the year 2000 and 61% in the year 2025 independently of whether the High, Medium or Low Projection is used.

3. POPULATION AND PROTECTED AREAS: PLANNING FOR THE FUTURE

This section contains three segments. The first segment examines the links between urbanization and protected areas, particularly in coastal zones. Migration is the topic of the second segment in which data from Guatemala's Peten province, where IUCN conducts field operations, is presented as a case study. The last segment analyses policy options to alleviate the demographic pressure on the protected areas of Madagascar.

3.1 Urbanization and Protected Areas

The impacts of urbanization on protected areas are, and will continue to be; mostly indirect, acting through the impacts of population pressures on the overall natural resource base and to the need for increases in productivity per agricultural worker to compensate for an increasingly urbanized population.

The sheer magnitude of growth in LDC urban populations over coming decades will drive some of the changes in pressure on the natural resource base and protected areas, while the increasing preponderance of urbanized population will cause other threats to change.

As can be seen in Maps I and II, the location of the twenty five largest cities in the world is shifting increasingly to LDC settings from 1990 to the year 2000. This is a reflection of a longer-term trend: in 1950 13 of the 25 largest cities were in LDC while by the year 2000, 20 out of the 25 will be located in LDC and of the 21 cities with a population of over 10 million, 18 will be in LDC.

The average size of these largest cities has also grown. In 1990 the average size of the 25 largest cities was 10.9 million while, in 1950, the average size of the 25 largest cities was of only 4.2 million. By the year 2000 the average size of the 25 largest cities will have reached 13.2 million.

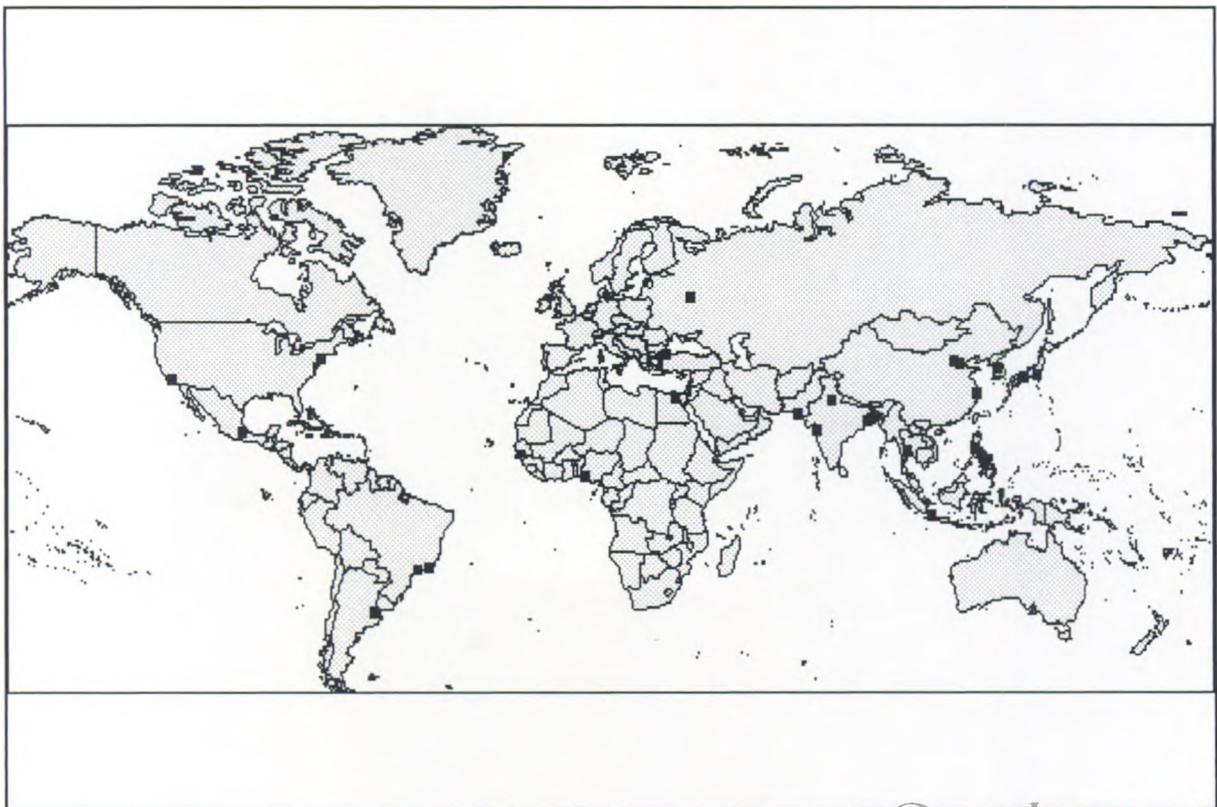
Clearly, environmental problems associated with urbanization do not start when a city reaches 10.9 million inhabitants. The scope of the problems associated with urbanization can be gathered from an examination of Map III representing cities with a population of over 3 million by the year 2000 and Map IV showing the location of cities of over 1 million in 1990.

There are a large number of changes associated with urbanization in LDC. Growth in the urban labor force has been resulting in rapid growth of informal sector activities since the formal sector has not been able to absorb all the entrants on the labor market. As previously noted, informal sector activities often place a greater burden on the natural resource base than more formal activities do.

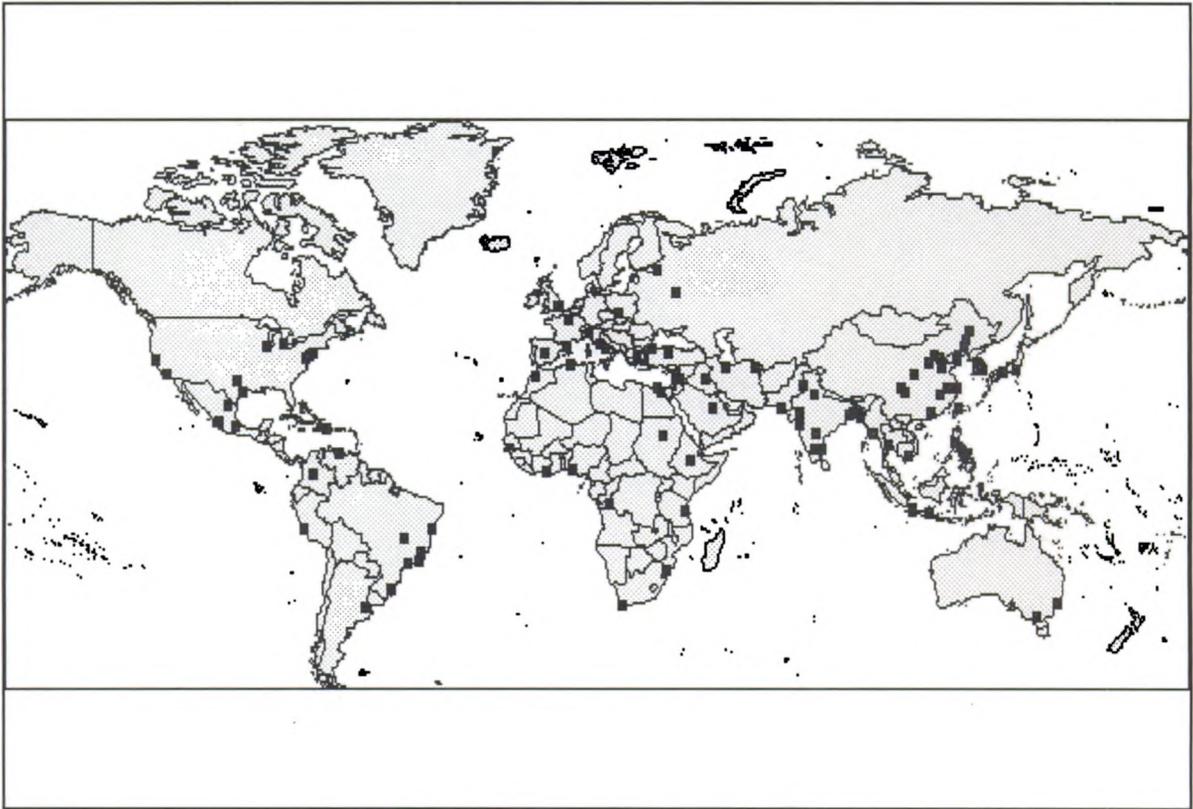
Map I: The 25 largest cities in the year 1990



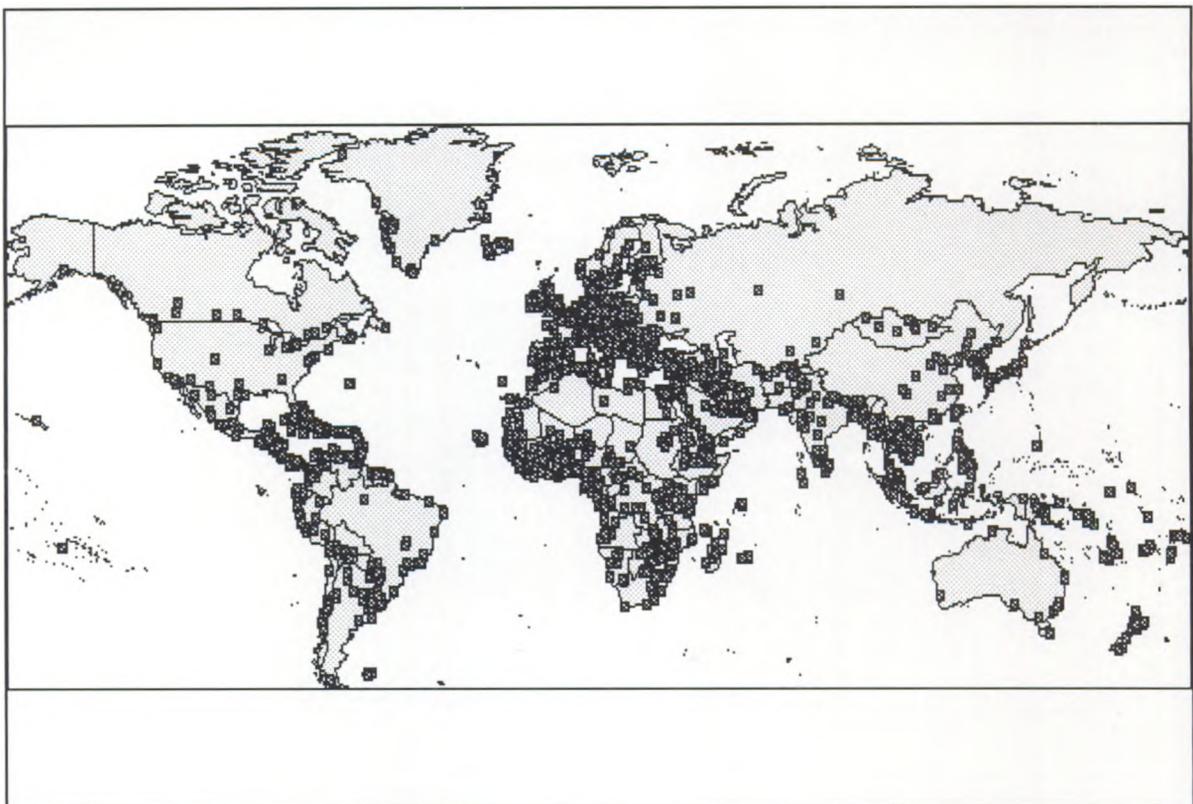
Map II: The 25 largest cities in the year 2000



Map III: Cities with over three million inhabitants in the year 2000



Map IV: Cities with over one million inhabitants in the year 1990



Industrial, human and solid waste disposal problems have led to the increasing pollution of LDC rivers, estuaries, coastal and near-shore resources. Other impacts on water are caused by soil erosion and sedimentation due to peri-urban deforestation driven by the demand for timber and fuelwood/charcoal in urban centers. Urban populations' needs for water add to water withdrawals for agriculture and industry. The demand for water has led a number of urban areas to withdraw more water than the available renewable supply would permit.

Indeed, as reported by the World Resource Institute, urban areas are prime transformers of natural resources. A number of threats to protected areas can be traced to the process of urbanization. Urban areas are often located on good agricultural land. Data for New Delhi provides an example of this: from 1971 through 1971, this city alone appropriated 14,000 ha. of prime agricultural land.

From 1980 to the year 2000 the surface area of urban areas in LDC is expected to double in area from 8 to 17 million ha. (or 476,000 ha./yr increase on average) and the FAO estimates that the worldwide loss of arable land to city growth will reach 1.4 billion Ha over this period. The encroachment of cities on agricultural land puts added pressures on the remaining (and potential) arable surfaces.

In peri-urban areas, the increased pressure leads to changes in the crop-mixes used and a shift to more intensive agriculture practices. Agricultural intensification is usually predicated on water-intensive crops. Thus competition for water intensifies just as untreated sewage and agricultural run-off threaten the water-supply. The impacts on water-partitioning, aquifer replenishment rates and a disturbed water-cycle compound water pollution and contamination problems so commonly associated with urban and peri-urban areas.

Figure V: Pressures and scales of impact on mangrove

Activity	Scale of impact
Clearfelling	10,000 – 500,000
Freshwater diversion	1,000 – 500,000
Conversion:	
agriculture	100 – 100,000
aquaculture	100 – 10,000
salt ponds	100 – 1,000
urban development	100 – 1,000
harbours/channels	100 – 1,000
Mineral/mineral extraction	10 – 100
Waster disposal:	
liquid	1 – 10
solid garbage	1 – 10
Spillage:	
oils and chemicals	1 – 10

Source: Saenger et al. (1983)

Figure VI: Key pressures on coral reefs

Mining and blast fishing	
Situation:	Sediment-loaded terrestrial run-off Dredge and fill operations
Overexploitation:	Overfishing/overharvesting
Changes in salinity:	River diversion Storm run-off
Pollution:	Industrial waste-water Domestic sewage Agricultural run-off/eutrophication

As can be seen in Map I-IV, urban areas tend to be located in coastal areas. It is estimated that 60% of world population lives in what is broadly defined as coastal areas. These coastal areas contain the ecosystems that are fast becoming priorities in terms of conservation efforts, as can be testified to by the UNCED process.

Figures V and VI list the prime threats to mangroves and coral reef ecosystems. The linkages between upstream water contamination and uses, a disproportionate share of which can be related to urbanization and population growth, have a pronounced impact on coastal ecosystems.

The combination of high population densities and rapid population growth in LDC urban settings can have noticeable effects quite a long ways downstream. And the proximity of numerous urban areas to the coastline substantially adds to the threat urban areas pose to coastal and near-shore resources.

Efforts have been made to quantify the vulnerability of coastal and near-shore ecosystems. These formulas do not generally include variables directly linked upstream urban areas and have do not yet provide reliable indicators even when all the data they require is available.

A review of attempts at assessing vulnerability reveal that these equations often contain explicit demographic elements such as population density, to which the

population growth rate is sometimes applied as an exponent. The inverse of GDP per capita can also be found used as a measure of poverty.

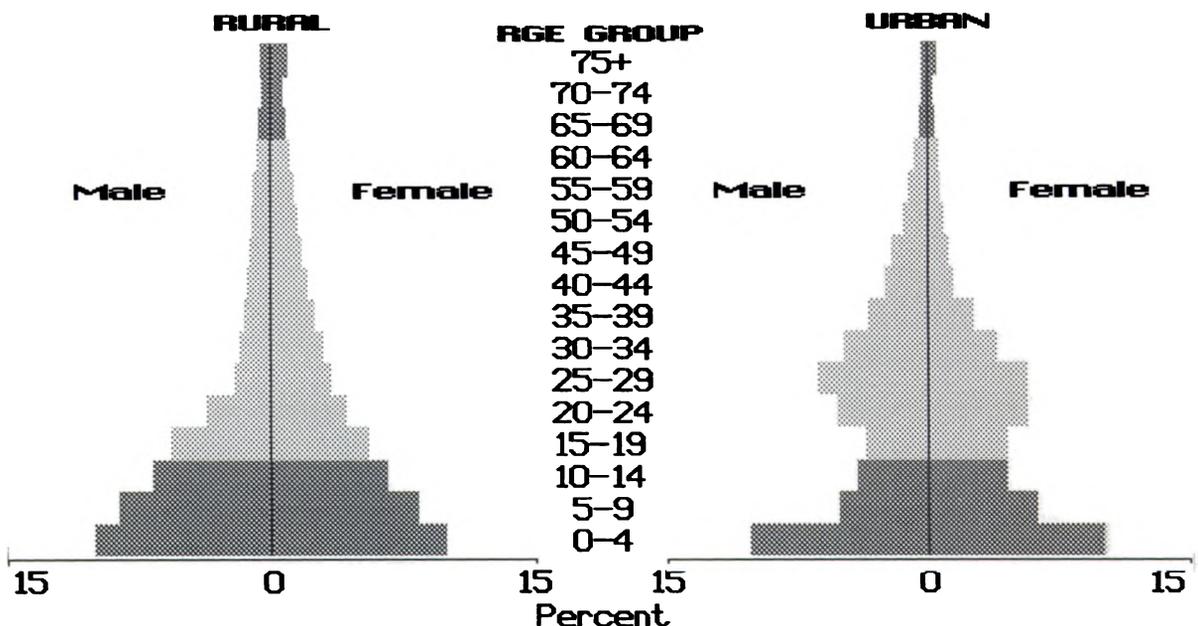
Of note is that the various elements are associated multiplicatively in these vulnerability equations. When formulas use elements multiplicatively; and demographic parameters affect more than one such element (such as in the case of the Universal Soil Loss Equation,) demographic changes have profound effects.

Before leaving the subject of urbanization, the factors leading to population growth must be examined. These can be broadly split into two: a certain amount of growth is attributable to natural population growth (the difference between births and deaths in a given population) with the remainder of urban growth being attributable to in-migration.

Cities often have high rates of natural growth. Figure VII shows the structure by age and sex of the urban and rural population of Botswana. As can be seen, a disproportionate share of the population of urban areas is in their prime child-bearing years. This combines with better health and social services delivery; and improved access to drinking water and sanitation in urban areas to reduce death rates, thus contributing to rapid rates of natural population growth.

The remainder of urban growth, the migration component, may be of more significance for protected

Figure VII: Botswana's urban and rural population structure by age and sex, 1986



areas. This is for two reasons. The first of these is that recent arrivals in the city tend to be poorer, are more likely to work in the informal sector and, in extreme cases squat in protected areas. This adds to the pressure on protected areas stemming from competition for water, urban pollution and increases in ambient temperature associated with urban centers.

The structure by age and composition by sex of urban and rural populations, as well as among migrants to urban areas, varies in different regions of the world. These elements need to be taken into account in designing and implementing policies or programs to either slow rural out-migration, or increase agricultural productivity per worker in the hinterlands.

3.2 Migration and Protected Areas: The Case of Guatemala's Peten Province

Guatemala (see Maps V) is situated in Central America and shares borders with Mexico, Belize, Honduras and El Salvador. The Central American region is affected by both Pacific and Atlantic climatic regimes and forms a land bridge between North and South America. This combines with wide variations in altitude and rugged terrain to produce a wide range of ecological lifezones,

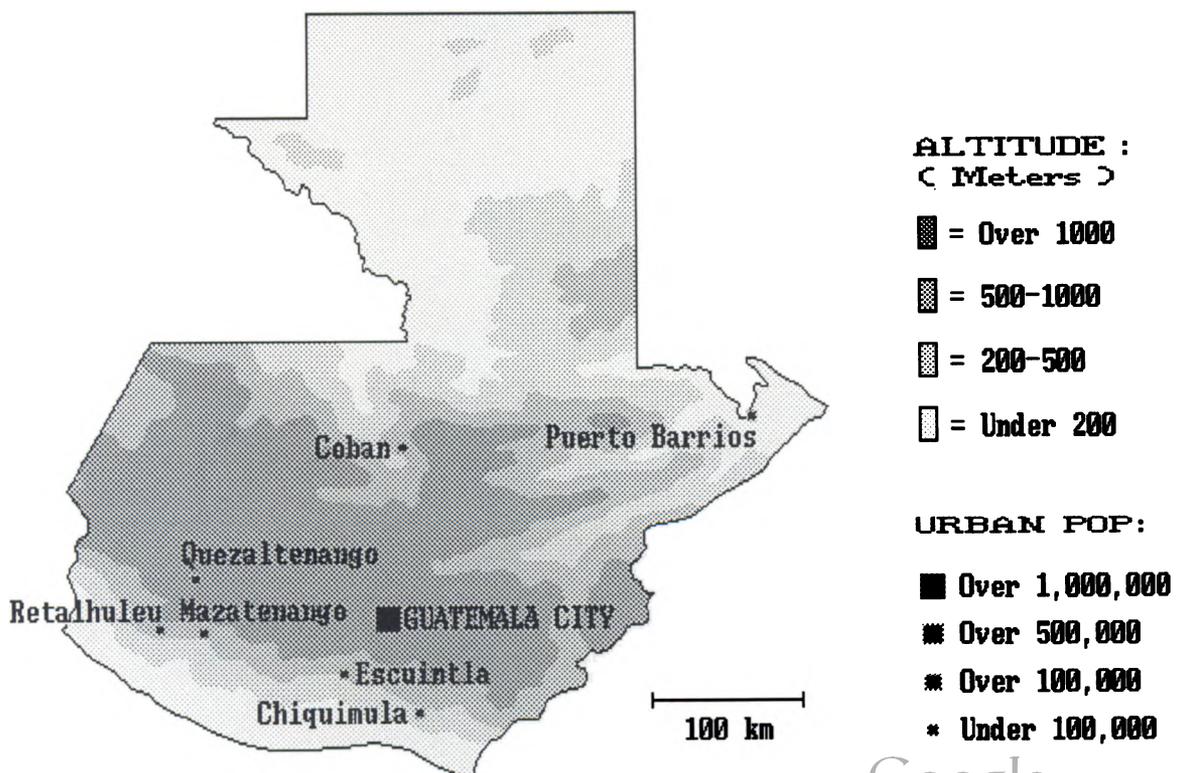
The most recent census information from Guatemala dates back to March 1981, when the country's enumerated population was reported as 6.054 million.

The 1990 population was estimated by the United Nations to be 9.246 million, of which 40% was classified as urban. The total annual growth rate stands at 2.9%, with urban population growing at 4.0% and rural population at 2%.

These rates of growth are due in large part to high fertility levels (for 1990-1995, the total fertility level was estimated at 5.4 and the crude birth rate at 39 per thousand.) The crude death rate stood at 8 per thousand, partly a reflection of the youthful composition by age of the population. Recent gains have led to decreases in the infant mortality rate, which stands at 48 per thousand for 1990-1995, and a life expectancy at birth of 62 years. Although the situation remains very fluid international out-migration is estimated to be greater than in-migration and plays a small role in the growth rate.

Guatemala is comprised of 108889 km². The country has been characterized by rapid loss of forest cover, proceeding at an annual average rate of 2% in the 1980s which, although fueled by a 89% reliance on biomass for domestic energy, is mainly caused by the conversion of forested areas to agricultural surfaces. Most of the remaining forested areas are in the Northern part of the country, more specifically the Peten province. As a whole, the Peten remains scarcely populated. It is estimated that there are 270'000 inhabitants in the Peten. The Peten's population density of only 7 inhabitants per km² remains much below the national average of 85 inhabitants per km².

Map V: Guatemala – Altitude and urban population



However, the population of the Peten is growing extremely rapidly. The generally accepted figure for its annual population growth rate is 5.5%, with estimates ranging as high as 7-9% for given years. The Peten's growth rate is unusually high for an essentially rural area. With a growth rate of 5.5%, population can be expected to double in under 13 years.

The structure by age of the Peten's population, with 52% of the population being under 15 years old, results in significant population momentum. Roughly 30% of the Peten's population growth is attributed to in-migration from other parts of Guatemala and neighboring countries. Since 50% of Guatemala's total population is also under age 15, population growth and the resulting pressure towards migration to the Peten can be expected to maintain themselves for quite some time yet.

As can be seen from Map VI, there are five principal sources of migrants to the Peten. Two of these are international. The first group consists of returning refugees which had gone to Mexico to escape military and political repression in the 1970s and early 1980s. As the political situation eases in Guatemala, these refugees are now returning to Guatemala. A concentration of such potential migrants is represented by the "boomerang" shape situated in Mexico, between the Guatemalan Aльтиplano and the Peten provinces.

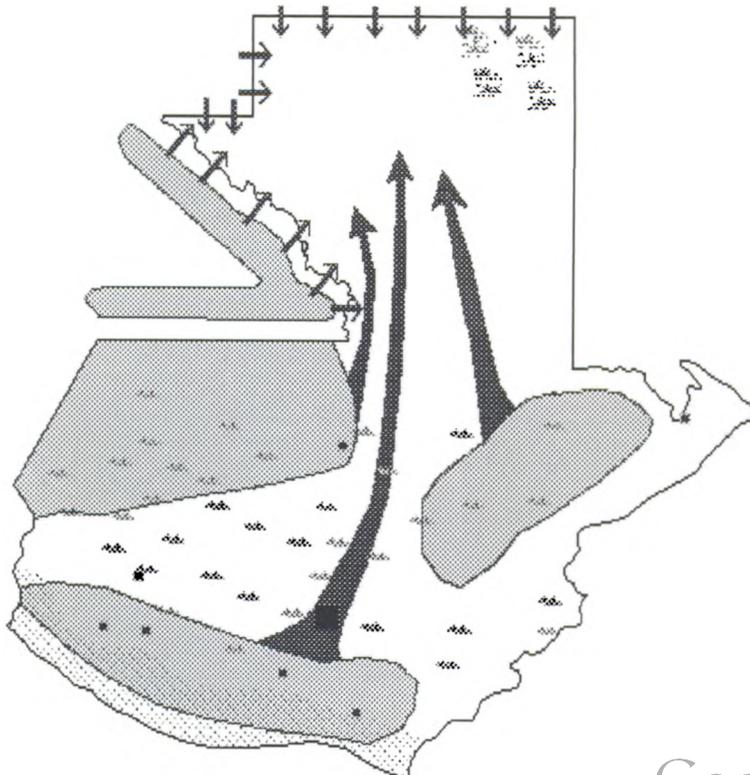
The second group of international migrants consists of Mexicans migrants who have recently been crossing into

Guatemala in increasing numbers. This migratory flow is caused by a combination of land distribution and resource depletion problems on the Mexican side of the border. Recent satellite imagery witnesses to the increased levels of cross-border movements into the North of the Peten: deforestation which was previously all but impossible to pick out has become obvious.

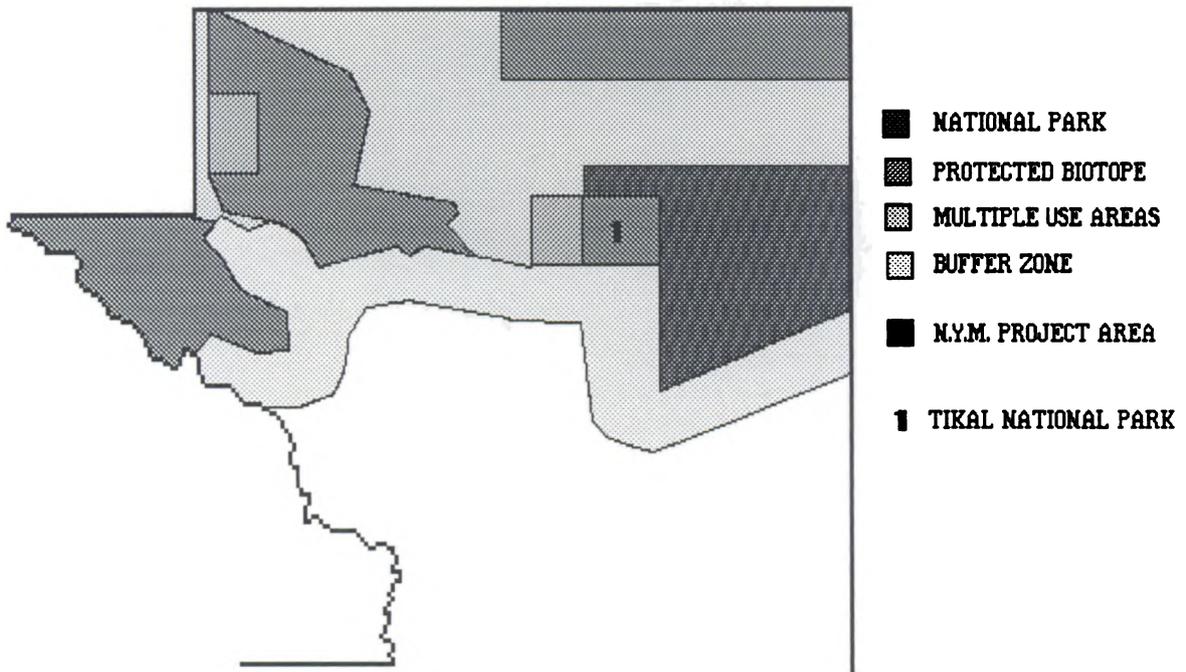
There are additionally three main groups of migrants coming to the Peten from other parts of Guatemala. The first group flows to the Peten from the Eastern (Oriente) provinces. The Ladinos from this area practice slash and burn agriculture. In the Oriente deforestation combined with aggressive rains, sloped terrain, and slash and burn agriculture on fragile soils; have led to severe soil erosion problems and disruptions in the water cycle. The Oriente is fast becoming an area where large-scale soil conservation efforts and reforestation will be needed to hopefully restore what has become an unproductive wasteland. Migrants from this area can be broadly classified as environmental refugees.

A second group of Ladino migrants originates in the Southern (Sur) provinces. The Sur has the best agricultural conditions in Guatemala, but this land is concentrated in a comparatively small number of large commercial farms where export crops are produced. The migratory flow is mostly prompted by what is euphemistically referred to as the "land concentration problem." This group can be broadly defined as economic refugees.

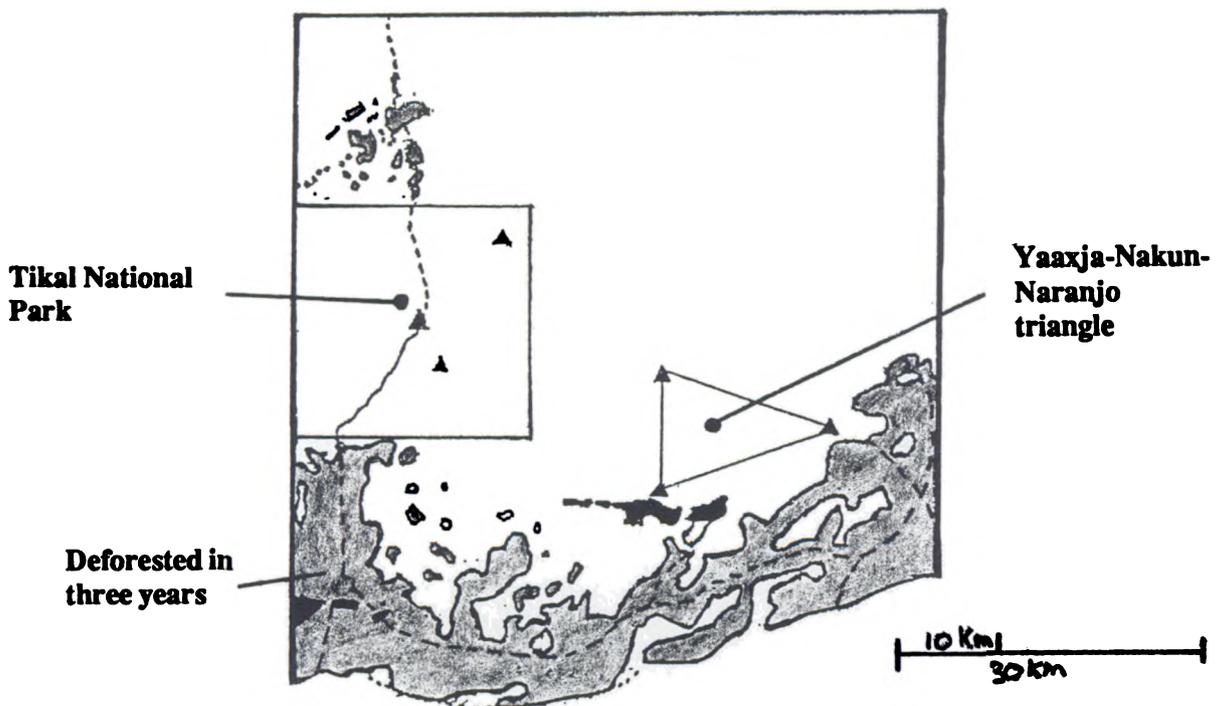
Map VI: Guatemala – Migratory flows into the Peten



Map VII: Guatemala – The Maya Biosphere Reserve of Peten



Map VIII: Guatemala – Protected areas and the agricultural frontier



The third group of migrants is comprised of Indians from the Altiplano. These migrants either come directly to the Peten, or sometimes arrive via the Mexican "boomerang" described above. Although political factors were largely responsible for migratory flows in the past, demographic pressure has become the main factor in deciding to leave for the Peten: The landscape of the Altiplano is characterized by a continuous quilt of farms on small plots, populated by Indians. Over the generations, the size of the plots has been shrinking rapidly, due to high fertility levels. The vast majority of these plots are now barely sufficient to sustain a family using traditional agricultural techniques, while poverty forms an obstacle to the use of chemical inputs to raise yields.

As yesterday's youth form new households, inherited plots have become too small for their families to subsist on. Since there is no more land to expand onto there is little option but to migrate out, joining owners of marginal or presently exhausted lands in a search for surfaces to cultivate in the Peten. This group can be broadly classified as demographic refugees.

Although a large part of the Peten (areas north of Parallel 17.1) is government-owned and enjoys a degree of protection (see Map VII,) policies and incentives encouraging migration to the Peten put in place by the Guatemalan government are having a powerful impact. As a result, new communities have been springing up in the Peten, while already existent population centers also grow rapidly.

Environmental degradation has been hastened by inappropriate agricultural practices. Soil and rain conditions in the Peten are quite different from those prevailing in the Altiplano and the South of Guatemala. Slash and burn, which is workable in the highlands, is practiced by Ladinos with disastrous consequences in the rain-forests of the Peten.

Map VIII shows the moving agricultural frontier and its relation to Tikal Park, as well as IUCN's Yaaxjà-Nakun-Naranjo project. This map shows that protected areas and buffer-zones are coming under increasing threat. While high fertility and rapid rates of natural population increase play a large role in this process, it is clear that the pressure is being fueled by in-migration.

It is becoming increasingly difficult and dangerous to view protected areas as islands insulated from socio-demographic problems. Demographic pressures that come to bear on protected areas may originate in distant areas and require changes in government policies at a national level as well as interventions in the immediate vicinity of the protected area.

3.3 Demographic Change and Protected Areas: The Case of Madagascar's Policy Options

Madagascar, the fourth largest island in the world with a total land area of 581,400 km², lies in the Indian Ocean off the coast of Mozambique. This island broke off from Africa about 65 million years ago. Since that time plants and animals followed their unique evolutionary adaptation paths, becoming quite different from their equivalents on the African continent. Madagascar's plant and animal life exhibit remarkably high levels of endemism and most of these species are forest dwellers.

The island of Madagascar was uninhabited by Man until 1500 years ago, when the island was first colonized by Batak migrants from Sumatra (Indonesia.) These migrants colonized the highlands, where they started cultivating rice. These migrants were followed by groups of migrants from Asia and Africa, and 17 distinct ethnic groups can be distinguished today. In recent decades, particularly since the end of French colonial rule, migration levels have remained low.

In 1990, Madagascar's population stood at 11.98 million of which 25% lived in urban areas and 6% in the capital, Antananarivo. The total fertility rate (TFR) has remained at 6.6 since the early 1950s and 44% of women are currently in their childbearing years. The structure by age of the population is pyramidal, with a very large base. Over 18% of the population is under 5 years old, and 45% of the population is under age 15.

Infant mortality stands at 120, under-five mortality at 184, and maternal mortality at 240. These high mortality levels are reflected in the low life expectancy of 57 years for women and 55.5 for men. Although the overall trend has been for a decrease in the crude death rate mortality has leveled off recently, partly due to increases in Plasmodium Falciparum malarial deaths.

The natural rate of growth of the population stands at 3.2%, up from 2.2% in the early 1950s, 2.5% in the early 1960s and 3% in the early 1980s. This young population, with a median age of 17.4 years, carries a powerful population momentum. Population is predicted to stabilize at 54 million, with a net reproductive rate of 1 being reached in 2030.

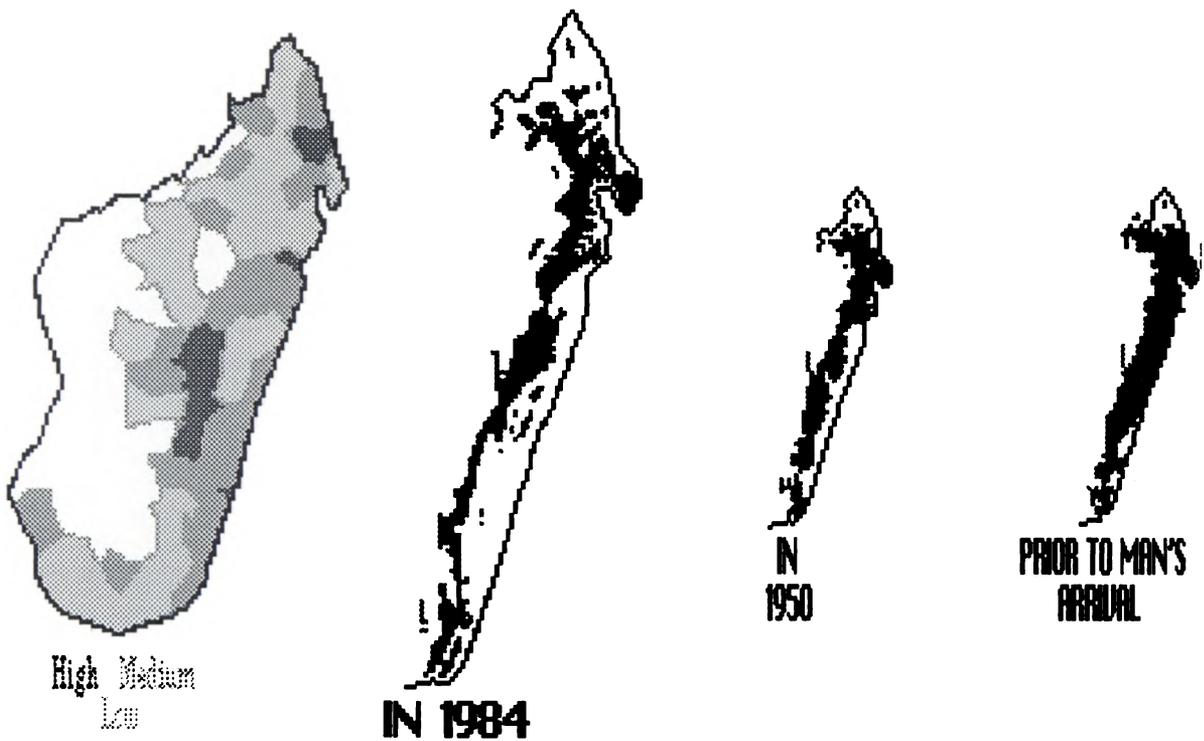
The economic situation of Madagascar is difficult. In 1989, the foreign debt stood at 154% of GNP, and interest payments stood at 27.8% of the export of goods and services (up from 10.9% in 1980.) The economy has a large services sector (accounting for 54% of GDP) followed by agriculture (31% of GDP.) However, while 40% of the labor force was composed of women in 1988, 85% of these worked in agriculture.

Map IXa: Forest cover – The eastern coast of Madagascar



Source: Sussman & Green, 1985

Map IXb: Forest cover – The eastern coast of Madagascar



Source: Sussman & Green, 1985

GNP per capita, decreasing by 1.9% annually over the period 1965-1989, had reached US\$230 by 1989. This difficult economic context is illustrated by 50% of the population living below the absolute poverty line, combined with an annual inflation rate of 18% through the 1980s.

Map IXa shows the presumed forest cover on the Eastern coast of Madagascar prior to Man's arrival and the actual forest covers in 1950 and 1984 (from remote-sensing data.) As can be seen, forest cover has been shrinking rapidly, especially since the 1950s. Deforestation rates in the early 1980s average 1.5%. Clearing for agriculture accounted for most of the deforestation, with fuelwood collection and charcoal making contributing to the process.

The protected areas of Madagascar have been compared to a necklace around the island. The remaining Eastern forest of Madagascar contains about half of the protected areas in Madagascar, and contain the niches of numerous endemic species.

Many factors affect deforestation. Population is one such factor: the most densely populated areas tend to be those most likely to be deforested, as seen in Map IXb. However, access, the desirability of underlying land, price policies for crop production, fuelwood consumption levels and economic factors also play a role.

The graphs in this section were developed under the auspices of the Malagasy Directorate of Planning, within the framework of Madagascar's Environmental Action Plan. The projections result from numerous meetings and workshops including participants from all relevant government bodies. The goal of this process was to develop policies to preserve Madagascar's natural resource base generally and protected areas in particular, and build consensus for the implementation of needed programs.

It was agreed that, in coming decades, the remaining forested areas would be increasingly threatened by the need for agricultural surfaces and fuelwood. It was thus necessary to develop policies in these two areas.

The principal food staple in Madagascar is rice. The Malagasy are reputed to be the greatest consumers of rice in the world, with an average of 150 kg of rice being consumed per person per year. Rice is not only important from a nutritive standpoint, it also plays a central role in the culture. A health-related government policy calls for the provision of 130 kg of rice per person per year.

Paddy rice is grown on irrigated as well as rain-fed surfaces. Of the irrigated surfaces most are cultivated using traditional methods. A fairly small surface is intensively cultivated, two crops a year being produced using hybrid seeds, fertilizers, integrated pest management, and efficient water-management techniques.

Rain-fed paddy cultivation also takes two forms: tanety and tave. Both are based on slash and burn agriculture. However, Tave is practiced on slopes, while tanety is practiced on flat surfaces. Although tave-produced rice is considered superior, the Malagasy government is aware that tave in particular rapidly leads to deforestation and soil erosion, disrupting the water cycle, affecting irrigation potential and increasing maintenance costs for irrigation systems.

The Malagasy experts agreed that deforestation caused by rice production, particularly Tave cultivation, could be alleviated by implementing programs to i) reduce post-harvest losses, ii) increase the irrigated surface cultivated using intensive methods, iii) substitute other crops for paddy; and iv) reduce the rate of population growth.

In 1989, 1.2 million ha were used for rice production. The model used the year 2034 as the projection horizon. Although 64% of land surfaces are potentially arable, only 1.01 million ha are suitable for irrigated paddy production. The surface needed for Tave and Tanety production is projected by assuming that rain-fed surfaces are only used to make up the difference between the demand for paddy and the amount of paddy produced on irrigated surfaces.

If 1989 production and consumption patterns remain constant, the surfaces needed for paddy production would grow to between 6.6 and 7.5 million ha. by 2034. Implementing only the three agricultural policies would reduce the surface needed for paddy production to 3.0 million ha. Implementing Madagascar's population policy as well as the three proposed agricultural policies would keep the surface needed for paddy production at or below current levels, with only 1.1 million ha needed in 2034.

Madagascar's domestic energy needs are mostly met by fuelwood. Fuelwood consumption levels are higher in the highlands, where heating is needed during the cold season, than in the warmer coastal regions. Fuelwood consumption is also higher in urban areas, where charcoal is used. Per capita energy needs also vary with age and sex.

Even if no forested surfaces were lost to agriculture, a significant threat to wooded areas would be posed by future domestic energy needs. The sustainable supply of fuelwood was projected by calculating the sustainable yield of accessible, non-protected forest. Once the demand for fuelwood exceeds sustainable production it is assumed that the deficit is met by clear-cutting, thereby reducing future sustainable production levels. Once demand exceeds sustainable supply, deforestation proceeds very rapidly.

Malagasy experts agreed that there were four areas where policies and programs could be implemented to reduce potential future population-driven, energy-related, threats to forested areas. These policies would result in: i) substitution of other energy sources

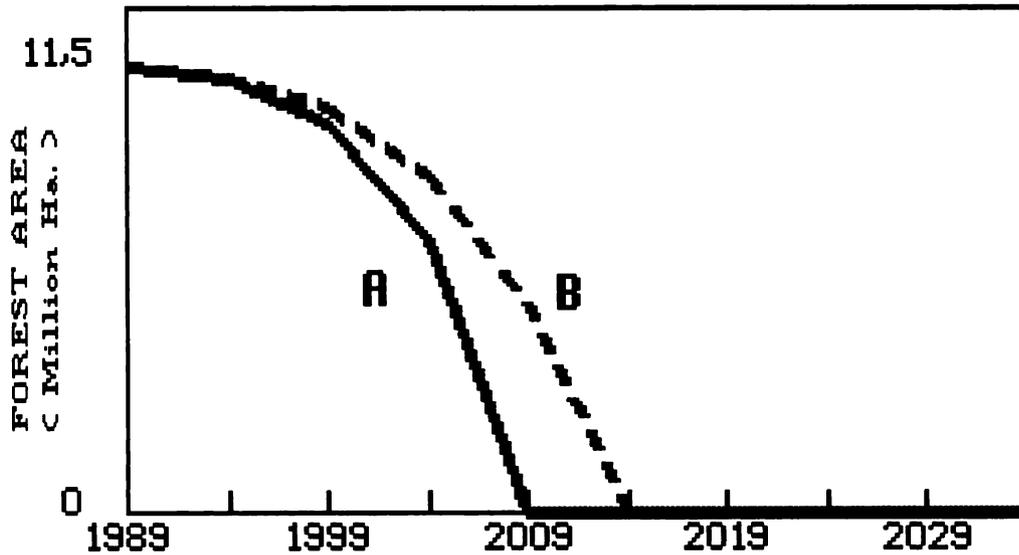
for fuelwood, ii) increased cooking efficiency, iii) improved charcoal production; and iv) a reduction in the rate of population growth.

Although pine and eucalyptus saplings have been planted in an attempt to produce both fuelwood and wood-pulp for paper, plantations have proven

economically non-viable to date. Fuelwood prices, particularly for charcoal, would need to increase substantially in order to make plantations economically attractive.

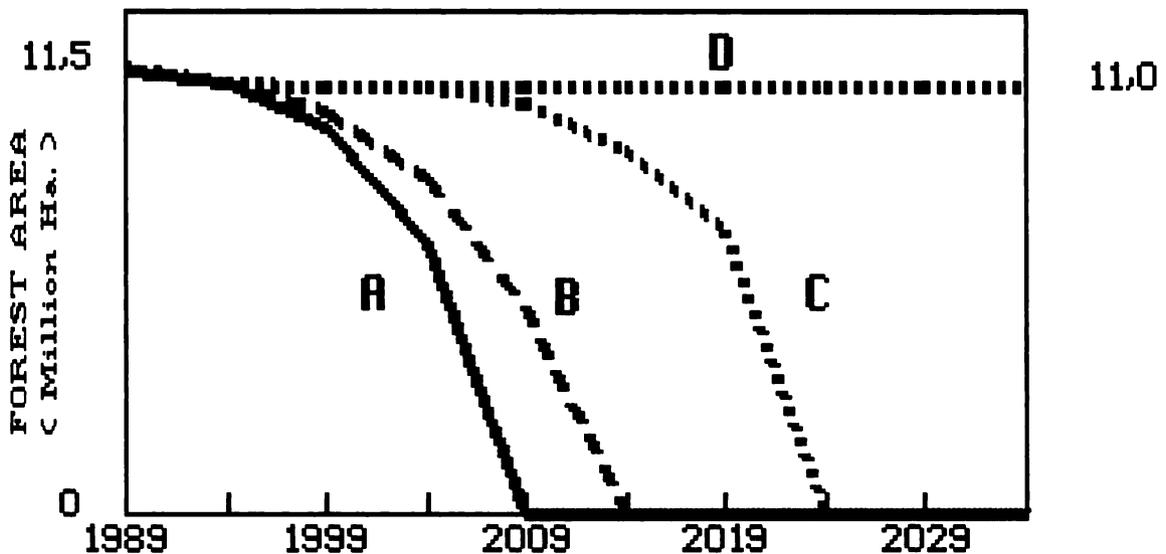
The introduction of stumpage fees was discussed in this context. Due to the political liability raising fuelwood

Figure VIII: Forest cover of Magascar



A: No change in consumption patterns
 B: Population policy implemented

Figure IX: Forest cover of Madagascar



C: Agriculture and energy policies implemented
 D: Population, agriculture and energy policies implemented

prices would cause, and the difficulty in enforcing stumpage fees, policies increasing fuelwood prices were rejected. Figure VIII shows that, if 1989 trends and patterns remained constant, Madagascar would be all but completely deforested by the year 2009. While price effects would presumably prevent complete deforestation, very limited forest resources could be expected to remain.

Implementing Madagascar's population policy alone would have no significant impact on deforestation, as seen in Figure VIII, due to the speed at which deforestation would take place. If all the policies and programs proposed in agriculture and energy were successful, but Madagascar's population policy were not implemented, forest cover would still be seriously threatened, as shown in Figure IX. Although the projection suggest that all forested surfaces would disappear by 2019, price effects and other economic factors would, once again, be expected to slow and then halt deforestation before all forest cover disappeared.

The Malagasy model also projects the cost of planting sufficient trees to compensate for the shortfall between demand for, and sustainable production of, fuelwood. It should be noted that while tree types selected for the model (eucalyptus and pine) mature rapidly, it would be all but impossible to plant sufficient surfaces in time, and the cost of such a program would be absolutely prohibitive.

However, deforestation caused by population-driven demands for fuelwood and rice can be halted and protected sites in forested areas preserved. A multi-sectorial approach is the key to this end. It is only when a combination of policies and programs in agriculture, energy and population are implemented that forest cover can be maintained through 2034, as show in Figure IX. An integrated, comprehensive framework incorporating demographic elements affords the best protection of parks and reserves.

4. CONCLUSIONS AND FINAL REMARKS

Figure X: Some final thoughts

- **Population will continue to grow**
- **Population growth will not be evenly distributed**
- **Protected areas are not isolated islands**

Demographic factors will pose an increasing threat to protected areas and it is essential to consider these in the

planning and management of protected areas. Three aspects of demographic change need be considered, as shown in Figure X.

The present structure by age of the population of developing nations in particular results in a powerful demographic momentum. This momentum will cause population to continue growing, even under the most conservative scenarios through at least 2050. By the year 2000 world population will reach at least 6.1 billion and 7.6 billion by 2025 (under the United Nation's Low Variant) and is expected to reach 6.3 billion in the year 2000 and 8.5 billion in 2025 (under the Medium Variant.)

The growth in world population will be unevenly distributed in coming decades. Urban areas in developing nations will account for 90% of the increase in world population from 1990 through the year 2025. While over 60% of the world's population currently reside in what can be broadly defined as coastal areas, this percentage may increase as urbanization proceeds in developing countries.

Urban areas have impacts ranging as far as the hinterlands. These effects are driven by consumption patterns and levels in urban areas. As the proportion of total population living in urban setting increases, productivity per agricultural worker must increase to compensate and agricultural practices intensify.

Wetlands close to cities and all areas downstream from urban areas may become increasingly vulnerable to changes in water quality and flow. Falling underground water levels, corresponding to water-mining has become increasingly common around developing world urban centers such as Bangkok, while other cities such as Mexico now need to pipe water in from distant localities. Protected areas are not immune to increases in the demand for municipal water: previously protected wetlands around Damascus (capital of Syria) have been drained of water. These wetlands are now dry, and the capital is thirstier than ever.

The natural growth in population (caused by a surplus of births over deaths) may also be locally compounded by in-migration. Protected areas are often situated in areas deemed desirable. Comparatively good lands and attractive water regimes characterize a majority of protected area. These assets, essential to the survival of many plant and animal species, are in increasing demand. It is increasingly dangerous to view protected areas as isolated islands.

Population / natural resource imbalances in distant areas can result in added pressure on buffer zones through in-migration. This is illustrated by the situation which has developed in the Peten, where protected areas are threatened by the advancing agricultural frontier. In many countries, political pressures aimed at easing restrictions on the use of protected areas and the biodiversity they contain are mounting. It is all but

impossible to argue for nature conservation when the population is in real need for food, land and water.

It is already clear that it will not be possible to save all the biodiversity on Earth. It is essential that long-term sustainability be a prime consideration in allocating funds and resources for conservation.

To improve the prospects of long-term viability of protected areas and improve selection criterion for granting new sites protected areas status, there needs to be a three-level approach depicted in Figure XI.

Changes affecting protected areas can be quite complex. If successful policies and programs are to be designed and implemented, a sound conceptual framework will need to be developed. Demographic as well as economic elements will need to be integrated in this framework. This conceptual framework should remain sufficient flexibility to make useful prediction in a number of different contexts. Such a conceptual framework is also a prerequisite to developing valid measures of vulnerability for existing as well as potential protected areas.

Protected areas are not insulated from socio-demographic and economic forces at work outside the boundaries or buffer zones of protected areas and park managers need to actively involve themselves in the policy process. Raising awareness among

decision-makers of issues is essential in this respect, while translating successful projects into policies may be necessary to prevent in-migration.

Unfortunately, the nature conservation movement has often been conservative, for want of a better word, in this respect. Up-to-date communication tools and techniques should be more broadly used. The use of awareness-raising computer-generated graphics and presentations can convey complex ideas rapidly and effectively.

Although conservation organizations have been involved in the policy process at an institutional level, an increased level of local participation in this process is desirable. These awareness-raising and public-relations efforts also need to be targeted at legislative issues.

There is also a need for action at the project level. Multi-sectoral teams and well integrated approaches should become the norm. The incorporation of socio-demographic consideration, the use of tools such as gender analysis and increased community involvement in project design and implementation can only promote the long-term sustainability of protected areas. The top priority areas for action in these terms are programs aimed at raising household incomes and the reduction/removal of obstacles to the successful introduction of mother-child health care services incorporating a family planning component.

APPENDIX E

PEOPLE AND PROTECTED AREAS: CONFLICTS OR COMPLEMENTARITY?

By Malin Falkenmark

Natural Science Research Council, Stockholm, Sweden

1. INTRODUCTION

Two of the Caracas workshops have discussed protected areas in relation to the hydrological cycle on the one hand, and to pollution on the other¹². The conclusion from the pollution workshop is that protected areas are "islands under siege" due to the inflow of water reflecting upstream land use. Downstream wetlands depend on hydrological linkages to upstream activities. National parks in Tjeckoslovakia have been killed by air pollution from outside sources, brought down with the precipitation. Human activities are in other words important as constituting more or less hidden sources of perturbations to protected areas, whether terrestrial or aquatic.

Human activities are intensified by population growth and by the migration into vulnerable areas, that often emerges as a consequence. Principally population may produce two types of population impacts on protected areas: on the one hand from the local population wanting *direct* access to resources within the area, on the other from upstream populations the activities of which imply *indirect* threat to the habitats in the protected area.

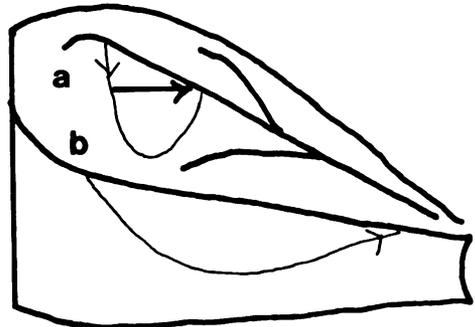
Unfortunately with these new degrees of understanding, conventional protection tools are becoming increasingly outdated. They are in fact based on a truncated view on what forms the main threats and what processes principally influence the habitat. As long as upstream activities cannot be controled, protection of downstream wetlands is virtually impossible. Starting to monitor will change nothing, of course – it adds however by a strenghtening of arguments, based on the background data provided.

In order to produce management guidelines it is essential to understand properly such indirect habitat threats, how they will grow as population doubles and as agricultural production trebles - quite realistic estimations of what is unavoidable in the next half-century or even less in many developing countries.

2. PROTECTED AREAS SEEN IN RELATION TO THE OVERALL LANDSCAPE

Since life is based on myriads of microscale water flows providing life-support to flora and fauna, a determinant of considerable importance for both terrestrial and aquatic habitats is the water cycle, the central clockwork of the biosphere. The water circulates in distinct patterns

Figure 1



In a catchment, from the point where the precipitation hits the ground, the water passes two partitioning points: an upper one a, and a lower one b respectively. At the upper one, the precipitation is divided between the water flowing on the land surface along the slope towards the nearest water course, and the infiltrating part. At the lower point in the root zone, the infiltrating water is anew partitioned between the uptake by the vegetation, returned to the atmosphere, and the surplus which percolates downward to recharge the groundwater. The groundwater moves along underground pathways, reappearing at the land surface in local hollows or in the valley bottom. In the hollows it feeds wetlands, in the valley bottoms it feeds the water course.

- 1 Workshop II.9. Impacts of pollution on protected areas. IVth World Congress on National Parks and Protected Areas, Caracas, Venezuela, February 1992
- 2 Workshop II.10. Protected areas and the hydrological cycle. IVth World Congress on National Parks and Protected Areas, Caracas, Venezuela, February 1992

in the landscape of which a protected area is one part. The module as seen from the aspect of water is the river basin and the water divides separating neighbouring basins from each other.

Within the river basin the water moves from hilltops, to slopes to valley bottoms and from upstream parts to downstream parts (figure 1).

Since most of the water in the downstream end may be water that emerges from rainfall over upstream hillslopes it carries the chemical finger-prints of its earlier journey through the river basin. The downstreamers are in a way the prisoners of the upstreamers in the sense that they have to live on the water that happens to arrive. In short, the water cycling through the river basin links upstream activities with opportunities as well as problems in the downstream end.

There are different types of linkages: one set is related to the very *movement of the water*, in other words the water pathways and the way the water arriving along different pathways mix in the water bodies. Another set are the *vegetation-related upstream-downstream linkages* by the interaction between infiltrating water and local vegetation.

The water pathways between the point in the landscape where the precipitation falls, and the end point at the land surface where the underground groundwater pathway ends, are important from the point of view of where the infiltrating water is moving. That will be the place where quality disturbances would be expected to cause visible ecological changes in wetlands or water courses. The time delay to reappearance at the land surface increases with the length and the depth of the pathway in question (figure 2a).

The water in the water course, on the other hand, is a mixture of water fractions, that have taken different pathways and taken differing lengths of time before reappearing (figure 2b). During melt periods and heavy rains, event water may dominate, whereas during dry periods groundwater fractions dominate the water in the water body. Thus there are considerable seasonality fluctuations in its chemical composition.

The second type of linkages has to do with what is often spoken of as the "watershed functions" of vegetated areas. In the hydrological terminology, hilltops and hillslopes act as recharge areas in the sense that the rainfall infiltrates, recharging first the rootzone and then

Figure 2: Some relations between the different water pathways in a catchment and the water course towards which the water is moving.

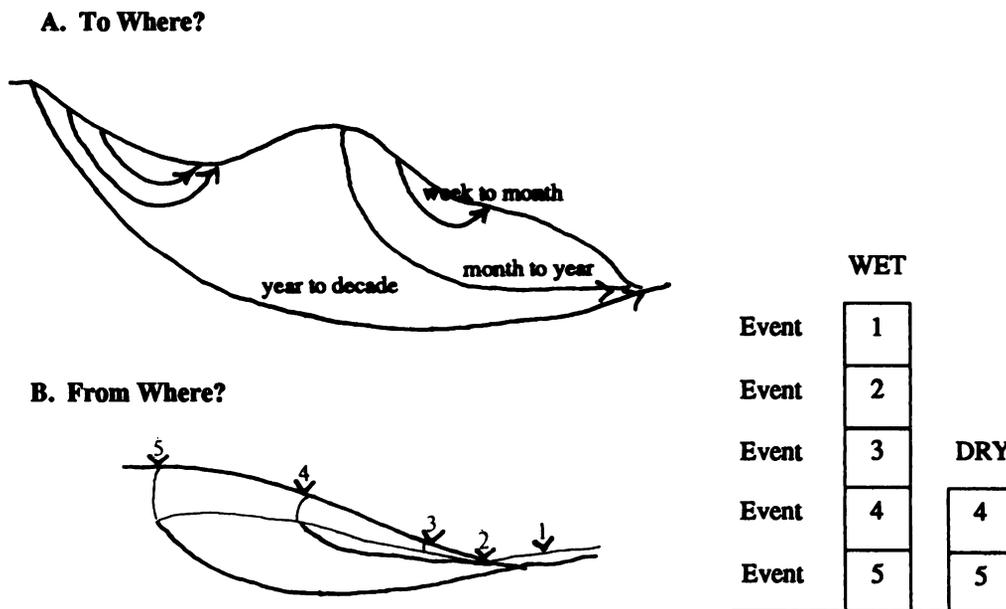
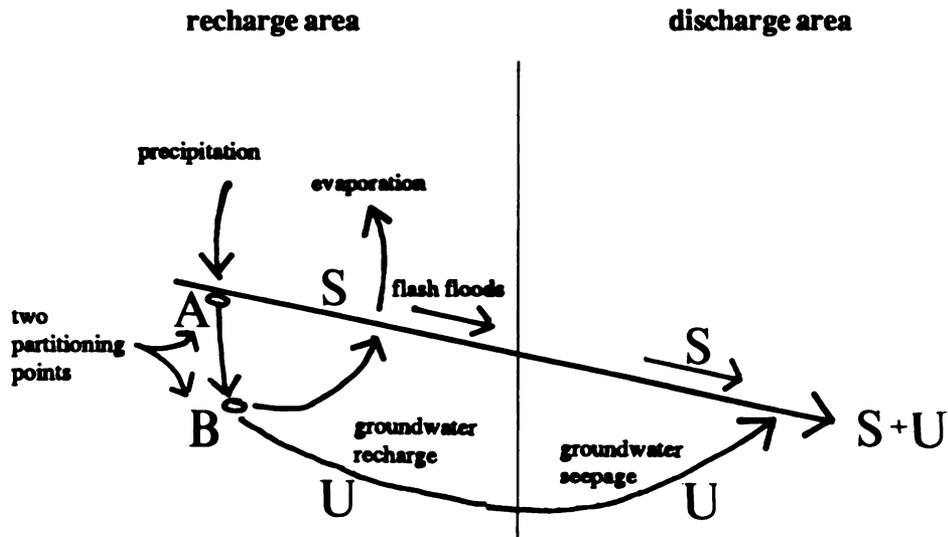


Figure a shows the three principal types of groundwater in a Scandinavian landscape: the shallow, reappearing at the surface after weeks to months; the intermediate, reappearing after months to years; and the deep, reappearing after years to decades. Since their respective recharge areas are positioned differently in the landscape, the type of risk for groundwater pollution depends strongly on where in the landscape a polluting land use activity is going on. Figure b shows how the precipitation over a landscape slope follows different pathways towards the river. During a wet season, the river water collects a whole set of water fractions, arriving along different pathways and therefore having different chemical history. During the dry season, there is no precipitation so that water fractions 1 and 2 are lacking. Due to low water table during the dry season, also the shallow groundwater fraction 3 may be lacking, so that the river is fed only by the intermediate fraction 4 and the deep groundwater fraction 5.

Figure 3: Watershed functions



The water movement links the upper part of the catchment, which acts as recharge area with two partitioning points (cf figure 1), and the lower part of the catchment, where the groundwater returns to the land surface. The more water that is consumed for biomass production in the recharge area, the less will be the groundwater feeding the downstream area.

the groundwater (figure 3). There are however two partitioning points that the infiltrating water will be passing:

- the upper one where the infiltrability of the soil surface determines how much of the rainfall that infiltrates, and how much leaves the area as rapid flash floods, generating erosion and downstream problems (inundations, sedimentation)
- the lower one where the water uptake by the plants takes place, the surplus continuing downwards to feed the groundwater

When reforestation is used as a tool for reducing land degradation it is the first partitioning point that forms the rationale. The idea is to reduce the flash floods and increase dry season flow by increased groundwater recharge. The pitfall is of course the lower partitioning point where part of the infiltrated water is returned to the atmosphere rather than recharging the groundwater, the amount being a function of the plant growth and the evaporative demand of the atmosphere. The result is that the dry season flow might be reduced again as the trees grow and consume more and more water as they grow.

3. CONFLICTS OR COMPLEMENTARITY

Whether population activities are in conflict or in line with the idea that protected areas can be protected depends on the mutual positions in the landscape.

3.1 Remote Linkages

Let us illustrate some of these linkages. The *population upstream* may be withdrawing water from the river for water supply purposes, thereby altering the river flow. They may be polluting the water: the surface water by waste water outlets, the groundwater by solid waste, leached to the groundwater during rainy periods. The former is a direct effect, the latter is delayed one. The population may also manipulate the vegetation cover directly, thereby intervening with the rainwater partitioning. The result is regime changes in the river runoff and/or altered runoff quantities.

The *population downstream* will be benefiting from any upstream recharge of groundwater reaching their region as groundwater flow, and sustaining the dry season flow in the river. As already indicated, facilitating infiltration upstream may increase groundwater as long as the upstream vegetation does not consume it.

3.2 Clashes and Time Delays

After this principal analysis, we are now in a position to make some clear distinctions between on the one hand the *position of the population in the catchment* (whether we are referring to a population in the park, in the buffer zone just outside the park, in the upstream parts of the catchment, or in the downstream parts of the catchment); and on the other the *environmental problems generated* to the protected area. (See Table 1.)

Table 1: Relation between the position of the population in a river basin and the water impacts produced, directly as well as indirectly.

		POPULATION				
		In Park	Buffer Zone	Upstream	Downstream	
PROBLEM GENERATED	Direct	Resource competition Biophysical disturbance	"Erosion" of park periphery	Withdrawal → reduced park inflow	City competitor for upstream water sources	
		Surface water pollution				
	Indirect	Short-term	Impact on water table		Drainage → Regime change	
		Medium-term			Vegetation → Regime change (a) → Run-off change (b)	
Long-term		Groundwater pollution				

4. GENERALIZED CONCLUSIONS

The population-driven threats to habitats in protected areas may be of three different origins: biomass-related, water-supply related and pollution-related.

Biomass-related activities for the supply of the population implies human needs to manipulate the catchment vegetation within agriculture, by fuelwood harvesting, by slash and burn agriculture, or within forestry by deforestation for trade. The resulting threats to protected areas may take the form of land degradation (often less correctly spoken of as "desertification" even

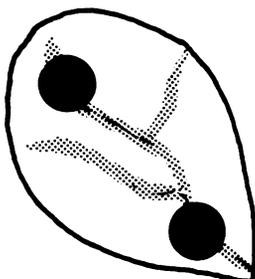
far from the desert border), or as regime changes in the runoff.

Water-supply related activities imply water withdrawal from water courses and pumping from wells. The result is altered river flows and water tables, the degree depending on the size of the population and its needs.

Pollution-related threats emerge from the waste production and waste handling of local populations and result in pollution of the water defining the habitats.

Table 2: Four different options in terms of mutual position in the catchment between the disturbing population, and the park or protected area.

Population and Protected Areas: Options in terms of relative position



		POPULATION	
		Upstream	Downstream
PARK	UPSTREAM	Local clashes	Complementary interests
	DOWNSTREAM	Indirect threats	Local clashes

Table 3: Hydroclimate, Population Growth and Environmental Degradation

Hydroclimate	Population Growth		Environmental Vulnerability			
			Water Conflict	Vegetation Land Degradation	Drainage Water Avail change	Pollution
	Fast	Slow				
Tropics	Humid	X		X		X
	Arid	X	X		X	X
Temperate	Humid	(1800 - 1950)	X			X
	Arid		X			X

The options in terms of interdependence depend on the mutual position of people as opposed to the area to be protected (see Table 2). The table illustrates that two different populations are of relevance to the park manager: the local population in the park or just outside it, on the one hand, and the population living upstream, and the activities of which determine the quality of the surface and subsurface inflow to the park, on the other.

Globalising our conclusions it is finally important to realize some fundamental differences in terms of population pressure and of environmental vulnerability between different hydroclimatic zones: the temperate as opposed to the tropics/subtropics on the one hand, and arid as opposed to humid conditions on the other (see

Table 3). The result is different combinations of factors, reflected in the intensity and the time dynamics in the human influences on protected areas. Things may change particularly rapidly in environmentally vulnerable areas with rapid population growth. The vulnerability may be related to vegetation changes, due to the complementarity of the vertical and the horizontal water branches in the local water balance. It may be related to conflicting water uses in arid areas, especially if there is rapid population growth.

The table clearly shows the tremendous differences between the rather straightforward predicament in the temperate zone with stable population, as opposed to the tropics with many different threats at the same time.

APPENDIX F

IVth World Congress on National Parks and Protected Areas

STATEMENT

By Arnfinn Jorgensen-Dahl
UNFPA

Let me first bring to the Congress greetings and good wishes from Dr Nafis Sadik, the Executive Director of UNFPA, who, because of a number of pressing engagements, was unable to participate in this important meeting.

There are some pertinent demographic facts around which all realistic deliberations about environment and development must or should revolve.

In mid-1990 the world's population stood at 5.3 billion. The latest projections show that by the year 2000 it will have reached 6.3 billion, and by 2025 8.5 billion. Of the average annual increase during the 1980s of 79 million, more than 90 per cent took place in the developing countries.

Many more details could be added but the ones mentioned suffice to show that all efforts to come to grips with the problems of the environment and development everywhere must include as a necessary and highly salient dimension the issue of population in all its complexity. Our deliberations here, and similar events elsewhere, would, however, hardly have been possible were it not for some important changes in our attitude to and views on population, environment, and development. These changes are not in all respects new but it is just as well that we are reminded of them since they form the basis on which all endeavours rest.

Let me therefore, first, recall that it is not long ago that one in many circles seemed convinced that rapid population growth would facilitate economic development. Few would hold that view now.

Second, neither is it that long ago that economic development towards ever higher levels of prosperity was seen by many, including governments, as more or less inevitable. Today we know that in this field very little is inevitable and that many nations are indeed experiencing both absolute and relative economic decline, something which we must hope is a temporary phenomenon.

And third, nor is it all that long ago that we more or less took for granted that the earth's resources were almost inexhaustible, and that the natural environment could tolerate and sustain almost any human activity. Today we know better.

There is a fourth change which in a sense flows from the previous ones and is equally, if not more, important. This is our growing understanding and awareness of how intimate the relationship is between population, development, and environment.

These observations may seem to many of you to be truisms or indeed, trivial and nothing would please me more if that is the case. The extent to which a proposition or observation is seen as self-evident or a truism is also a significant measure of the extent to which the validity of the proposition has gained acceptance.

But there is another reason for recalling past attitudes to population, environment, and development. For those individuals and organizations like the UNFPA, which strove for many years to convince governments and people of the importance of the population issue both to the environment and development debates, policies and actions, the changes to which I have alluded indicate that it pays to be persistent. The experience also shows that to change attitudes is not an easy task but that when it is accomplished, or at least substantially accomplished, the stepping stone for more rapid progress has been but in place.

That the task is laborious of changing attitudes and have the new ones reflected in plans and policies is indicated by the fact that it was only in October 1989, that is, only a little more than two years ago, that UNFPA had its guidelines on "Population and Environment" adopted. Awareness of the nexus between population, development, and environment was, of course, well advanced in some circles before 1989, but there can be no doubt that for a body like the UNFPA, whose association with environmental issues go back to 1973, it helps a great deal to have this nexus formally recognized and incorporated in policy guidelines.

Since October 1989, therefore, the UNFPA has become rather more involved in environmental and developmental issues where these intersect with population issues which is – on is tempted to say almost everywhere. The fund has taken a number of initiatives and staged a number of meetings at which population and environment has been the principal. The latest was a meeting of experts, held in New York last month in preparation for UNFPA's 1994 International Conference

on Population and Development, at which Dr Sadik could say:

"Our meeting ... is the first United Nations Expert meeting which includes population, the environment, and development in the same title. This appropriately reflects our much heightened awareness of the intricacy of the relationships among population, development, and the environment".

The point of departure for UNFPA's environmental activities, is that "concern for the environment contains within it a concern for population growth as an underlying cause of environmental degradation". Given this concern UNFPA has been given a mandate in the field of population and environment to engage in five major activities:

1. Research, Data Collection, and Analysis
2. Awareness-creation and Sensitization through Information, Education, and Communication
3. Policy Formulation and Planning
4. Training
5. Cooperation with other Agencies

In all these areas of activity much needs to be done, and certainly much more than is possible to mention in the short time left me here.

Since, however, all our efforts presumably take as their starting point that we know what we are doing, it may be useful to address a few remarks to the area of research, data collection, and analysis because in one sense this area is prior to the others.

Considerable knowledge of a general kind has been generated about population, development, and environment. The question that needs to be asked is, of course, whether this general knowledge can be applied to specific situations and circumstances. There are reasons to suspect that when we sit down seriously to consider it, we shall be rather disappointed. On the other hand, there is also much knowledge floating about of local conditions and relationships, but much of it needs to be retrieved and systematized. In the time ahead the UNFPA, in collaboration with others, will put much emphasis on project which seeks to identify or map areas of the world where population pressures are having critically degrading effects on the environment and where, therefore, there is an urgent need for remedial action. At the same time it is also important to provide a map of our knowledge about the links between population and environment in particular localities.

The interesting and decisive question as far as policies and action are concerned will then be whether the two maps fit or to what extent they fit. In other words, is our knowledge about the links between population and environment in *particular localities* also the very same

localities whose environment has been identified as critically hurt. Or, seen from the other side, are the localities with critically damaged environment also those about which we have knowledge of the links between population and environment that would make us sufficiently confident to propose policies and remedies which would improve rather than worsen the situation. I think we have a busy and interesting time ahead of us.

When all this is said, however, you should not leave with the impression that the only and right thing to do is to sit around and wait for masses of research to be done before we can institute practical measures and remedies. Much research has already been carried out and even more practical experience is available to continue at a fairly high level of activity what already has begun.

It is in this area as in so many others a question of funds. The other thing that should be said is that in the field in which we are operating, there is no such thing as perfect knowledge. Whilst we undoubtedly must, can, and will improve on our state of knowledge about the links between population and environment, the idea that we need *the* knowledge to act will in fact only lead to a state of hibernation and inaction.

The demands for UNFPA assistance in the area of population and environment are now increasing steadily, and UNFPA could easily spend on highly worthwhile projects and programs much more funds than it currently has at its disposal. This greatly increased demand is in part a function of the following facts.

First, it has become clear that the problems involved often are recognized most rapidly and clearly at the local or community level.

Second, as mentioned earlier, there is a need for case studies at the local or community level in order better to understand the many causes likely to lead to environmental degradation and then in turn be able to realistically assess what can be accomplished through populations measures and intervention.

Third, the role of women in the entire population-environment nexus is more widely appreciated now than before, especially their actual and potential role as protectors and managers of the environment.

Fourth, although much has been accomplished in this field, much remains to be done in the area of consciousness-raising among all groups of people on the relationship between population and environmentally sound development.

All of these points have a bearing on the theme of this congress which is the enhancement of the role of protected areas in sustaining society. Indeed, the whole underlying rationale of this congress is to consider the results and consequences of population pressures.

APPENDIX G

IVth World Congress on National Parks and protected Areas

LIST OF PAPERS PRESENTED AT THE WORKSHOP ON PROTECTED AREAS AND DEMOGRAPHIC CHANGE: PLANNING FOR THE FUTURE (available upon request)

Title of the Paper Presented <i>(and the language in which the paper has been written)</i>	Name of Author(s)
Case Study – Use of Land and Natural Resources by the Telirean Cabecars of La Amistad, Costa Rica <i>English</i>	Ms Rosa Vazquez
La Participación de la Mujer en la Conservación del Parque Nacional Montecristo <i>Spanish</i>	Ms Melany Machado
Case Study – Indus River Ecosystem <i>English</i>	Mr Mumtaz Malik
*The Shared Need for Flowing Water: People and Wildlife on Nebraska's, Platte River <i>English</i>	Dr Kenneth Strom
Population Movement and Management of the Buffer Zone of the Tai National Park, Ivory Coast <i>English</i>	Mrs Dulce Castleton Ms Léonnie Bonnehin
Case Study – The Kuril Isles: Human Populations and Natural Resources <i>English</i>	Mr Sergey Sheveiko
Case Study – The Gulf of Maine: Population Economy and the Fishery <i>English</i>	Dr John Williams
Proyecto Demostrativo Nakum-Yaaxja-Naranja Manejo Integrado de Patrimonios Cultural y Natural y Desarrollo Sostenible, Guatemala <i>Spanish</i>	Ms Paula Del Cid
Case Study – People and Wildlife in Communal Lands in Zimbabwe <i>English</i>	Mrs Dorothy Musokotwane Ms Elizabeth Rihoy Mr Elliott Nobula
*Sharing the Earth: Case Studies on Population, Wildlife and the Environment <i>English</i>	Dr Patricia Waak
*Land Use Policy, Economics and Maintenance of Protected Areas <i>English</i>	Mr Joseph Alper
Linking Human and Biological Aspects with Respect to Protected Areas: Some Observations on Indigenous Systems in Africa <i>English</i>	Dr Joseph Matowanyika

Protected Areas and Demographic Change: Planning for the Future

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Case Study – Human Activities and Protected Areas with an Emphasis on agro-forestry Programme in Bangladesh
<i>English</i> | Mr Ali Akbar Bhuiyan |
| The Gender Variable in Social Analysis for Conservation and Sustainable Development: Key to Understanding and Catalyst for Change
<i>English</i> | Mrs Patricia Thomas |
| Planificación de Parques y Areas Protegidas en un Programa Regional de la UICN
<i>English</i> | Mr Oscar Lücke |

Papers marked with an * are only available from:

NATIONAL AUDUBON SOCIETY
Capital Office
666 Pennsylvania Av, SE
Washington, DC 20003, USA
FAX: (202) 547-9022

APPENDIX H

IVth World Congress on National Parks and Protected Areas

AGENDA OF WORKSHOP 1.6 ON PROTECTED AREAS AND DEMOGRAPHIC CHANGE: PLANNING FOR THE FUTURE

Rationale	Planning for maintenance of parks and protected areas needs to take into account a balanced interest in the physical requirements for conservation of biological diversity on the one hand, and needs of human populations on the other hand. Recent demographic changes make the option of exclusion of human populations from parks and protected areas in many cases increasingly difficult. In addition, ever more powerful technologies have an increasingly large impact on nature. Therefore, possibilities need to be explored on how to create and maintain a sustainable balance between human populations, wildlife and natural resources, and how protected areas managers can incorporate demographic scenarios into their planning.
Organizer	IUCN Social Sciences Division
Chairpersons:	Session 1: Dr Riga Adiwoso Suprpto Session 2: Prof. H.W.O. Okoth-Ogendo Session 3: Mr Ayub Qutub Session 4: Dr Pietronella van den Oever
	Each Session is divided in two meetings of 90 minutes, with a 30 minutes coffee break in-between
Rapporteur:	Ms. Frances Dennis, assisted by Chairpersons Simultaneous translation into English, Spanish and French

Session 1: Monday, February 17, 1992, 09.00-12.30 pm

PARKS AND PROTECTED AREAS: EXCLUSION OR INTEGRATION OF HUMAN POPULATIONS?

Chairperson:	Dr Riga Adiwoso Suprpto (Indonesia)	E
Case Studies:	1a. Costa Rica, The Cabecars of Telire Ms Rosa (Chela) Vazquez	S
	1b. El Salvador, Participation in the Montecristo National Park Ms Melany Machado	S
	1c. Pakistan, Indus River Mr Malik Mumtaz	E
	1d. Nebraska, USA, Platte River Ecosystem Dr Kenneth Strom	E

Protected Areas and Demographic Change: Planning for the Future

- Presentation: 1e. *"Computer simulation of the World population situation and its potential interaction with parks and protected areas"*
Mr James Ypsilantis (USA) E
-

Session 2: Tuesday, February 18, 1992, 09.00-12.30 pm

**PROTECTED AREAS, ECOLOGICAL AND ADMINISTRATIVE BOUNDARIES,
AND POPULATION GROWTH AND MOVEMENT**

- Chairperson: Prof. H.W.O. Okoth-Ogendo (Kenya) E
- Case Studies: 2a. Dominican Republic, Los Haitises
Prof. Marcos Peña Franjul S
2b. Côte d'Ivoire, Taï Forest F
Ms Leonie Bonnehin and Ms Dulce Castleton E
2c. Siberia, Kuril Islands
Mr. Sergey Sheveiko E
2d. USA/Canada Gulf of Maine and Bay of Fundy/World Waters project
Dr John Williams E
- Presentation: 2e. *"Water Issues in Protected Areas"*
Prof. Malin Falkenmark (Sweden) E
-

Session 3: Tuesday, February 18, 1992, 14.00 - 17.30 p.m.

**HUMAN POPULATIONS, AND POLICIES AND STRATEGIES FOR PLANNING
AND MAINTENANCE OF PROTECTED AREAS:
AN INTEGRATED APPROACH**

- Chairperson: Mr. Ayub Qutub (Pakistan) E
- Case studies: 3a. Peten Forest, Guatemala
Ms Paula del Cid S
3b. Zimbabwe, Zambezi Valley, (CAMPFIRE),
Ms Dorothy Musokotwane, Ms Elizabeth Rihoy, Mr Elliott Nobula E
- Presentations: 3c. *"Sharing the Earth: Case Studies on Population, Wildlife, and the Environment"*
Dr Patricia Waak (Baldi) Audubon Society E
3d. *"Land Use Policy, Economics, and Maintenance of Protected Areas"*
Prof. Joseph Alper, University of Minnesota E
-

Session 4: Wednesday, February 19, 1992, 09.00 - 12.30 p.m.

AN ACTION PLAN: HOW CAN OUR NETWORK CONCRETELY ADDRESS THE BIOLOGICAL AND HUMAN ASPECTS OF PARKS AND PROTECTED AREAS?

- Chairperson: Dr Pietronella van den Oever (IUCN) E
- Presentations: "*Grassroots Coping Strategies*"
- 4a. "*Linking Biological and Human Aspects*"
Dr Joseph Matowanyika (Zimbabwe) E
- 4b. "*Human Activities and Agro-forestry in Bangladesh*"
Mr Ali Akbar Bhuiyan (Bangladesh) E
- 4c. "*The Gender Variable in Social Analysis for Conservation and Sustainable Development: Key to Understanding and Catalyst for Change*"
Ms Patricia Thomas (Canada) E
- Presentation: "*Planning Parks and Protected Areas in an IUCN Regional Programme*"
Mr Oscar Lucke S
- Discussant: Dr David Munro (Canada)
-

APPENDIX I

IVth World Congress on National Parks and Protected Areas

LIST OF PARTICIPANTS AT THE WORKSHOP ON PROTECTED AREAS AND DEMOGRAPHIC CHANGE: PLANNING FOR THE FUTURE

Mrs Miriam ABRAMOVAY
Regional Programme Coordinator
for Social Aspects of Conservation
IUCN Oficina Regional de America Central (ORCA)
Apartado 91 – 1009
Fecosa, San José
Costa Rica

Dr Riga ADIWOSO-SUPRAPTO
Gendung IPMI
Jalan Tamang Komang 1
Jakarta 12730
Indonesia

Mr Joseph ALPER
Conservation Biology Programme
University of Minnesota
200 Hodson Hall
1980 Folwell Avenue
St. Paul, MN 55108
USA

Mr Ali Akbar BHUIYAN
Conservator of Forests
Ban Bahban, Gulshan Road
Mohakhali, Dhaka-1212
Bangladesh

Dr Donald AXELRAD
The Nature Conservancy
PO Box 4958
Key West, Florida 33041
USA

Mrs Nathalie BILLENS
Social Sciences Division
Rue Mauverney 28
1196 Gland
Switzerland

Ms Léonie BONNEHIN
Centre Néerlandais
BPV 51, Abidjan 01
Ivory Coast

Ms Dulce CASTLETON
IUCN Consultant
APHIS US EMBASSY STO. DOMINGO
Unit 5527, APO AA 34041
Santo Domingo
Dominican Republic

Ms Paula DEL CID
Responsable Area Social
IUCN Proyecto Yaaxjá
Ciudad Flores
El Petén, Ciudad de Guatemala
Guatemala

Ms Frances DENNIS
IUCN Consultant
Northdene
33 Eastbury Road
Northwood, Middlesex, HA6 3AJ
UK

Prof. Jesus R. DELGADO
Centro de Estudios Integrales Del Ambiente
(CENAMB)
Universidad Central de Venezuela
Caracas
Venezuela

Prof. Malin FALKENMARK
Swedish Natural Science Research Council
Wenner-Gren Center
Box 6711
Stockholm
Sweden

Prof. Marcos Peña FRANJUL
c/o Prof Joseph Stycos
Population and Development Programme
Dept. of Rural Sociology
184, Warren Hall
Ithaca, New York
USA

Mrs Elizabeth HOLDGATE
Pré de la Ferme 13
1261 Gingins
Switzerland

Sr Lorenzo Isaias REYES
Consejo Nacional de Areas Protegidas
Presidencia de la Republica
2a. Avenida No. 0-69
Zona 3 Colonia Bran
Ciudad de Guatemala
Guatemala

Protected Areas and Demographic Change: Planning for the Future

Dr Ock-Kyung KIM
IUCN Consultant
Chemin des Esserts, 3bis
1213 Petit-Lancy
Genève
Switzerland

Mr Oscar LUCKE
Regional Technical Coordinator
IUCN Oficina Regional de America Central (ORCA)
Apartado 91 – 1009
Fecosa, San José
Costa Rica

Ms Jane LYONS
National Audubon Society
Southwest Regional Office
2525 Wallingwood, Suite 1505
Austin, TX 78746
USA

Ms Melany MACHADO
Servicio de Parques Nacionales y Vida Silvestre
Centro de Recursos Naturales
Apartado Postal 2265, San Salvador
El Salvador

Mr M. Mumtaz MALIK
Conservator of Wildlife
Forest Department NWFP
Shami Road
Peshawar
Pakistan

Ms Tabeth MATIZA
Wetlands Programme Co-ordinator
IUCN Regional Office for Southern Africa
PO Box 745
Harare
Zimbabwe

Dr Joseph MATOWANYIKA
Agricultural Development Authority
PO Box 8439, Causeway,
Harare
Zimbabwe

Ms Alison MEARES
IUCN-US
1400 16th Street NW
Washington, DC 20036
USA

Dr Judy MESSER
Nature Conservation Council of NSW
39 George Street
The Rocks, NSW 2000
Australia

Ms Luisa V. MEZONES-LICCIONI
c/Diaz Trujino, URB, El Sitio, OTA
Las Virginias
San Antonio de Los Altos
Estado Miranda
Venezuela

Mr Victor H. MORGAN
Director Ejecutivo
Asociación Demografica Costarricense
PO Box 10203
San José 1000
Costa Rica

Mr Wila D. MUNG'OMBA
Chairman. Environment and Population Centre
PO Box 34791
Lusaka
Zambia

Dr David A. MUNRO
IUCN Project Director, Caring for the Earth
Rue Mauverney 28
1196 Gland
Switzerland

Ms Dorothy MUSOKOTWANE
c/o IUCN Regional Office for Southern Africa
PO Box 745
Harare
Zimbabwe

Mr Elliot NOBULA
Nyaminyama Wildlife Management Trust
Nyaminyama District Council
P/A Siakobvu
Via Karoi
Zimbabwe

Prof. H.W.O. OKOTH-OGENDO
Director, Centre for African Family Studies
PO Box 60054
Nairobi
Kenya

Mr Ayub QUTUB
41, Bhitai Rd F7/1
Islamabad
Pakistan

Mr François RAMADE
Laboratoire de zoologie
Bâtiment 442
Université de Paris-Sud
91405 Orsay Cedex
France

Dr Sultan Hafeez RAHMAN
Senior Research Fellow
Bangladesh Institute of Development Studies
E-17 Agargaon
Bangladesh

Mrs E.C. RIHOY
Zimbabwe Trust
PO Box 4027, 4 Lamak Road
Belgravia
Harare
Zimbabwe

Mr John ROWLEY
Editor, PEOPLE
IPPF
Regent's College, Inner Circle
Regent's Park, London, NW1 4NS
UK

Mr Paul SYMONDS
55 Voltaire Road
Clapham
London, SW4 6DD
UK

Dr Pietronella VAN DEN OEVER
Head, IUCN Social Sciences Division
Rue Mauverney 28
1196 Gland
Switzerland

Ms Rosa (Chela) VAZQUEZ
Ohio State University
Zoology Department
1735 Neil Ave. Rm 104
Columbus, Ohio 43210
USA

Mr Paul VRINS
01 BP 3133
Ouagadougou 01
Burkina Faso

Mr Sergey SHEVEIKO
Executive Director
World Waters
8630 Fenton Street
Silver Spring, Maryland 20910
USA

Dr Kenneth STROM
Director, Rowe Bird Sanctuary
Route 2, Box 146
Gibbon, Nebraska 68840
USA

Ms Patricia THOMAS
845, Moncton
Québec City
Québec
Canada G1S 2Y4

Dr Patricia WAAK
Director of Population Program
National Audubon Society
801 Pennsylvania Ave, SE
Suite 301, Washington, DC 20003
USA

Dr John S. WILLIAMS
HWLF Consulting Services
8630 Fenton Street, Suite 910
Silver Spring
Maryland 20910
USA

Mr James N. YPSILANTIS
IUCN Consultant
170-49 Cedarcroft Road
Apt. 1C
Jamaica, NY 11432
USA
