

IUCN's 50th Anniversary Celebration:

Results of Imagine Tomorrow's World: Symposium Workshops

Edited by:

Jeffrey A McNeely, Chief Scientist

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EDITOR'S INTRODUCTION

Building on the theme of "Imagine Tomorrow's World", the Steering Committee for the 50th Anniversary celebrations of IUCN wanted to bring some new thinking into the Union. Realising that time available for the symposium was very limited, as was participation in the event, they decided to focus on three main elements: Conservation, the traditional heartland of IUCN; Communities, a more recent effort of IUCN to deliver benefits at the community level; and Consumption, seeking to define a new approach to problems that have arisen as economic development over the past 50 years has greatly increased the impact of our species on the rest of the biota.

We decided to bring in a combination of familiar figures, like Professor M.S. Swaminathan (a former President of IUCN), Jeff Sayer and Robert Prescott-Allen (both former IUCN staff members who have moved on to more responsible positions), with some new faces, such as Philippe Descola, a French anthropologist with vast experience in Amazonia, and Herbert Girardet, an expert on urban issues from the Sustainable London Trust.

We also wanted the various sessions to reflect the full diversity of IUCN, so we identified "respondents" from among the participants invited from various interest groups and parts of the world to respond to each keynote address, leaving ample time for interventions from the floor. It was our hope that the combination of a major paper, thoughtful responses, and audience participation would lead to the clear identification of new directions for IUCN as it moves into its second half-century.

Each of the three streams - Conservation, Communities, and Consumption - was assigned to an overall co-ordinator: Jeff McNeely for Conservation; Pierre Galland for Communities; and Patrick Blandin for Consumption. For each of the sessions, we identified an organizer from within the IUCN Secretariat, and a chair from the IUCN membership. A rapporteur from within the IUCN Secretariat or Commissions was appointed for each session. Thus we had a symposium that well reflected the old and the new, as well as reflecting the rich diversity of IUCN membership. With such great diversity, what follows is necessarily somewhat eclectic. Not all respondents submitted written comments, so we sometimes simply present a summary of the main points they made. And not all rapporteurs were able to capture the full richness of the audience participation. But even so, this volume well reflects the extraordinary richness of ideas and enthusiasm generated by IUCN's 50th Anniversary Symposium. We hope that what follows can feed into the process that will lead to the IUCN Programme to be discussed and adopted at the World Conservation Congress to be held in Jordan in October 2000.

The symposium would not have been possible without the strong support of the Steering Committee, led by Pierre-Marc Johnson and Bettina Laville. Pierre Galland and Patrick Blandin deserve particular thanks for their roles in co-ordinating the Communities and Consumption themes, respectively. Ursula Hiltbrunner provided many kinds of logistic support, and Cindy Craker and Sue Rallo were responsible for the secretarial support that enabled the publication to actually be produced.

We would like to thank the French Ministry of Agriculture and Fisheries for their financial support in the production of this publication, and to the French Government as well as several

sponsors from the private and public sector for the organization of the 50th Anniversary celebration that took place in Fontainebleau, France from 3-5 November 1998. Our warm appreciation goes to all of these individuals and institutions.

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Reports from the Workshops

1. CONSERVATION

1.a EXPANDING THE SCALE

A simple focus on protected areas is no longer an adequate response to conservation. The scale of attention needs to be greatly increased, involving linking protected areas with surrounding lands, building corridors, and so forth, under approaches variously called "ecosystem management" or "bioregional planning". What are the key social, ecological, and economic measures required to expand the scale of conservation and develop new ways of involving a broader set of stakeholders?

Organizer: IUCN Commission on Ecosystem Management and World Commission on Protected Areas (Ed Maltby, with David Sheppard/Adrian Phillips)

Chair: Kenton R. Miller, World Resources Institute and former Director General of IUCN (USA)

Keynote speaker: Walter Lusigi, Global Environment Facility (Kenya)

Respondents:

- o Pierre Lasserre, UNESCO (France)
- o Jean-Claude Lefevre, National Museum of Natural History, former Regional Councillor of IUCN (France)
- o Assad Serhal, Society for the Protection of Nature and Natural Resources (Lebanon)

CHAIR'S OPENING REMARKS

CHAIR: KENTON MILLER

RAPPORTEUR: DAVID SHEPPARD

Dr. Walter Lusigi's keynote address presents clearly and insightfully some of the issues that will confront protected areas in the next century. He outlines for us some of the steps that we need to consider in "expanding the scale" in our thinking and our action.

I would like to borrow and expand on one of his thoughts that parallels my own recent thinking on the subject: Protected areas are tools in society's survival kit. As Dr. Lusigi notes, we have come through an era in which romantic values and ethics have served as motivating forces for conservation and the creation of protected areas. While these values must be retained, and will perhaps ultimately be sufficient to drive humanity to leave spaces for all of nature and learn to live in harmony with it, the challenges of the 21st century will require far more articulate and explicit justification and rationale for conservation action.

Since time immemorial, people and societies have given special status and protection to fresh water springs, sources of medicinal plants, places where historical events took place, hunting grounds, and sites considered to have particular spiritual power. Modern efforts to protect those geographic places that generate fundamental ecosystem services build upon these traditions and ancient wisdom. Where based upon local knowledge and scientific guidelines, modern protected areas can ensure society the flow of water, protection of soils, provision of nutrients, digestion of wastes, building materials, fuelwood, protein, genetic resources, recreation, food security, and many other services critical to human survival.

Thus, by way of provoking discussion following our presentations, I would like to propose that we shift our approach to protected areas management in the next century, in three ways:

First, let us change our vision of the role of protected areas. No longer should we see these areas as conservation islands floating in a hostile sea of development, to be bulwarked against all intrusion from surrounding forces. Rather, let us see protected areas as instruments of peace, reaching out to the surrounding lands and bringing the benefits of ecosystem services to those surrounding landscapes, near and far.

Second, let us change our approach on the ground. Sites critical for their ecosystem services and biodiversity can be embedded into their respective surrounding landscapes. They are the core areas that contribute to keeping the greater ecosystems alive and healthy for people and all of nature. These wetlands, mountain catchments, unique habitats, forests, and coral reefs generate the full range of ecosystem services. They drive economies and provide the basis for cultural identity and continuity.

Third, let us listen to the voices of experience and the results of research. We are being told very clearly that efforts to protect species, ecosystem structure and ecological functions need to be expanded well beyond existing protected areas outward into whole ecosystems and landscapes. Achieving this goal where surrounding lands are now already inhabited requires

that we must foster biodiversity-friendly land use practices on neighbouring lands, and build connective biological corridors among protected areas to anticipate and provide for adaptation of nature in the face of global change.

Furthermore, experience also shows that if we are to expand the scale, it will take more than the efforts of scientists and protected area managers. Local communities must take the lead, and NGOs must help by providing education and information, convening stakeholders, and offering negotiation and mediation services to resolve conflicts. Economic instruments and institutional mechanisms have already been shown to form the critical ingredients that governments can offer to encourage the shift to landscape scales of planning and action.

Recent works on bioregional planning and ecosystem management around the world are illustrating practical approaches to these three issues. IUCN's Commissions on Protected Areas and Ecosystem Management are pushing the forefront of these movements through their volunteer networks of scientists and practitioners.

Creating Enabling Environments for Protected Areas in the 21st Century

By: Walter J. Lusigi, Senior Technical Adviser,
Global Environment Facility, Washington DC, USA

ABSTRACT

Protected areas are the essential foundation of the conservation movement, but they will need to adapt to changing conditions. Protected areas systems that are dependent on strict government control without the support of local people often fail, especially under conditions of economic difficulty. Protected area managers need to reach out and embrace various traditional management authorities and work with them to create enabling local environments for protected areas, building on a blend of all the local authorities that have a bearing on protected areas and the use of natural resources. Because these are highly variable, numerous models are available to suit specific social settings. Many protected areas today are faced by various forms of conflict, so conservationists will need to become part of the peace brokering process by contributing to a better understanding of the relationship between people and their resources, including issues of distribution of benefits. Conservationists will also need to help restore basic social bonds and try to balance cultural against material wellbeing; religion can often play an important role in this. Protected areas are likely to prosper only when the surrounding lands are also being appropriately developed, so greater efforts are needed to build an agro-industrial structure in rural areas that can provide appropriate employment to the local people and improve the management of lands around protected areas. Non-governmental institutions have long played an important role in protected areas, and they will need to expand their efforts in the coming decades, as will government institutions and the international community. More innovative approaches are also required for linking protected areas to surrounding lands, thereby enabling appropriate benefits to flow to society, with conservation based on a broad array of innovative forms of resource management and sound ecological principles that link different sorts of land uses in a bioregional context. This will require improved scientific contributions as well as improved education, information, and training. The problems facing protected areas are urgent and need to be addressed at a scale sufficient to have an adequate impact on the problems. IUCN, through its World Commission on Protected Areas, must be a leader in this effort.

INTRODUCTION

Establishment and management of protected areas is one of the most important ways of ensuring that the world's natural resources are conserved so that they can better meet the material and cultural needs of humanity now and in the future. But human activities are progressively reducing this planet's life supporting capacity, while rising human numbers and consumption make increasing demands on it. The **World Conservation Strategy** (IUCN, WWF, and UNEP, 1980) points out that the combined destructive impacts of a poor majority of people struggling to survive and an affluent minority consuming a disproportionately large

share of the world's resources are undermining the very means by which all people can survive and flourish. It predicts that humanity's relationship with the biosphere will continue to deteriorate until a new ethic is adopted and sustainable modes of development become the rule rather than the exception.

Largely dictated by the mood of the day - territorialism - the last century has concentrated on the establishment of national parks and other kinds of protected areas. Today we can look back with pride and satisfaction at the establishment of some 30,361 protected areas in 225 countries and territories, covering some 13,245,527 km² (8.84% of the earth's surface) (WCMC, 1997). But these areas are neither large enough nor secure enough to adequately conserve the species, ecosystems and ecosystem functions that they are established to conserve. While we must strive as a goal to establish protected areas whenever we can, demands for food for a fast-growing world population might not allow for such an expansion and the existing areas might even come under pressure to be converted to alternative uses. Any quantitative analysis of land allocated for conservation must be viewed within this real-world context.

The future integrity of protected areas depends on their being developed to achieve the fulfilment of a set of realistic objectives and multiple functions, in particular perpetuation and use. As Nicholson (1974) put it: "If the world's parks are successfully to weather their second century, it can only be with the aid of much more effective public backing based upon much clearer thinking and more professional management, assuring the basic integrity of the parks in the face of a wider and more diverse range of uses".

He was arguing for a change in attitude away from the traditional romantic values, which played such a large part in the establishment of the protected areas movement but which in the words of Hugh Lamprey are now becoming increasingly outdated in an "ever less romantic and more crowded world."

Nevertheless, he also suggests that it would be a tragedy if the earlier "emotional" values should be totally rejected by a new generation of protected area managers and users. He appeared to have been prophetic in many respects. Ten years later, at the World National Parks Congress in Bali, the papers presented demonstrated clearer thinking, epitomised by the title of the proceedings: **National Parks, Conservation, and Development: the Role of Protected Areas in Sustaining Society** (McNeely and Miller, 1984).

The Caracas Congress ten years later was even more comprehensive in its coverage of the concerns for practical management of protected areas and took this message even further (McNeely, 1992). The change of emphasis that had taken place in the intervening two decades was clear. If they are to succeed, protected areas must have public support and the whole protected areas movement must become reconciled to political, demographic and economic realities. Nowhere is this more true than in Africa and I underlined this in my own presentation at the Bali Congress that "whatever the future of protected areas in Africa might be, it is conditional upon the degree of support from the people locally" (Lusigi, 1984).

Despite our seeming increased awareness of the modern pressures and threats to the environment, conservation still remains the concern of the minority and the transformation

which is necessary to make it emotionally and intellectually satisfying in the so-called modern world seems not to have occurred. The future of protected areas in the next century will largely depend on the creation of enabling environments in which conservation can thrive politically, socio-economically, institutionally and scientifically.

CREATING AN ENABLING POLITICAL ENVIRONMENT

The modern protected area movement is based on the assumption that protected areas will be established by the highest authority in a country, which in turn will guarantee their survival, as it guarantees the general welfare of its citizens and protection of the resources on which they depend. The basic assumption here is that governments work and they take care of the interests of their citizens. This was a sensible assumption in terms of the modern world, but a closer look at the reality of what is going on around us suggests that this assumption might have been too optimistic. Indeed the 1968 New Delhi IUCN General Assembly adopted a definition of protected areas with four basic conditions: outstanding contents; an effective system of protection; *creation and management by the highest competent authority in the country concerned*; and authorisation of tourism. These were all conditions which were met by Yellowstone National Park in 1872 but a century later Paul Harroy (1974) noted that "Many of those who are acquainted with Yellowstone will be aware that there are a number of protected areas throughout the world which resemble this area and which also bear the name of national park, although they differ fundamentally from it either by what their managers wish to do or by what they are capable of doing".

REGIONAL AND LOCAL ENVIRONMENTS

Although we may think of protected areas mainly in the context of the traditional National Park movement, which started in 1872 with the inauguration of Yellowstone National Park in the United States, we now have a diverse array of categories of protected areas around the world that requires a diverse array of enabling environments in which they can survive.

The practice of protecting land for special purposes goes back much further than 1872; examples include the great feudal forest and game reserves of central Europe in the middle ages and the traditional Muslim grazing reserves established under the *hema* system of the Arabian countries by the Prophet Mohammed. Both systems were products of the social and political circumstances of their times and by modern standards might be regarded as undemocratic, because they were imposed by autocratic authority. Nevertheless these ancient conservation practices were successful; central Europe still has great forests, now mainly under state control, with wildlife management an integral part of the forest management. Unfortunately, the *hema* reserves of Saudi Arabia were opened to free grazing by decree in 1953. Dr. Omar Draz of the Desert Institute Council of Egypt wrote in 1969, "Today it is difficult to see any difference in the vegetation on these government reserves and adjoining lands because of destructive grazing and uncontrolled tree and scrub cutting. The tragic story of loss of fertility, aridity and transformation to man-made desert, the fate of millions of acres in the Near East, has been repeated".

This example suggests that the protection formerly provided by Muslim religious authorities was necessary and effective, while the government control that replaced it was a failure. In the highlands of Ethiopia the only places where the indigenous forest has been preserved within an enormous area of total deforestation is in the small churchyards of the Coptic Church. On the coast of Kenya, the small relict *kaya* forests have survived the almost total clearing of the coastal forest zone for agriculture because of their traditional significance to the local animists.

In recent years, with the decline of traditional beliefs, the *kaya* forests are being seriously encroached upon and damaged. It is now necessary to find a means to reinforce the protection that rests upon traditional - but unofficial - authority of the *kaya* religious elders. The Kenya government is considering establishing a network of *kaya* national monuments under the authority of the National Museums of Kenya, changing the protection of the *kaya* forests from the traditional system maintained by the local society at *no monetary cost* to a modern institutionalised system dependent upon the dedication of paid and trained staff.

Experience of the last decade has shown that systems that are dependent on strict governmental control without the support of the local level populations through their traditional authorities, tend to fail, especially in the face of the serious economic constraints which affect many developing countries. As economic situations are unlikely to improve in the next century, especially for developing countries, protected area managers should reach out and embrace these traditional management authorities and work together to create enabling local environments for protected areas. These local environments should be a blend of all the local authorities that have a bearing on protected areas and the use of natural resources, resulting not in any single model but rather a wide range of approaches to suit specific social settings.

CIVIL STRIFE AND CONFLICTS

Realistic conservation cannot take place in an environment of civil strife, war and other political conflicts. This means that stable and functioning political systems are a prerequisite for conservation, yet a look around the world reveals that political stability is the exception rather than the rule. The Caracas Congress recognised the importance of the issue of conflict in protected areas management by convening a workshop on conflict resolution (Lewis, 1996). This century has already seen two world wars which threatened to transform the face of the planet. Today national disputes and civil strife within national borders combined represent human suffering, resource destruction and resource commitments of almost a similar magnitude. On every continent today, it is possible to point to some form of conflict that has a bearing on the integrity of protected areas.

Because of the sensitivity of this subject, I will not mention any specific names but the trends of conflict and their effect on protected areas are similar in many situations. First are the relatively high expenditures on military hardware and war preparedness. At a time when the world is battling with basic evils of poverty, it is difficult to justify these types of expenditure especially by relatively poor nations. These expenditures are escalating at a time when conservation departments within governments are starved of the funds needed to effect basic conservation activities.

Protected areas are also being used as battlegrounds for conflicts and as refuges for the fighting factions, definitely a use which the founding fathers of the protected area movement never imagined. This use usually leads to the depletion of the wildlife resources to feed the soldiers and sale of wildlife products to finance their activities.

Another aspect of conflict and protected areas is the wave of refugees who, while fleeing the fighting, often settle in protected areas since these are the only open spaces left amidst other intensive uses of the land.

In discussing this issue in Bali I made the remark that "it is not possible to say when such situations of conflict will stabilise towards peace, but conservationists should not only hope for the best but prepare for the worst. They must try to develop policies that would maintain the wholeness of protected areas against such a background" (Lusigi, 1984). As one solution at that time, I suggested enabling the rural populations to get involved in the management of protected areas. In the next century we will need to go several steps further. Conservationists must become part of the peace brokering process by participating actively in such negotiations and drawing the attention of those concerned of the price the nations would pay through loss of natural resources critical for their survival. The idea of the peace parks movement is very commendable in this regard. Through the establishment of these transboundary reserves, conservationists can foster a new alliance between nations and communities through shared resources which are a basis for their survival. These are good practical demonstrations by the conservation community which will contribute to creating enabling political environments for protected areas through ensuring peaceful political processes. History has taught us that compromises produced by conflict resolution may be better for the environment than forced decisions that nobody respects (Lewis, 1996).

GLOBALLY ENABLING POLITICAL ENVIRONMENTS

The National Park idea was never the result of a public demand. It was because a few farsighted, unselfish, and idealistic men and women foresaw the national need and got the areas established and protected in one way or another, fighting public inertia and selfish commercial interests at every step. IUCN must be commended for taking on the burden of harnessing these minority concerns into an international forum that has seen the establishment of the present network of protected areas especially in the developing world.

The protected areas movement was born in a period when empires were being created and massive settlements of new lands were going on. It is interesting to note that the beginning of the protected area movement coincided with the Berlin Conference which saw the partitioning of Africa into its present network of countries. It was a period of settlement and laying claim to territories and it is not surprising therefore that the protected areas movement sought to allocate territories where conservation would be the main form of land use. Looking back, we have every reason to be grateful for the efforts that went into establishing what we can proudly refer to today as protected areas, the nucleus of the conservation movement.

The present network of protected areas in the developing countries will, for the foreseeable future, still rely on international collaboration, support and good will to survive. Conservationists should, in the next century, concentrate on making sure that this support

continues by ensuring that international agreements which enhance protected areas are functional and respected.

The 1900 London conference convened by the governments of Britain and Germany, and attended by representatives of other great powers, was one of the earliest efforts at reaching international agreement on the establishment of protected areas although only the word reserve was used. The express object of that conference was to endeavour to protect the fauna of Africa, in those territories controlled by the signatories "from the destruction which has overtaken wild animals in South Africa and in other parts of the world" (Simon, 1962).

Broad agreement was reached on many basic conservation principles but the adherence to them remained a matter of good will by the signatories, leading to less-than-expected actions in practice. This conference also established the principle of transboundary collaboration in the protection of migratory species - the subject of the Convention for the Conservation of Migratory Species (Bonn, 1979) some eight decades later. Other international conferences that have had a profound impact on the protected area movement include the London Conference of 1933 and the 10th General Assembly of IUCN in New Delhi in November 1969.

These conferences also have set the stage for other major conventions concerning protected areas like the International Convention on Wetlands of International Importance (Ramsar, 1971), the International Convention concerning the Protection of the World Cultural Heritage (Paris, 1972), and the International Convention on Trade in Endangered Species of Wild Fauna and Flora (CITES) (Washington, 1971). Although these conventions have been instrumental in drawing world attention to various problems affecting protected areas, their continued dependence on good will for their implementation and their effectiveness in bringing about meaningful action on the ground still raises concerns among conservationists. For example, the African Convention on the Conservation of Nature and Natural Resources was convened with assistance from IUCN in Algiers in September 1968 and signed by all heads of the newly independent African States; but it remains almost unknown in Africa itself and indeed the whole world. There would have been no need for any other agreement on natural resources in Africa if that Convention had been taken seriously and implemented.

Of the periodic conventions striving towards conservation of nature and natural resources, perhaps the most influential and promising for protected areas is the Convention on Biological Diversity (CBD). This convention recognises the role of protected areas as instruments for maintaining biological diversity *in situ*, and calls for each Contracting Party to, as far as possible and as appropriate: establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity, and promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas.

Although the CBD is the most comprehensive international agreement affecting protected areas, it still suffers from the profound gap between means and goals that seem to separate its 175 state parties. Further, even with goals and objectives defined, conservationists themselves often perceive different things. Conservationists in the next century should strive towards a common perception of the role of protected areas in sustaining society, based on the idea that

protected areas are the nucleus of biodiversity conservation and that all biodiversity is unique and important for human survival. Conservationists should therefore work towards establishing the enabling environments that will assure the ultimate preservation of biodiversity through sincere and genuine international collaboration.

THE SOCIO-ECONOMIC ENVIRONMENT

The Social and Cultural Environments

Predictions about the state of the world over the past three decades continue to be most frightening especially when they seem to come true. For example the authors of the Global 2000 Report more than two decades ago reported that "If present trends continue, the world in the year 2000 will be more crowded, more polluted, less stable ecologically and more vulnerable to disruption than the world we live in now. Serious stresses involving population, resources and environment are clearly visible ahead. Despite greater material output, the world's people will be poorer in many ways than they are today".

Those clearly visible stresses of population, resources and the environment which have been of concern to a small minority of the population especially in developed countries, have become a matter of increasing public concern in the last two decades. The Brundtland Commission, the United Nations Conference on Environment and Development (UNCED) and the creation of the United Nations Commission on Sustainable Development are a few reflections of that concern. All these concerns seem to accept the ecological realism that the global economy has already exceeded the sustainable limits of the global ecosystem and that any further expansion of the present economic and population trends would simply speed us from today's long-running unsustainability to imminent collapse.

Considerable literature is now available on consequences of population growth and scenarios for possible solutions. It is not my intention to attempt to review the various models for population control here but rather to reflect on how world populations could be made to behave in a more responsible way towards protected areas.

By the year 2000, half the world's population will live in cities. Although the majority of people in most developing countries outside South America still live in the rural areas, land shortages are forcing many rural people to migrate to crowded cities where they find shelter in slums and shantytowns. The biggest danger of these population trends on protected areas is the breakdown in the family and social structures which have been responsible for regulating human behaviour towards their environment. In my experience from observations around the world, I have not known of any social group or culture that did not have some form of ethical and moral orientation towards nature and the resource base. In the evolution of the so-called global culture which is being aided by better communication, societies are quickly losing the basic fabric of culture that regulates their responsibility for their environment. Although this better communications technology could have been used to enhance such cultural ties, for lack of quick adjustment to the technological revolution, family ties and cultural bonds are becoming weaker and sometimes breaking down completely. Conservationists in the next century must strive to restore some of these basic social bonds and try to balance the cultural against material well being. Religion, even in the modern sense, could play a very important

role in this regard. In India, the respect for nature that has largely been enhanced through religion has played a very important part in conserving some protected areas.

In discussing how to achieve sustainability, **Caring for the Earth** (IUCN, 1992) observes that three main obstacles must be overcome:

- o lack of ethical commitment to sustainability;
- o inequitable distribution of power and access to information and resources; and
- o the notion that conservation and development can be managed separately.

It goes on to recommend that "a deeper and more widespread understanding is needed of how the biosphere works and what threatens it. We must develop a commitment to the sustainability based on ethics and learn to behave as though tomorrow mattered". In this regard, I completely agree with the proposed action to "form an international coalition to promote a world ethic of sustainability; establish Amnesty for Earth to alert the world's people to offences against the biosphere; and incorporate environmental education in all education programmes and fund it sufficiently". Creating an enabling environment where this can happen in the next century should be the preoccupation of every conservationist.

The Economic Environment

It is of little use stressing the need for protected areas in developing countries without understanding the problems facing their people and governments. Poverty is perhaps the biggest threat to protected areas in the world today. Nearly all the developing countries have a modern sector where the patterns of living and working are similar to those of the developed countries, but they also have a non-modern sector, accounting for the vast majority of the total population, where the patterns of living and working are not only profoundly unsatisfactory but also in a process of accelerating decay.

The rural poor are the neighbours of protected areas and the people most affected by their establishment. This implies that all successes in the modern sector are likely to be illusory unless there is also a healthy economic improvement - or at least a healthy condition of stability - among the very great numbers of people today whose life is characterised not only by dire poverty but also by hopelessness.

The condition of the poor is characterised by a breakdown in the social fabric of society. The work opportunities of the rural poor are so restricted that they cannot work their way out of misery. They are underemployed or totally unemployed, and when they do find occasional work, their productivity is exceedingly low. Some of them have land, but often too little. Many have no land and no prospects of ever getting any, and then drift into big cities. But they find no work in the big cities either and, of course, no housing. All the same, they still flock into the cities because the chances of finding some work appear to be greater than in the village, where their chances are nil. Although population growth serves to worsen the situation, life for these people was not always hopeless. In Africa, for example, the explorer Richard Burton in 1861 compared the conditions he found in East Africa with that of other peasantries. "The Africans in this region", he wrote, "are superior in comforts, better dressed, fed and lodged and less worked than the unhappy Ryot of British Asia. His condition where

the slave trade is slack, may indeed be compared advantageously with that of peasantry in some of the richest European countries".

When Burton came to the region in 1856 he found it divided into a mosaic of chiefdoms, each with its chief, councillors and elders. Most of this infrastructure was destroyed during the slave trade and the wars that accompanied it. Thus German traveller Herman Wissmann records in his second journey through the upper Congo region:

"Where formerly thousands of Benecki, inhabitants of the strikingly beautiful and prosperous villages, had joyfully welcomed us, where in peace and amity we had been conducted from village to village, we now found a waste, laid bare by murder and fire, the clearings in the bush on both sides of the straight tracks, which three years before had been occupied by neatly cultivated plots of the Benecki, were now overgrown with grass of a man's height, while here and there a burnt pole, a bleached skull and broken pottery were left as the only reminders".

This illustrates the fact that poverty was not completely the result of population growth but a disruption of ways of life through wars imposed by invaders. A great deal of the poverty can only be alleviated by a restoration of the functioning of the rural economy and reconstruction of the social structures which have been abandoned through modernisation and migrations to the cities. Conservationists should be involved in fighting rural poverty because an enabling rural economic environment will enhance the capacity of the people to maintain the integrity of protected areas.

It is necessary, therefore, that at least an important part of the development effort should be directly concerned with the creation of an "agro-industrial structure" in the rural areas. It must be emphasised here that the primary need is literally millions of workplaces and opportunities for the unemployed and underemployed. For a poor man the chance to work is the greatest of all needs, and even poorly paid and relatively unproductive work is better than idleness. In the words of economist Eugene Schumacher, "It is important that there should be enough work for all because that is the only way to eliminate anti-productive reflexes and create a new state of mind - that of a country where labour has become precious and must be put to the best possible use".

The international community, while scaling down its own resource consumption patterns, must be prepared to provide effective assistance where needed. In the words of the Peruvian conservationist Marc Dourojeanni, "The developed countries should practice what they preach and should be more serious about their own contradictions regarding biodiversity conservation before attempting to rule the international environment. They should also abolish the poisonous concept of donor with regard to biodiversity conservation. The response to global environment issues should be based on real partnership for a common endeavour and not on a beggar to donor relationship".

THE INSTITUTIONAL ENVIRONMENT

Non-governmental Institutions

The protected area movement was started through voluntary contributions of both time and resources from individuals and non-governmental institutions. Nathaniel Langford, for example, who was the first superintendent of Yellowstone National Park, was appointed without any pay or appropriations for five years. Steve Mather, the first Director of the US National Park Service, had to depend many times on his own finances to carry out his official duties. When the protected area movement spread to Europe it was also carried out largely by non-governmental organisations. The Society for the Preservation of the Fauna of the Empire, which was responsible for establishment of the first protected areas in Africa, was founded in 1903, developing into the Kenya Wildlife Society in 1955.

IUCN's early work was largely based on commissions which consisted of volunteers who belonged to institutions that were supportive in their activities as they related to IUCN and its conservation mission. Although the IUCN membership has achieved considerable success which is manifested in the present network of protected areas, this success has not been without its shortcomings. First, is there a mistaken assumption that conservation represents a single philosophy or school of thought and action? On closer examination, profound differences in means and goals still separate the many organizations and institutions which bear the conservation label. Second, even with goals and objectives defined, rivalry between conservation organizations has tended to distort the conservation message being conveyed and even served to confuse the recipients of the intended messages. These differences have also been exploited by unscrupulous entrepreneurs who have used this as an excuse to overexploit the resources conservationists seek to put under protection.

Progress in the next century to overcome these shortcomings will require an enabling institutional environment. We will need to build trust and confidence between conservation institutions by agreeing on a common vision for conservation. Although the means for achieving this vision might differ, and indeed diversity in this respect might be a strength, the institutions must have a common perception of the intended outcome of their actions. This basic understanding must be accompanied by a tolerance of the institutions for each other. As we shall see later in this discussion, the institutions should look at the landscape as a totality and not a grid of different types of protected areas supported by different institutions trying to overtake each other. IUCN must provide the forum for this dialogue and should specifically have a programme to achieve this objective. The commitment of volunteer time from members of these organisations should continue to be the driving force for these initiatives.

Governmental Institutions

Largely due to non-governmental pressure, many governments have adopted conservation of natural resources as public policy, either to conserve the country's natural wealth or as a matter of prestige. Many countries, including some in the lowest per capita income groups, have established and expanded their protected area systems. At that same time, those who were charged with the responsibility to manage protected areas and other natural resources were realising that financial resources were declining and many times inadequate. For many countries in Africa, this was also the period of nationalism and independence. When many of

the countries in Africa got their independence in the early sixties, the international community had concerns regarding the future of protected areas, leading to generous donations from the international community which tended to make the protected area departments largely dependent on international development aid. For example, the development plans of one African country said that, "should the targets for private donations not be met, it will be necessary to reduce levels of some wildlife activities below those planned". In the global economic crisis of the seventies which saw many international programmes scale down, many wildlife departments were weakened.

This was also a period of great international awakening to environmental concerns which culminated in the 1972 United Nations Conference on Environment in Stockholm. Apart from establishing the United Nations Environment Programme (UNEP), which was the first UN to be located in a developing country, many governments committed themselves to establishing environment departments. These new departments were often imposed on existing natural resource management departments which were themselves starving of funds. Although attention was rightfully given to environmental problems, financial commitments to governmental institutions continued to dwindle. The 1992 UN Rio Summit does not seem to have improved this situation. Protected area management will not flourish in an environment where adequate funding support is clearly not one of the highest priorities of the governments concerned. This means that conservationists in the next century must work through governmental mechanisms to ensure better support for conservation.

Another major point of concern is the sectoral rivalry between government departments, even between those charged with conservation, which has weakened the capacity of many governments to realistically focus on the correct priorities. As with NGOs, the resource departments themselves need to resolve their differences and present a common vision of their goals for conservation.

Despite considerable discussion linking conservation and development and the need for co-ordination at the governmental level, the link is not being forged in practice. If we have to achieve our conservation objective, this must be made to happen. While governmental institutions responsible for wildlife conservation and protected areas need strengthening, even the most successful conservation programmes will not succeed unless they are supported by appropriate developments in the other sectors. In the words of IUCN Chief Scientist Jeff McNeely, "progress in sustainable approaches to forestry, agriculture, rural development, international trade, energy, population, national security and other areas are so essential to the success of efforts to conserve protected areas that they deserve as much attention as the traditional conservation related sectors".

SCIENTIFIC AND RESOURCE MANAGEMENT ENVIRONMENTS

Resource Management Environment

Few nations anywhere have disagreed with the national parks concept, but many have argued with the way the concept has been applied - too often at the cost of displacement of traditional cultures, and nearly always with insufficient consideration for the practices and policies affecting lands outside the parks. It has become abundantly clear that national parks, and

other protected areas for that matter, must not continue to serve as an excuse for disposing of members of traditional societies who have always cared for the land and its biota. Nor can national parks survive as islands surrounded by hostile people who have lost the land that was once their home. Parks, furthermore, cannot exist in a natural state if they are surrounded by lands that are degraded or devastated by failure to obey the simplest ecological rules. The heart of the issue has been to find sustainable approaches for land use in which protected areas can find a natural home. Although considerable progress has been made in the last decade, much remains to be done.

The need for a broad-based multi-sectoral approach to conservation is clearly identified in both the **Global Biodiversity Strategy** (WRI, IUCN, and UNEP, 1992) and the Convention on Biological Diversity. Under the convention, countries are required to prepare national biodiversity strategies and action plans and report on their implementation. These plans will need to focus on biodiversity both inside and outside the confines of protected areas, and address the fundamental requirements of reconciling the pressure of human development with conservation of protected areas in the wider landscape.

In planning a system of protected areas for supporting national development goals, criteria for selection and management are essential. Criteria will enable a relatively systematic comparison of different sites; help communicate to decision-makers why certain areas or policy initiatives are important; help focus research on the most important questions; promote the drawing of boundaries for the protected areas by specifying the features which need special management; and facilitate public participation programmes.

Although the best-known method of managing protected areas is through national parks, it is now widely accepted that other types of reserves can also make contributions to both conservation and development, providing a range of tools. The World Commission on Protected Areas, after a broad consideration of the existing criteria and experience gained in implementing them, recently revised the international criteria, recognising six categories of protected areas (IUCN, 1996).

Although since 1970, the world's networks of protected areas have expanded in extent by more than 80 percent, around two-thirds in developing countries. This is still insufficient; the IUCN 1990 review of the protected areas of Africa, for example, calls for them to be at least tripled in area, if the protected areas are to be effective in delivering nature's benefits to people. But given the pressures on land today, these additional protected areas will need to be of a new type, far more flexible in the management than the traditional national parks.

Conservation must be based on a broad array of ecologically linked landscapes at the national, regional and local level. While the specifics will vary from case to case, the major generalisation is that local support for protected areas must be increased through such measures as education, revenue sharing, participation in decisions, complementary development schemes adjacent to the protected area, and, where compatible with the protected area's objectives, access to resources.

By themselves protected areas will never be able to conserve all, or even most, of the species, genetic resources, and ecological processes they were established to protect; these areas are

simply too small to support viable populations of wildlife if the areas are isolated from the surrounding lands. Far greater expanses are required for conservation than modern societies can afford to remove from direct production. The best answer to this dilemma is to select and manage protected areas to support the overall fabric of social and economic development, not as islands of anti-development, but rather as critical elements of regionally envisioned harmonious landscapes. Through a planned mix of national parks and other categories of protected areas, amidst productive forests, agriculture, and grazing, conservation can serve human communities and safeguard the well-being of future generations of people living in balance with their local ecosystems.

Improvements in conservation over the coming decades will be of three main types:

- o the establishment and improved management of categories of protected areas where some kinds of human use are tolerated or even encouraged;
- o the establishment of new types of protected areas in degraded landscapes which have been restored to productive use of conservation; and
- o management regimes in non-protected areas which bring sustainable benefits from harvesting biological resources to local communities.

These will be founded on a rapidly improving information base to support management decisions. Scientific research will play a major role in providing some of the desired information.

The Scientific Environment

The International Biological Programme (IBP) was the first major international venture in biological research. Its experience sparked the creation of the UNESCO Man and the Biosphere (MAB) Programme with which I was privileged to participate for a decade. MAB is a programme of multidisciplinary research on major environmental problems (especially related to land use and resource management) whose evolution in the last three decades typifies the problems that have confronted researchers in protected areas. The evolution of MAB during the 1970s was conditioned by a changing and unpredictable environment. In real terms, funds for research shrank in many countries. In addition, the usefulness of the results of the high-cost biome studies within the IBP had, rightly or wrongly, been questioned in some countries. It was increasingly recognised that the time available for dealing with environmental problems was critically limited; despite an increasing awareness of environmental issues, research continued to suffer and little progress was made in finding solutions. Scepticism about global models, and global solutions, became more deeply entrenched. Such changes in the field of research had important repercussions for the development of protected areas. Research that had been started in protected areas like Tsavo National Park in Kenya and Tanzania's Serengeti Research Institute, for example, suddenly came to a standstill. The IUCN Commission on Ecology, which provided scientific inputs into IUCN conservation programmes, had very weak support.

But protected areas cannot be managed without appropriate and sound scientific information regarding their state and functioning. One of the main functions of most protected areas is to protect indigenous plant and animal species as well as the integrity of the indigenous biological communities and the ecological processes that regulate them in as natural a state as possible. Another aim is that this should be achieved by considering various human influences on these ecological systems. Although some ecosystems in the absence of serious interference will remain unchanged for relatively long periods of time, many are in a constant state of change. It may not be possible to define a specific condition that we regard as the most natural one, because each condition could be a successional stage in a constantly changing environment. This underlines one of the most important objectives of research - documenting the status of a specific ecosystem at a point in time and monitoring the changes in it to guide management strategies and actions.

Research must recognise the integrity of the total landscape and the site specificity of various resource use problems and find answers to three basic questions:

- 1) What are the distinctive characteristics of the landscape in which a specific protected area is located - area, altitude, topography, climate, main vegetation types, animal life - and what are their interactions;
- 2) What management measures are needed to sustainably maintain the functioning of those ecosystems while providing services to human beings - accessibility, potential siting of roads, buildings, water, tourism, visitor facilities and other human economic and recreational activities; and
- 3) What are the interactions between protected areas and their neighbours and how can these be made mutually compatible.

While scientists should be allowed the opportunity to pursue activities of their interest which will contribute to better knowledge of ecological systems in general, they should be sensitive to the needs of information for management. Research objectives should therefore be focused to include the following:

- o to provide reliable information to serve as the basis for management plans and decisions;
- o to inform the management staff of the status and trends in the ecology of the protected area concerned with a view to modifying the management plans to meet a changing situation;
- o to provide interpretative information for visitors and for education purposes; and
- o to add to the sum of knowledge on nature and natural resources or, in the case of cultural monuments, on human ecology and history.

In the coming decades, a better scientific base will be needed for the long term use of natural resources and new ways of linking the efforts of scientists from different disciplines, from different countries, and of resource users from different sectors of society. Both the natural and social sciences must be involved in this effort and the integration of these different

scientific disciplines should be promoted. The training of specialists should form a major part of this effort and the promotion of successful trends while eliminating negative ones should be encouraged. The problem of funding research needs specific attention as the above cannot happen without adequate resources devoted to research without any conditionalities. Talented researchers must be given specific incentives to pursue their findings for the good of humanity.

EDUCATION, INFORMATION AND TRAINING

This presentation would be incomplete without some reference to the important issue of education and training. Although everybody seems to acknowledge the importance of education and training in achieving the above targets for conservation in the 21st Century, conservation education seems to have been left to chance or everybody assumes someone else is doing it or it is the responsibility of the state or governments.

Of the things that can be done to assure the integrity of protected areas in the long term, nothing is more important than education. At the Bali conference, I said that, "The crisis in which conservation areas find themselves at present requires an urgent conservation education effort that should reach the whole population almost immediately at the same time. This means that conservation education will have to be intensified at all levels of society" (Lusigi, 1984).

This is even truer today than it was then. Most developing countries have nearly doubled their population since Bali and urbanisation has almost doubled with populations that are not sympathetic or do not understand or care about conservation. In that presentation I went on to describe in detail how the education effort was needed at all levels - the local rural level, the formal education in schools at all levels and conservation education for administrators and policy makers. Protected area managers also need special training to enable them to deal with current conservation problems in society. We need mass action in education and not isolated initiatives that do not seem to have a major impact on the whole problem of building support for protected areas throughout the population. Education needs to be aimed at making conservation an integral part of societies' survival effort.

CONCLUSIONS

I would like to conclude with a reflection on the need for collaboration among the conservation community if we have to make progress in maintaining the integrity of protected areas in the 21st Century. The world is getting smaller, not by physical reduction in size, but through improved communication and transport. As conservationists, we should take advantage of this opportunity to overcome one of the biggest problems that have confronted both scientists and protected area managers - isolation. Many conservation practitioners feel the insecurity of their present positions because they are isolated in their own institutions or countries. Lack of communication is leading to unnecessary duplication of effort and waste of scarce resources for management of natural resources. Lack of communication also leads to misunderstanding and suspicion among different cultures. The conservation community should build networks for exchange of information and experiences that can be used to

improve the management of protected areas. The exchange of scientific information, best practices in management, experiences of different cultures in resource management and interaction of scientists, resource users, administrators and politicians will be crucial in realising our conservation objectives for the future. IUCN, through its World Commission on Protected Areas, is in a unique position to facilitate this exchange. Although various attempts have been made at realising this in the past, these efforts have been sporadic. What is needed now is for a consolidation of these efforts in an established and predictable programme. The Convention on Biological Diversity should continue to be the political forum where agreements are reached, while IUCN through its WCPA can be the vehicle through which the agreed strategies and actions are realised on the ground.

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RESPONSES TO KEYNOTE SPEECH

By: Pierre Lasserre, Director, Division of Ecological Sciences, UNESCO,
Secretary of the International Council of the MAB Programme

The recent Symposium organised by IUCN in Albany, Australia, on "Protected Areas for the 21st Century" (November 1998), and of course this 50th Anniversary workshop, highlight the need for a bioregional approach for promoting integrated ecosystem management. In other words, conservation is not synonymous with preservation and it is now necessary to integrate the ecological, social, economic and cultural dimensions of protected areas into land use planning.

UNESCO can only thank IUCN for drawing us into this discussion or "brainstorming" on expanding the scale for conservation, associated with truly integrated ecosystem management, and resource development "with a human face". Kenton Miller's writings have been the main source of inspiration for bioregional planning and establishment of biological corridors. The Commission on Ecosystem Management, and the World Commission on Protected Areas, have also mobilised energy in this direction.

At the Albany Symposium, Peter Bridgewater argued that the future of nature conservation would depend more on flexible co-management systems rather than on binding legal instruments. The conditions that are necessary to expand the scale for conservation, whether social, ecological, or economic, demand a pluralistic approach to land management, i.e. management where the principle of subsidiarity has been accepted by the governing bodies and which leads to a true policy of participation.

In some ways, this corresponds to the perception of conservation and land management that UNESCO's MAB programme has developed through the biosphere reserve (BR) concept. BRs are study sites and demonstration areas that combine three functions:

1) conservation of landscapes, ecosystems, species and genetic variability; 2) human economic development; and 3) logistic support for research and innovation. The basic model has not changed since its inception in the early 1970s but evolved to respond to new challenges. Objective 6 of the 1984 Minsk Action Plan for Biosphere Reserves stipulated the need to strengthen the role of BRs in land management and regional development. The Statutory Framework of the World Network of Biosphere Reserves adopted by UNESCO in November 1995 states in article 4 that BRs "should provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale".

Today, two trends are becoming apparent: BRs are increasing in size; and there are more and more twinning arrangements and transfrontier BRs which start to form biological corridors in a bioregional planning context.

Some figures: of a total of 359 BRs representative of the main ecosystems of 90 countries, 33 BRs are larger than 1 million ha. Ten of these have been designated in the last 5 years (1993-98) and they contain sites of great biogeographical interest, both from the natural and social points of view. Examples include: Tonle Sap (Cambodia, 7 million ha); Aïr et Ténéré (Niger,

24 million ha); Alto Orinoco-Casiquiare (Venezuela, 8.7 million ha); Mata Atlantica (Brazil, 30 million ha); and the Arganeraie (Morocco, 2.5 million ha). Several entire islands, such as Lanzarote and Menorca, are BRs. An increasing number of countries are considering enlarging their BRs to take in coastal areas, wetlands and highly urbanised areas. Examples include the Vesuvius BR and its hinterland near Naples, the green belts of Rio Janeiro and San Paulo, and other recent proposals to apply the BR approach to cities and their hinterlands.

The increasing number of transfrontier BRs is another highly significant indicator of how countries wish to co-operate. One example is the transfrontier BR of the Vosges du Nord and Pfälzerwald in France and Germany, with a total area of 300,000 ha, and with some 245,000 resident people. Other examples in Central Europe include the Carpathians BR between Poland, Slovakia and Ukraine (total 160,000 ha), the Danube Delta BR between Romania and Ukraine (740,000 ha), and a project for a future Daurian BR between China, Mongolia and Russia.

There are also ideas to create transfrontier BRs in politically sensitive areas, for example Changbaishan and Mount Paekdu between China and North Korea, or in the Rift Valley between Israel and Jordan, or in the Gulf of Aqaba, thus contributing to the culture of peace. Similar types of approaches are being tried elsewhere, for example the IUCN initiative on "Peace Parks" and the "Meso-American Biological Corridor" launched by UNDP, UNEP, the World Bank, GEF, IUCN and the Central American Commission on Environment and Development. In the same way, natural World Heritage sites of the World Heritage Convention can contribute to this bioregional approach.

Today, it is no longer a question of "preserving" a "wilderness" type of nature in its "pristine" state by setting it aside from human action. On the contrary, one must maintain the evolutionary capacity of ecological processes. This requires a complex system of management of a highly varied spatial area. In such an approach, people are not foreign to nature but part of it and have the responsibility of "good stewardship". This is the very idea behind sustainable development. The question then is: how to manage in a given piece of land the multitude of stakeholders, actors and often contradictory interests?

Let us take an example. In Madagascar, customary land rights are very ancient and widespread. Land management through central state authority with laws stipulating that unoccupied and unused land belongs to the public domain is very often unacceptable to local communities. This paradoxically can lead to local communities' degrading protected areas, whereas in most cases customary land rights served to conserve the environment. The approach taken in the Mananara Nord Biosphere Reserve has three main characteristics:

- o contractual arrangements between local communities and the administration;
- o creation of a body of "environmental mediators" made up of specialists and scientists with an excellent knowledge of the rural area, conservation and ecology; and
- o a taxation system by resource type, zone and management regime.

The experience of the Mananara Nord BR has been extended to the entire island of Madagascar and law 96-025, voted in 1996, sets the legal framework for what are known as GELOSE contracts (*Gestion Locale Secunse*) setting out the local management arrangements between the state, the villages, and the rural communities based on the principle of mediation. Similar arrangements are being tried out in two other African countries: Niger between forest workers and fishermen; and Mali as concerns land rights accorded to local fishing communities. FAO, IUCN, Conservation International and WWF are all very active in promoting participatory management.

The sharing of such local experience through networking can help to promote nature conservation associated with cultural diversity and social development. An enormous amount of work remains to be done, but we are still far from creating the "enabling institutional environment" which is a prerequisite for "expanding the scale" in conservation.

There are many reasons for this. I shall again take the example of the World Network of Biosphere Reserves. In May 1974, the Task Force which met to establish the objectives of biosphere reserves underlined the importance of institutional co-operation among UNESCO, IUCN, FAO and UNEP in what was a wonderful gesture of solidarity. Such co-operation did in fact happen before and after the Minsk Action Plan of 1984, but it has not led to the desired results. Tomas Azcarate, former Chairman of the MAB Council, in a lucid evaluation of the Minsk Action Plan, emphasised how difficult it was to really forge such co-operative links. He also stressed that "one of the main obstacles to reconciling conservation with development is the sectoral structure of our institutions".

The remarks are still relevant for most of our institutions today - including UNESCO! We need more streamlining of mission, a clear deontology, an opening to society as a whole. Unavoidably, institutions need to dialogue with civil associations, networks, and commissions. In this context, education, training and public awareness have a critically important role. The experience of UNESCO is acknowledged in this field. We can only highlight how urgent it has become to work together - with IUCN, UNEP, UNDP and FAO - to make more progress in this respect.

It was not until the International Conference on Biosphere Reserves held in Seville in March 1995 that the World Network of Biosphere Reserves was endowed with a Statutory Framework, and which was formally adopted by UNESCO in November that year. I should like to highlight that IUCN played a decisive role in elaborating the Seville Strategy and the Statutory Framework.

We are here in the Fontainebleau region, about to become a biosphere reserve, and I would like to make an appeal. At UNESCO, we are convinced that strengthening co-operation with the various organisations I have already cited, plus WWF, WRI, Conservation International, ICSU (and its DIVERSITAS Programme), is indispensable for implementing the World Network of Biosphere Reserves - the structure and contents of which are fully recognised by Member States. We can only hope that such strengthened co-operation can take the form of a series of agreements - both new and updated - between UNESCO and the institutions concerned. Such co-operation should lead to concrete action, for example in elaborating planning strategies in common, supported by pooled human and financial resources. The

World Network of Biosphere Reserves is one means to engage institutional rapprochement, which is so necessary if we are indeed to "expand the scale" as we look towards the 21st century.

By: Jean-Claude Lefevre, Professor, National Natural History Museum, Paris, Honorary President of IUCN-France, Former IUCN Advisor for Western Europe

The threats to the functioning of our planet posed by recent changes in the composition of the atmosphere provoked by human activities, and which have led to climatic changes whose scale is as yet difficult to assess, have one enormous merit: they remind us that we live in an ever-changing environment and that we must keep this carefully in mind if we want to develop and manage territories which preserve the diversity of the living world for future generations.

Human societies have for so long had to face the whims of the climate, and on such a scale, that their response to such changes should be a part of our cultural background. Yves Coppens' famous comment that "Hominids are the fruit of drought" shows how past fluctuations in climate are seen by archaeologists and palaeontologists not just as factors which explain how we evolved, but also as triggers for the migratory movements which colonised the planet. During past ice ages lower sea levels uncovered landbridges between continents which, for example, helped in the settling of America from Asia. De Lumley (1991) goes so far as to state that mankind's cultural leaps forward are all the greater when environmental factors are at their most imposing. He cites the modest beginnings and the subsequent upsurge in prehistoric paintings of animals created by the first modern-day men during the last ice age as proof of this theory.

Between 800,000 BC and the present, there have been no less than twenty major climatic variations, in other words almost a dozen interglacial - glacial cycles. Each ice age saw a drop in sea level, a degradation of the forests in present-day temperate zones and the disappearance of animal and plant species. They also were marked by important "migrations" of organisms to places of refuge further to the south and the arrival from the tundra and steppes of species typically found in wide open spaces. Conversely, during interglacial periods, the warmer climate allowed forest tree species and forest-dwelling animal species to recolonise. The last glacial - interglacial cycle is particularly noteworthy since during the last, Würmian, period (35,000 BC) *Homo sapiens sapiens* took over from Neanderthal man.

Towards 20,000 BC, in the northern hemisphere, the ice cap had spread over much of North America and northern Europe. Mammals which had adapted to the cold, like mammoth, reindeer, woolly rhinoceros and saiga, settled on the steppes. At the height of the Würmian cold, sea levels fell to as much as 120 metres below current levels, and Great Britain and Ireland were a part of the continent of Europe.

Only 10,000 years later would the climate warm sufficiently for Europe to be covered in the landscapes which would still be with us today were it not for the deforestation carried out by the Neolithic peoples (Renault-Miskovsky). The forests spread up from three main areas of refuge, the south of the Iberian and Italian peninsulas and the Balkans. We now know that

pedunculate and sessile oaks which make up about 30% of European forests started to reconquer Europe about 15,000 years ago and that they reached Norway 7,000 years ago. That was the beginning of a drastic turnaround in the history of natural environments. Man was now a farmer and thanks to his mastery of fire and tools was able to have a significant influence on his environment. So, at the end of the Quaternary, man had become a major player in ecosystems, able to cancel out the effects of the admittedly minor climatic fluctuations of the next six thousand years (Vernet, 1997).

People were quick to react when they realised the damage caused to flora and fauna, by proposing that areas be placed under protection. As early as the 7th century Venice proposed that deer decimated by hunting be preserved. Later on, European royal forests were to take on a twofold mission: avoiding excessive removal for firewood; and serving as reserved hunting grounds for kings and nobles. After 1492, Europe's global expansion brought know-how to all continents, a notable consequence being the replacement of natural environments by farmed lands. The policy of colonisation, often entailing major deforestation (as was the case in many American states), led to many tracts of land being declared off limits under the National Park concept. Thus, in Canada, the USA and Australia, some notable areas were preserved and exceptional "natural monuments" were able to escape the clutches of farming and industry.

From the early 20th century and particularly since World War II, a whole set of legislative arrangements have been set up to protect what can still be protected: national parks have been joined by nature reserves, biosphere reserves, landscape parks and regional natural parks. Depending on the country, between 2% to 30% of the national territory enjoys protected status. The remarkable work done by the WCMC (World Conservation Monitoring Centre) created by IUCN, WWF and UNEP in Cambridge, and at the European level by the Council of Europe and the European Environment Agency allows us to inventory and monitor the overall way in which these areas evolve.

It is now clear that current protected area policy, which countries have often been forced to adopt in emergency situations, does not necessarily correspond to what a scientist would define as the need for reasonable conservation of notable flora, fauna and ecosystems. There is a simple reason for this: in many countries, including France, no heed has been given to the real environmental situation of a territory. There has frequently been more attention paid to the possibility of gaining political acceptance for territories where no economic stakes are involved than to a policy of diversifying protected areas to take account of eco-diversity. The result has been sometimes random distribution - most national parks in France are in the south-eastern quarter of the country - to the exclusion of some areas of major environmental heritage interest. Furthermore, since no account is generally taken of the complex functionality of ecosystems, the "protected" area is not safe from the regression which affects the surrounding unprotected areas related to it: protecting a peat bog, however notable it may be, is pointless if you continue to degrade its catchment area. So much so that, when assessing public wetlands protection policy in France, it was proved that the loss of 50% of notable wetlands in just over ten years was at the expense of both unprotected wetlands and wetlands inside nature reserves (which unfortunately had no control over surrounding territories which could be drained or reclaimed with all the familiar consequences for water levels on adjacent land).

Finally, signing a decree that an area is a protected area is not enough to stop the degradation of the ecosystems that one wants to protect or to preserve flora and fauna. Conservation aims require not just precise knowledge of how the ecosystems function but also that we consider their dynamics. They can evolve contrary to our objectives and we may sometimes have to close off certain stages of vegetation growth or combine them spatially to maintain certain notable species. The need to compile management plans to achieve specific conservation goals is far from being a concept with world-wide acceptance. Indeed, the small numbers of park staff, small budgets (or even the elimination of budgets for almost ten years in the national parks of great interest in some former Soviet republics) and the absence of park staff not only make day-to-day management hard but also make no inroads into poaching.

The case of some African national parks where poaching is rife is a sorry and familiar story, but it is spreading to other parts of the world, such as the Pantanal - one of the world's great wetlands - where hunting is banned, but where professional poaching (by plane, hovercraft and seaplane) develops unabated, opposed by just five rangers with one boat between them: 3 million crocodile skins originate in an area which many would like to see transformed into a National Park (the wetland is currently in danger of reclamation because of a project for a gigantic canal, the Hydrovia, 3,442 km long and 100 metres wide).

The idea is not to question existing protected areas but to accept that, to comply with the Rio Biodiversity Convention (1992), species need sufficient room in their natural habitats if they are to survive; they do not need "Indian reservations" which are likely to disappear as soon as disaster strikes (Julien, 1998).

Preserving biodiversity requires the maintenance of a sufficient number of geographically well-distributed sites in the natural range of the species to be protected where living conditions are preserved by reasonable and efficient ecosystem management.

What protected areas particularly need is to be free of spatial constraints in order to respond to global climate change. Just as Sahel countries are led to their doom when people who are used to responding to desert creep by nomadism (forced population movement in the areas where desert and savannah meet) are sedentarised by acquired nationality and the creation of national frontiers, the danger is that when major climatic fluctuations occur our protected areas may well turn into death traps for the organisms we wanted to preserve. This is because the fragmentation of ecosystems by human agency and their enclosure in a hostile matrix (particularly as a result of the agricultural revolution which has transformed industrialised countries since the 1950s) stifles the full dispersal and colonisation processes of such species.

Restoring dispersal mechanisms will require a land use policy based on networking all the protected areas which would serve as "sources" for dispersal: to this end they would have to be linked by effective ecological infrastructures serving as "corridors". The benefit of this approach is that it can be carried out on differing scales and that it can also help to protect "ordinary" nature as well as the notable species and areas inside the reserves. It can be applied when restoring a basic functional unit such as a catchment (which can regain biological attributes through the growing of a network of hedgerows, which also help to manage water) and when networking the protected areas of a national territory, including the embankments of the roads which link them.

True, such policies still need careful consideration: after all, "uncontrolled" corridors may help non-native species to spread and thus create serious upheavals in the functions of indigenous ecosystems. Their very structure needs reviewing and adjusting if they are to be multi-purpose corridors. Corridors today most frequently take the form of lines of trees, and take insufficient account of the need of some colonising species for open spaces; nor do these artificially created environments meet the needs of plants which thrive in wet, sub-humid or drought conditions.

Nevertheless the European Community has chosen to extend this approach to cover the whole continent. By multiplying protected areas through networks like Natura 2000 (EU) or the Emerald Network (Bern Convention) it is considering the establishment of strong links between protected areas with its proposal for a pan-European network of ecological structures covering the whole territory.

None of these new approaches for biodiversity conservation will have any chance of success unless the resident human communities which exploit resources accept the new land use schemes. This change in attitude on the part of the conservationists bears the strong imprint of UNESCO's proposals and of the creation of biosphere reserves. Their motto could well be "Protect nature, and societies' capacity to develop with and for mankind", thus echoing the precepts of the World Conservation Strategy which were laid down in 1980 and which IUCN can be proud of.

The case of the Banc d'Arguin National Park is exemplary. It was designed by Europeans who had been struck by the key role played by this exceptional site as a wintering ground for most of the wading birds from their continent, but could well have quickly fallen into disuse if another analysis had not been conducted. Thanks to scientific research the park is now seen as decisive for the Mauritanian fishing economy, since it serves as a refuge for overfished species, but also as a spawning ground and nursery for many other species. It has also been occupied for centuries by one particular community, the Imragens, who live essentially by casting for yellow mullet and who reach their fishing grounds on sailing boats known as "lanches". The strategy introduced for the preservation of the park was based on the local populations who agreed to a ban on engine-powered dug-outs on the banc in exchange for the rehabilitation of their sailing boats: this involved cooperative management of the timber and sailcloth used for the boats. Pressure on fisheries, including external pressure, can be controlled by the Imragens, who are responsible for running the park. It has also been possible to impose bans on fishing (biological recovery) to restore shark and ray numbers (which because of demand from Far-Eastern countries were taking over from mullet as the Imragens' catch).

Examples of this sort are on the increase and are a promising path for conservation to tread. The EU launched Natura 2000 on the basis of the principles of "Conservation - development with and for mankind". This conservation process no longer focuses solely on the species and ecosystems to be protected (after rigorous scientific work to define them), but seeks to convince users of selected areas that their method of adding value, their relationship with resources and their management methods can help them to protect notable ecosystems and species at the European level. Consensus should thus be the basis for the creation of new

protected areas, since users are asked to help mark out the territories and to become involved thanks to their daily management of these future strongholds of Europe's heritage.

Countries and large international organisations which were for so many years forced to propose that sites be declared off-limits to respond to damage to ecosystems will now have to rethink their attitudes and overall approaches. They will have to call upon scientific analysis which highlights the importance of places of refuge, of areas where species are endemic, of sites containing rare species and sites of high natural heritage importance, they will have to draw on progress in the environmental sciences and be guided in particular by the development of landscape ecology if they are to propose true territorial management plans which can ensure the survival of species and the functions of ecosystems, however artificial they may have become. It will be essential, however, to convince decision-makers that putting nature back into political and economic life is one of the few paths which can lead us to sustainable development and which will allow future generations to inherit a natural heritage which we have already considerably squandered.

By: Assad Serhal, Al-Shouf Cedar Reserve Manager, Lebanon

I want to address the subject of a working definition of what we mean by an empowering environment for the successful implementation of cogent conservation policy on the scale that is now accepted as essential if IUCN is to deliver on the mission. How do conditions - particularly security - need to change, and how can this be brought about? I will address these issues with reference to my own experience in Lebanon in recent years, and to the rest of the Middle East.

Some 16 years ago, when I was studying Wildlife Ecology Management at Oklahoma State University, I wrote a paper with the help of my friend Jeffrey McNeely, called "The need for establishing a National Park System in Lebanon". That was back in 1982, the year of the Israeli invasion of Lebanon. The Civil War in Lebanon was then already 7 years old. Elsewhere, there was the Iran-Iraq War, and later of course the Gulf War. Plus the Intifada while we were talking of "the Middle East Peace Process". And so on. The media had dubbed the region "a patch of Hell", with border disputes, changes in regimes, assassinations, abortive settlements, invasions and occupations throughout the area.

One result was the massive and forced displacement of entire populations, or sections of populations, struggling to survive, migrating in search of basic necessities. As you can imagine, the attendant environmental problems were on a scale to match - I am using here the term "environment" in the broadest sense - because we are talking of the "habitat" as well as the natural environment. Air and water pollution have reached far beyond the warring regions; large areas of forest and wildlife territory have suffered, both within and outside protected areas. This in turn has had repercussions on the climate and biodiversity of these and other parts of the world.

I have spent some time "setting the scene" in order to provide a better understanding of the factors that need to be identified when it comes to assessing the success or failure of attempts

to further the cause of conservation of natural resources in such circumstances. We also need to ask how security conditions have to change, and how this can be brought about.

I shall begin by sharing with you the lessons that we environmentalists have learned - under sometimes extreme conditions, at the deep end - in our attempt to safeguard biodiversity as well as the very existence of protected areas.

The first obstacle we have encountered is the attitude of the public at large and of decision-makers. As environmentalists, we naturally believe that "survival" means the continued dwelling of man and other living creatures in their natural habitat. This is the simple proposition that underlies the concept of what we call protected areas - the protection of biodiversity and, following from that, the protection of the life support system both FOR the benefit of humans as well as FROM their own tendency to destroy that support system.

That is true everywhere, but in the Middle-East, this basic proposition has an added force, because the devastation brought about by conflicts in the region has only served to reinforce the Malthusian belief that the basic need in times of stress is survival: how, people ask, do you expect us to be interested in protecting trees and wildlife while people are being slaughtered or displaced in their thousands and hundreds of thousands?

That of course is the main stumbling block, and we have heard it before, and elsewhere. It is all to do with seeing things in context, with making people aware of how they think, and of giving them a broader perspective. The same argument prevailed in the peaceful and prosperous western industrialised world only a quarter of a century ago: the environment was the pastime of a few dreamers, hippies, lefties, call them what you want, so long as it was derogatory. It was a pie in the sky, miles down below we had the necessity - as it was called - of economic development and cost-effectiveness. Most of you had to contend with that one if you care to recall. Today Greenpeace has more members than the Labour Party in England, and even the most conservative politicians are obliged to pay lip service to the environment, throughout the world.

It's always the same story when it comes to anything visionary or constructive - the old debate between "idealism" and "realism". Arguably the hardest time the industrialised world has gone through within memory was the Great Depression before World War II, itself the biggest global conflict ever. In the name of this realism, President Roosevelt - whose New Deal, incidentally, included some significant environmental measures already back then - kept being told by isolationists and realists that America should stay out of the war and peacefully co-exist with a Hitler-dominated Europe. He replied that he very much doubted that such co-existence would be practically possible, and also that if for the sake of expediency Hitler should be allowed to rule over Europe with America's blessing, then what values were there left to defend?

The trouble with the survival argument is that if you're not surviving for anything, dog eats dog, including the environment, and then nothing much *will* survive. Back in our part of the world, they knew as much a long time ago: there were already cedar reserves, or the equivalent of them, in what is now Lebanon under the Roman empire, and it is only when the downturn began in 110 AD that the deforestation of the Cedars as we now know of it became a fact.

The proponents of the survival argument, as it is now cast in my part of the world, might actually look to what Islam itself has to say on the subject. On this, as on much else, they will be given precedents. During the first wars of expansion, the Prophet Mohammed rewarded victorious generals and leaders with lands set aside for cultivation - not for exploitation or self-aggrandisement, mind you. This practice turned into a tradition in the peninsula called the *hema* system of grazing reserves - *hema* has the same root as *Mehmeh*, the Arabic name which we call the Shouf Cedar Society in English - the meaning contained in the root word is "empowerment", or "encouragement". In Arabia the system remained in force for centuries - it was only in the 19th Century that the reserves of Saudi Arabia were open to free grazing, with the problems that have resulted there and elsewhere.

The second main lesson is that the aims and goals set for national parks in the US and Canada and other regions are not applicable to small countries like ours or to regions that have been and still are subject to alteration and use by human activities since early history. But other IUCN protected areas management categories, adopted after the World Parks Congress in Caracas, especially IV, V, and VI, are more applicable, and could be the models for bioregional protected areas, or linked with important natural corridors as worked landscapes, where man and nature make a protected area.

Well here again, let's look at the facts. In Lebanon itself three reserves were created during the 1990s, one of them being the Shouf Cedar Reserve of which I am the manager. The reserve covers 5% of the Lebanese territory. Even in a small country, that's quite a large area. As to the place or the time being "ready", perhaps some of you don't know that what used to be called the Lebanese miracle was one of the country's most serious problems: perpetual short-termism was the rule on any given day, with little attention to long term planning or industry. Agriculture and tourism were the cornerstones of the economy, and at the rate at which the war took over from the endemic destruction of the environment, there was soon going to be very little space left for either agriculture or tourism, while a major NGO report in the early nineties singled out Lebanon as a country whose water pollution problem was already critical. Just going by this, in a country like Lebanon environmental vision IS economic realism, and if we are talking timetables, the date is overdue.

The third lesson is the fact that the environment, as a concept, cannot be separated from the rest of the habitat and the culture, that it is essential not only to address the issue in these terms, but also to make one's audience aware that one is addressing *them* in such terms.

The exception - in the Middle East, I remind you - to what I have been saying is precisely in areas which have religious or spiritual associations, including the Holy Places themselves. Here, even in the most demented circumstances, the areas are much better preserved, and there is a perception among the population that the Malthusianism I referred to earlier does not, somehow, apply. But this only makes the point which any of us who calls himself an environmentalist should bear in mind: that *environment* means *habitat*, and that in turn means *culture*, and we should not be guilty of the very error of those whom we claim we are trying to convert, or of those who resisted us for years: of talking about the environment abstractly, separating the human geography from the physical geography, forgetting that we must speak

to those we are trying to reach in a way which is relevant to them, and their concerns, and making our entry points at the right level.

That brings me to the fourth point: Protected areas need to be approved, and their creation ratified, at the highest level of authority - in other words at government level. But the request itself, the conception, has to come from the communities themselves, and from community-based organisations - at any rate it has to have at least their consent and must benefit from their active participation in the process. NGOs, local spiritual and political leaders, the private sector, indeed any group or organisation which stands to be one of the stakeholders or participants, have to be involved at the earliest possible stage in the planning and management of protected areas, and eventually in reaping the benefits.

With regard to this, the next point also became obvious to me. I only had to look around to see for myself the glaring gap, so far at least, between the fragmented and often ineffective nature of the environmental groups, and the strength, efficiency and influence of other relief or religious organisations and private sector groups, be it in war time or peace time, and the respect they command within the community at large. We not only have much to learn from them, but we also have much to gain by gaining their support for our objectives and activities.

In Lebanon, the reserves I mentioned earlier are part of a protected area project funded by the GEF. All this came about as the result of efforts from all directions: the environmental groups springing up in every area, which resulted in the feedback at national level, with participation by IUCN and UNDP

At regional level, we have been fortunate in having traditional leaders such as Minister Walid Joumblatt and Minister Suleiman Frangieh who not only supported these movements, but spearheaded them before any UN organism ever became involved. This is a clear case of traditional leadership backing causes for the future.

And there are other success stories: the mentality responsible for the so-called Lebanese economic miracle was going to result in common land on beaches south of Beirut - I am talking of the actual beach between the coastal road and the sea - being acquired by so-called entrepreneurs for what they would no doubt term "development" purposes. In the post-war economic situation, there were some local authorities whose cash-flow situation was desperate enough to consent to such a transaction. It was through the pressure of local environmental groups that the successful appeal against this went all the way up to Parliament who ruled on the matter.

The crucial step in this direction is going to be the media. We must convince them to give us some exposure, and get across the basic need for protected areas in times of deprivation and difficulty as well as of peace and plenty. If this is achieved - and it's going to need application and consistency - then we could have an effective weapon to influence public opinion in making demands upon those in power to help us realise our agenda - not least by funding it. We are nowhere near this at present and it's going to be a challenge, but a challenge we must face, take on and win.

Another important step in mobilising opinion is to translate such issues as sustainable use and sustainable development into practical and workable ideas that can be adopted by communities near protected areas. We should do this by highlighting existing successes to explain the benefits that may come to the community, for example from nature-based tourism.

Finally, working again from the grassroots upwards, the values and objectives related to protected areas, and the benefits they stand to bring, have to be integrated at all levels - not only educationally, but also institutionally. They have to be integrated into the training of national enforcement agencies in the form of a Green Police and a Green Army to underpin protected areas.

I would now like to draw some conclusions with regard to both IUCN and WCPA delivering on their objectives as the 21st Century approaches:

- o First we have to persevere in our function as a role model for co-operation between governments and NGO professionals in the field of protected areas research, management and legislation. We have to widen our constituency to include economists, people from the media, journalists, and social and political figures. We also have to work towards a partnership with the private sector.
- o Second, we have to pursue the current - and very successful - effort by United Nations agencies and the GEF to help governments and NGOs initiate and formulate plans for bioregional and cross-border protected areas.
- o Parallel to this, we should continue to actively promote field projects in whose realisation we can be involved. We should then draw attention to our success stories as examples for people to follow, to the benefit of all concerned.
- o We should put forward our own proposals in peace negotiations and the resolution of regional conflicts. We should campaign for the creation of cross-border protected areas and "Parks for Peace". That would help increase protected areas across the world, and would be a means of preventing wars over boundaries and borders. At the moment, these seem to be the rule rather than the exception in the developing world.
- o It follows from this that we should propose the initiation of a United Nations Green Force - Green Berets of a very different kind! These would have a mandate to intervene in disputes and conflicts in or near protected areas and to ensure the protection of important sites and heritage in times of conflict.
- o It is crucial that we keep pushing, and campaigning for countries to adopt and ratify international conventions - and then to work for their enforcement. The Biodiversity Convention, the Land Mines Convention, the Bonn Convention, the CITES Convention, the World Heritage Convention, and others.
- o Finally, we should actively work through the UN system itself, or by any other means, towards setting up an international court to resolve disputes and make rulings in matters relating to cross-border protected areas and the application of international conventions.

COMMENTS FROM PARTICIPANTS

Written submission tabled by:

Ed Maltby, Chair, IUCN Commission on Ecosystem Management

We need to recognise that a formal protected area structure is likely to cover only a small proportion of the total area of the planet. Our challenge is as much to address what Kenton Miller in his introduction referred to as the "hostile sea". That hostile area comprises a rich diversity of ecosystems both protective as well as productive. They are protective of biodiversity as well as the environmental support mechanism essential for both people as well as wildlife. We need to learn from the lesson of protected areas management in order to improve our approach to management of the larger area of natural resources including their biodiversity. Whether we call this the ecosystem approach or bioregional planning or something else is not as important as the fact that we begin to integrate the Union's effort to address the key problems such as sustainable development, maintenance of environmental quality, biodiversity as well as food security and human welfare.

Written submission tabled by:

Sir Martin Holdgate, former IUCN Director General

I think IUCN - as a body whose primary expertise is in nature conservation - must develop the theme of "enabling environment" from an ecological as well as human community and institutional aspect.

We know that the old static concept of ecology, like climax vegetation and stable ecosystem, is not valid. Humanity has broken down barriers that have kept floras and faunas apart for millions of years, and some at least of the "invasive aliens" will inevitably figure in new ecosystems.

Two conclusions follow. First, protected area management and any other management for biodiversity must allow for the dynamism of ecological change, steering the process towards ecological patterns that best conform to our conservation goals. This is the "ecologically enabling" environment. Second, it is all very well, and correct, to speak of the need to involve local communities in defining protected area aims and management BUT it is essential to involve ecologists - including local traditional ecologists who know the area - to define the ecological constraints, trends and issues. For, while with great effort, we *can* maintain species and habitants in the face of environmental change, we will have to move with the broad trends of nature and we must have ecological understanding of the possible if we are to achieve the conservation objectives set out by Walter Lusigi. I am concerned that we are not mobilising the ecological network. We need to define ecologically practical options. This is a central challenge for the IUCN Commission on Ecosystem Management.

Written submission tabled by:

Eric Edroma, IUCN Regional Councillor for Africa

The poor communities around protected areas often have negative attitudes towards protected areas because they are poverty and disease stricken, malnourished, poorly dressed and

housed, and they have no economic incentive provided by governments. The enabling environments are costly to provide in situations where government priorities do not often include protected areas management.

I feel that the brilliant enabling environments presented by Dr. Lusigi will remain on paper just as the numerous conventions have not worked. I propose that IUCN should seek ways and means to make the enabling environments work; and IUCN and other NGOs should focus their contributions increasingly to the provision of a healthy socio-economic improvement for the poor people in rural areas most affected by creation of protected areas.

KEY CONCLUSIONS:

1. **The scale of conservation management needs to be expanded geographically and institutionally.** Areas critical for the generation of ecosystem services, the maintenance of biodiversity, and social, cultural, spiritual and wilderness values must be protected and managed as core areas within larger landscapes. Resource use in the surrounding land and seascapes needs to become biodiversity-friendly while ensuring sustainable livelihoods. Further, these landscapes need to be connected to other bioregional programmes to provide for adaptation to global change. As a Union, IUCN should recognise explicitly this agreement in its policies and its outreach to Members and the world at large.
2. **Bioregional planning approaches can assist protected area managers, politicians and community leaders in designing and organizing such programmes.** This approach depends upon the participation of stakeholders, the use of information, science and local knowledge, and involvement of the private sector. IUCN, specifically WCPA and CEM, should further develop and promote these approaches co-operatively and a joint programme of action should be developed. Biosphere reserves are examples of the application of these approaches. There are others. Contrary to concerns that these approaches may weaken national parks and other protected area categories, the purpose is to help stakeholders recognise how these critical areas contribute to their livelihoods and thereby encourage them to provide stewardship for these as components of their own ecosystem.
3. **Research on relevant ecological questions is critical to enable local leaders and managers to select important sites that are generators of ecosystem services and key to biodiversity protection, and to provide them with appropriate management.** IUCN should take steps to reverse current declines in research funding support for habitat and ecosystem-scale research and should support the effective application of information arising from such research.
4. **Local communities need to receive tangible value for their co-operation with protected areas and bioregional programmes.** Specifically, IUCN should continue to expand its work on identifying the values of ecosystem services, and developing economic tools and institutional mechanisms to help capture these values and foster their equitable distribution.

5. **There are inherent synergies among the major global issues, such as climate change, land degradation, biodiversity and forestry.** IUCN should promote the linkages between protected area management and bioregional planning, with opportunities designed to maintain carbon and water balances, prevent erosion, promote land restoration, and foster sustainable forestry practice.
6. **In pursuing biodiversity-friendly uses of the land and water areas surrounding protected core areas, and in biological corridors, numerous management options are available.** These include the systematic use and harvesting of wildlife, fish, crops and wood and non-wood products from the forest. IUCN should promote debate among interested parties and facilitate mediation in those cases where stakeholders have important divergent views on which options are appropriate and acceptable.
7. **The 5th World Congress on Protected Areas, to be celebrated in Africa in 2002 under the auspices of IUCN, should include themes and sessions on the following topics:**
 - a) **Parks for Peace.** Areas in conflict, especially where ecosystems are shared across boundaries, can often find resolution through establishment of protected areas on each side of the boundary by their respective governments and communities. The recent example between Ecuador and Peru is noteworthy.
 - b) **Bioregional Planning.** Methods and cases from on-the-ground experience can be reviewed and debated to formulate agreed commitments for further expansion and application of these approaches in the coming decade.
 - c) **Science and Information.** Financing directed research and information services of relevance to management decisions remains critical and warrants resolution.
 - d) **Planning for a Dynamic Landscape.** Habitats, communities, and species will shift geographically in the face of global change, and ecological structures and ecosystem functions are expected to change in ways difficult to anticipate. Methods and guidelines need to be developed for the planning of dynamic protected areas in a changing landscape.

1. CONSERVATION

1.b THE BIOLOGICAL CENTURY

While the 20th century might be characterised as the century of physics, the 21st century will be characterised by much greater attention being given to the biological systems that support all life. This will go far beyond the current micro-biological scale to address whole organisms and ecological systems (including the concept of "ecological engineering"). Modern approaches to biotechnology will underline the importance of biological systems, and seek new ways of ensuring that modern society is sustainable; this will involve much greater efforts in conserving evolving biological systems and giving appropriate attention to the potential problems inherent in the new technology.

Organizer: IUCN Biodiversity Policy Coordination Division
(Jeff McNeely)

Chair: Veit Koester, Ministry of Environment and Energy (Denmark)

Keynote speaker:: M.S. Swaminathan, M.S. Swaminathan Research Foundation
and former President, IUCN (India)

Respondents:

- o Carlos Joly, Monsanto Europe (Belgium)
- o Tom Lovejoy, Smithsonian Institution and World Bank (USA)
- o Grethel Aguilar, Centro de Derecho Ambiental y de los Recursos Naturales (Costa Rica)
- o Hervé La Prairie, President, IFOAM (Germany)

CHAIR'S OPENING REMARKS

CHAIR: VEIT KOESTER

RAPPORTEUR: JEFFREY MCNEELY

IUCN has based its approach to this workshop on "the biological century" on five allegations:

- o Much greater attention will be given in the coming century to biological systems, which are based on renewable resources;
- o The approach will tend to address whole organisms, and perhaps build on the concept of "ecological engineering";
- o Modern approaches to biotechnology will underline the importance of biological systems in the coming century;
- o Given the threats to both environmental and social systems, new ways will need to be found for ensuring that modern society is sustainable;
- o Therefore, IUCN, including its members, will need to put greater effort into conserving biological systems, including giving due attention to the potential problems that arise from the new biotechnology.

As the chair of the working group seeking to develop a protocol on biosafety under the Convention on Biological Diversity, I would like to share with you some of the perspectives on biotechnology which have arisen. The new biotechnology has the potential to provide considerable benefits to humanity, as well as posing possible risks for both biodiversity and human health. Both benefits and dangers are being addressed under the Convention on Biological Diversity. We are giving considerable attention to the issues of access to genetic resources, equitable sharing of benefits arising from the use of such resources, and protection of the knowledge of indigenous peoples and local communities about biological systems. These issues are complex from political, legal, technical, and scientific points of view, requiring a continuing effort at research, policy development, legal considerations, and public information.

Regarding the Biosafety Protocol, one final meeting is being held in February in Cartagena, Colombia, seeking to agree the final protocol. But virtually all of the main problems remain unresolved, and the draft text is filled with bracketed words, sentences, and phrases. Such brackets are indicators of disagreement among governments, and these disagreements are manageable only if the governments can mobilise sufficient will to achieve a positive result.

As we begin our discussions today, I suggest that we should not discuss bio-engineering from the point of view of whether the risks outweigh the benefits, or the benefits outweigh the risks. This is not really a discussion for or against biotechnology because the CBD has already recognised that biotechnology is a reality that countries need to address. I hope very much that our discussions this morning will focus on the allegations raised by IUCN, and I encourage IUCN to draw on the results of this workshop to develop further its initiatives in this area.

The New Biology and an Ever-Green Revolution

By: M. S. Swaminathan, UNESCO Chair in Ecotechnology,
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ABSTRACT

A combination of factors has led to significant increases in agricultural productivity, sufficient to support the growing human population. However, demand for food and water continues to increase at the same time the ecological foundations essential for sustained advances in biological productivity are becoming degraded. Three major revolutions in science and technology are helping to enable more food to be produced: the "gene revolution" is based on better understanding of the genetic basis of living organisms, enabling modern biotechnology to support the development of new processes and products or agriculture and health; the "information and communication revolution" has enabled very rapid growth in the systematic assimilation and dissemination of relevant and timely information; and the "ecotechnology revolution" is promoting the blending of the best in traditional knowledge and technology with the modern technologies being developed in biology, energy, and materials science. The next century will require more knowledge-intensive agriculture, in which international Cupertino is vital for delivering the benefits of new technologies to those who need them the most. IUCN can contribute to this enterprise through developing an "IUCN Knowledge System Network" that would provide information on practical measures to promote sustainable relationships between people and resources. It could help contribute to ecological and livelihood security, throwing light where darkness persists and fostering a global consensus for a better common future for humanity.

THE GREEN REVOLUTION

In 1798, Thomas Malthus warned humankind about the dire consequences of unchecked population growth. The French mathematician, Marquis de Condorcet, a contemporary of Malthus, pointed out that population will stabilise itself if children are born for happiness and not just for mere existence. Thanks to dramatic advances in preventive and curative medicine, particularly from the time IUCN was established in 1948, human numbers have been increasing at a rapid rate. A billion persons are now being added to the human population every 12 to 13 years. This will call for an increase in annual food grain production by 250 million tons every 10 years. When Malthus published his essay in 1798 the global population was 980 million. The population of India alone is now 990 million. In spite of such a rapid rise in population, food production has on the whole kept pace with the needs of the expanding population during recent decades. How did this happen?

Four important factors helped to keep Malthusian fears at bay:

- o Rapid advances in science and technology, particularly in the area of breeding new varieties and hybrids of food crops which can respond well to irrigation water and good soil fertility.
- o Services like the production and distribution of good seeds, fertilisers and pesticides, as well as the of efficient credit and extension services.
- o Public policies in the areas of land reform, rural infrastructure development input and output pricing and marketing.
- o The hard work of farm women and men, who have demonstrated that whether they live in industrialised or developing countries, they will respond to technological progress and opportunities for assured and remunerative marketing.

Mutually reinforcing packages of technology, services and public policies led to the birth of what was termed in October 1968 by Dr. William Gaud of the USA as "the green revolution". In January of the same year, I made the following points in my Presidential address to the Agricultural Science Section of the Indian Science Congress, held in Varanasi, India:

"Exploitive agriculture offers great possibilities if carried out in a scientific way, but poses great dangers if carried out with only an immediate profit motive. The emerging exploitive farming community in India should become aware of this. Intensive cultivation of land without conservation of soil fertility and soil structure would lead, ultimately, to the springing up of deserts. Irrigation without arrangements for drainage would result in soils getting alkaline or saline. Indiscriminate use of pesticides, fungicides and herbicides could cause adverse changes in biological balance as well as lead to an increase in the incidence of cancer and other diseases, through the toxic residues present in the grains or other edible parts. Unscientific tapping of underground water will lead to the rapid exhaustion of this wonderful capital resource left to us through ages of natural farming. The rapid replacement of numerous locally adapted varieties with one or two high-yielding strains in large contiguous areas would result in the spread of serious diseases capable of wiping out entire crops. Therefore the initiation of exploitive agriculture without a proper understanding of the various consequences of every one of the changes introduced into traditional agriculture, and without first building up a proper scientific and training base to sustain it, may only lead us, in the long run, into an era of agricultural disaster rather than one of agricultural prosperity."

The above analysis resulted in the intensification of research on integrated pest management (IPM) and the initiation of whole-village operational research projects involving IPM procedures in rice and cotton (Swaminathan, 1975). Also, in 1974, the mineral fertiliser industry was requested to adopt integrated nutrient supply systems (INS) involving organic manures, compost, green manures, biofertilisers and cereal-legume crop rotations (Swaminathan, 1974). Through the integration of INS and IPM procedures, technologies were developed to make the excessive use of mineral fertilisers and chemical pesticides unnecessary.

In subsequent years, the significance of my 1968 analysis has been widely realised. Genetic homogeneity enhances genetic vulnerability to pests and diseases. Excessive use of mineral fertilisers and chemical pesticides has caused soil degradation, ground water pollution and the spread of pests resistant to pesticides in several green revolution areas. This has led to warnings of impending food crisis in the coming millennium. Lester Brown and his associates (1994, 1995), for example, have concluded that population-rich but land hungry countries like China and India may have to resort to substantial food imports in another 30 years due to the following reasons:

- o first, increasing population leads to increased demand for food and reduced per capita availability of arable land and irrigation water;
- o second, improved purchasing power and increased urbanisation lead to higher per capita food grain requirements due to an increased consumption of animal products;
- o third, marine fish production has reached a plateau and many fisheries are over-exploited;
- o fourth, there is increasing damage to the ecological foundations of agriculture, such as land, water, forests, biodiversity and the atmosphere and there are distinct possibilities for adverse changes in climate and sea level; and
- o finally, no dramatic technological breakthroughs are on the horizon, which can help to halt the fatigue of the green revolution.

Since land is a shrinking resource for agriculture, there is no option except to produce more food and other agricultural commodities from less land per capita. In other words, the need for more food has to be met through higher yields per units of land, water, energy and time. It would therefore be useful to examine how science can be mobilised for raising further the ceiling to biological productivity without associated ecological harm. It will be appropriate to refer to the emerging scientific progress on the farms as an "ever-green revolution", to emphasise that the productivity advance is sustainable over time since it is rooted in the principles of ecology, economics, social and gender equity and employment generation (Swaminathan, 1996)

To give an idea of the dimensions of challenges faced by all involved in developing scientific strategies and public policies for sustainable food security, I would like to refer to the situation prevailing in my country, India. In global terms, India today has:

- o 16% of the world's human population
- o 15% of farm animal population
- o 2% of the geographical area
- o 1% of rainfall
- o 0.5% of forests
- o 0.5% of grazing land.

A similar situation also prevails in many other countries in Asia and Africa. The demand for food and water will increase every year. At the same time, the ecological foundations essential for sustained advances in biological productivity, such as land, water, forests, biodiversity and the atmosphere are experiencing degradation or depletion. The Living Planet Index published recently by the World Wide Fund for Nature (WWF) underlines the seriousness of the situation.

MEETING THE CHALLENGES AHEAD

Julian Huxley wrote in 1957, "It is as if man has been suddenly appointed managing director of the biggest business of all, the business of evolution. Whether he wants it or not he is determining the future direction of evolution on the earth". It is clear that if children are to be born for happiness in the coming millennium, nature, humanity and technology must work in harmony. The present pattern of development based on the destruction of environmental capital stocks and life support systems, gross economic, social and gender inequity and jobless economic growth cannot lead to a better common future. We need a paradigm shift in our approach to technology development. Natural resource management concerns must be integrated in genetic improvement methodologies. Sir Francis Bacon once said "it would be an unsound fancy to expect that things which have never yet been done can be done except by methods which have never been tried".

What are the new methods available to meet the first among the hierarchical needs of humankind, namely food?

Fortunately, as we approach the new millennium we are experiencing three major revolutions in science and technology, which will influence agricultural technology in a fundamental manner. It will therefore be appropriate to make a brief reference to them.

- I. The gene revolution - which provides a molecular understanding of the genetic basis of living organisms, as well as the ability to use this understanding to develop new processes and products for agriculture, the environment, and for human and animal health.
- II. The information and communication revolution - which allows a very rapid growth in the systematic assimilation and dissemination of relevant and timely information, as well as a dramatically improved ability to access the universe of knowledge and communicate through low-cost electronic networks.
- III. And the ecotechnology revolution - which promotes the blending of the best in traditional knowledge and technology with frontier technologies such as biotechnology, space and information technologies, renewable energy and new materials.

In principle, these three types of advances - when coupled with improvements in management science and governance - greatly increase the power of a scientific approach to genetic improvement, agronomics, the integrated management of natural resources and ecosystems, and the management of local and regional development policies. Eco-technologies enable the

adoption of ISO 9000 and ISO 14000 standards of environmental management. These scientific revolutions seem to be proceeding at an ever-increasing pace, with most of the action occurring in a few places in industrialised nations. Also, new discoveries of great relevance to sustainable food security are coming under the purview of proprietary science. These three revolutions deserve further examination.

THE GENE REVOLUTION

The past ten years have seen dramatic advances in our understanding of how biological organisms function at the molecular level, as well as in our abilities to analyse, understand, and manipulate DNA molecules, the biological material from which the genes in all organisms are made. The entire process has been accelerated by the Human Genome Project, which has poured substantial resources into the development of new technologies for working with human genes. The same technologies are directly applicable to all other organisms, including plants. Thus, a new scientific discipline of "genomics" has arisen. This discipline has contributed to powerful new approaches that can be used in agriculture as well as in medicine and has helped to promote the biotechnology industry.

Several large corporations in Europe and the United States have made major investments in adapting these technologies to produce new plant varieties of agricultural importance for large-scale commercial agriculture. The same technologies have equally important potential applications for addressing food security in the developing world.

The key technological developments in this area are:

- a) genomics: the molecular characterisation of species;
- b) bioinformatics: data banks and data processing for genomic analysis;
- c) transformation: introduction of individual genes conferring potentially useful traits into plants, trees, livestock, and fish species;
- d) molecular breeding: identification and evaluation of useful traits by use of marker-assisted selection, which greatly speeds up traditional breeding processes;
- e) diagnostics: identification of pathogens by molecular characterisation; and
- f) vaccine technology: use of modern immunology to develop recombinant DNA vaccines for improved disease control against lethal diseases of animal and fish.

There are widespread public concerns about the potential adverse impact of genetically modified organisms (GMOs) on human health and the environment. Some of these concerns are well-founded. In order to take advantage of recombinant DNA technologies without associated harm to human or ecological health, it is important that every country has in place suitable institutional structures and regulations for biosafety, bioethics and biosurveillance. A recent statement issued by the Royal Society of London on "Genetically Modified Plants for Food Use" provides guidelines for the safe handling of biotechnological applications (Royal

Society, 1998). Also, the basic feedstock for the biotechnology industry is biodiversity, and this remains a major interest of IUCN.

The Information Technology Revolution

New communication and computing technologies will have profound implications in everyday research activities.

- a) Access to the Internet will soon be virtually universal, and it can provide unrestricted low-cost access to information, as well as highly interactive distance learning. The Internet will not only facilitate interactions among researchers, but also greatly improve their ability to communicate effectively with the potential users of their research knowledge.
- b) Computing makes it possible to process large-capacity databases (libraries, remote sensing and GIS data, gene banks) and to construct simulation models with possible applications in ecosystem modelling, and preparation of contingency plans to suit different weather probabilities and market variables.
- c) The software industry is continuously providing new tools that increase research productivity and create new opportunities for understanding complex systems of growing conditions.
- d) Remote sensing and other space satellite outputs are providing detailed geographic information useful for land and natural resources management.

The Ecotechnology Revolution

Knowledge is a continuum. There is much to learn from the past in terms of the ecological and social sustainability of technologies. At the same time, new developments have opened up new opportunities for developing technologies which can lead to high productivity without adverse impact on the natural resources base. Blending traditional and frontier technologies leads to the birth of ecotechnologies with combined strength in the following areas:

- o Economics
- o Ecology
- o Equity
- o Employment
- o Energy

For example, in the area of water harvesting and sustainable use, many lessons can be learned from the past. In the desert area of Rajasthan, India, drinking water is available even in areas with 100 mm annual rainfall, largely because women are continuing to harvest water in simple structures called kunds. In contrast, drinking water is scarce during summer months in some parts of North East India with an annual rainfall of 15000 mm. Thus, there is need to conserve traditional wisdom and practices, which are being lost at an accelerating rate (Agarwal and Narain, 1996). The decision of the World Intellectual Property (WIPO) to

explore the intellectual property needs, rights and expectations of holders of traditional knowledge, innovations and culture is hence an important step in widening the concept of intellectual property. Principles of ethics and equity demand that this invaluable component of IPR gets included when the TRIPS agreement (Trade-Related Intellectual Property Rights) of the World Trade comes up for review in 1999. FAO has been a pioneer in the recognition of the contributions of farm families in genetic resources conservation and enhancement by promoting the concept of "Farmers Rights". Like WIPO, UPOV (Union for the Protection of New Varieties of Crops) should also undertake the task of preparing an integrated concept of breeders' and farmers' rights.

PRECISION FARMING AND SUSTAINABLE FOOD SECURITY

"Precision agriculture" involves a systems approach to experimental design and agronomic practices. It needs inter-disciplinary research drawing on expertise in a range of subject areas such as agronomy, plant science, genetics, soil science, entomology, meteorology, weed science, plant physiology, plant pathology, ecology and economics (National Research Council, 1997). Agricultural extension workers using information technology will play an increasingly important role in crop production and natural resource management. The curricula of agricultural schools and colleges need to be modified to make precision agriculture the road to an ever green revolution. Precision agriculture is particularly valuable for increasing opportunities for skilled employment in the farm sector. For example, computer software development, equipment fabrication and sales, custom hiring of software and farm equipment, local production of biofertilisers, biopesticides and drip irrigation equipment and consultancy services can all provide new opportunities for unskilled workers to become skilled.

Precision farming methods have to be based on scientific land and water use planning. They will need concurrent attention to natural capital stocks and nature's services. Examples of stocks include: soils and soil nutrients; biodiversity; water; minerals; forests; and oceans. Examples of nature's services include: water cycles; nutrient cycles; carbon sequestration; and waste recycling. Agro-forestry and other sustainable systems of land management need to be popularised in areas experiencing varying degrees of desertification. Costanza *et al.*, (1997) have assessed the value of 17 ecosystem services and flows for 16 biomes (desert, tundra, ice/rock excluded) at US\$33 trillion per year. By comparison, global GNP is now \$18 trillion per year. Food production services of crop lands is \$130 billion per year. Thus, the need to conserve ecosystem services and flows under varying agro-ecological conditions through precision farming practices can hardly be over-emphasised.

In the emerging knowledge-intensive agricultural era, international co-operation is vital for taking the benefits of new technologies to those who have so far been bypassed by new knowledge and techniques. Women farmers and farm labour need particular attention in any agricultural extension and development programme designed to reach the unreached. The gender dimension needs to be internalised in all research, educational and development programmes intended to promote the conservation of biodiversity and natural resources (Swaminathan, 1998). Sustainable agriculture in the 21st century will be based on the appropriate use of biotechnology, information technology and ecotechnology. Practical achievements in bringing about the desired paradigm shift will depend upon public policy

support and political action. Regulation through legislation, social mobilisation through local level community organisations and education through the mass media and information shops will all be needed to meet the dual demands for food and ecological security.

The experience of the present century teaches us that unless technology and public policy are rooted in the principles of ecology, social and gender equity, employment generation and energy conservation, development will not be environmentally and socially sustainable. While technological progress, particularly in the areas of genomics, molecular breeding and information technology is rapid, much of the new knowledge and technology is coming under monopolistic control through the system of intellectual property rights (IPR). Support for public goods research is shrinking, while investment in research for commercial projects is increasing at a fast pace. At the same time, it is known that knowledge is a continuum and that much of the progress in molecular breeding has become possible because of the genetic conservation traditions of rural and tribal women and men.

Also, a recent study in USA showed that 73% of private patents were based on knowledge generated by public-funded institutions like universities and government laboratories (Thurrow, 1997). The ethical aspects of genetic engineering research are also assuming significance (Reiss and Straughan, 1996).

Thus, on the one hand we need new tools to solve the serious environmental and economic issues confronting humankind; on the other hand, important ecological, social and ethical issues relate to the use of such new tools, particularly the recombinant DNA technology.

The Convention on Biological Diversity shows a way to approach this dilemma. For the first time, an internationally binding convention views the problems of conservation, sustainable use and equitable sharing of benefits in a holistic manner. Also, for the first time, international organisations like the World Intellectual Property Rights (WIPO) are looking at human creativity in an integrated manner. The edifice of both human food and health security has been built on the knowledge gained and material conserved by rural and tribal communities. Knowledge is a continuum and it is obvious that if its roots are starved, the tree of knowledge will not bear fruits for long. Traditional knowledge forms the backbone of modern discovery. Recognition and reward systems for traditional knowledge and genetic material should ensure that:

- o commercialisation of knowledge does not result in inhibiting the sharing of knowledge and material for public good;
- o the gender dimension is internalised in benefit sharing mechanisms; and
- o the reward system helps to preserve and revitalise the conservation ethics of rural and tribal communities.

The emerging biological and knowledge revolution will need appropriate national, regional and global systems of knowledge creation and sharing based on Albert Einstein's dictum, "concern for man himself and his fate must always form the chief interest of all technical

endeavours in order that the creation of our minds shall be a blessing and not a curse". As stressed earlier, effective mechanisms for biosafety, bioethics and biosurveillance will be needed for taking advantage of genetic engineering without associated ecological and or social harm. There must be an internationally agreed protocol on biosafety as provided in Article 19 of the CBD in order to ensure the environmentally safe handling of genetically modified organisms.

The importance of information empowerment will be clear from the fact that in the referendum conducted on 7 June 1998 in Switzerland, contrary to general expectation, more than 66% of people and all the 26 cantons voted against outlawing genetic alteration of animals and the release of genetically modified organisms into the environment. According to Professor Heidi Diggelmann, President of the Swiss National Science Foundation, this was because of researchers talking to the people in the streets and addressing their concerns and fears (New Scientist, 13 June 1998).

IUCN AND THE BIOLOGICAL CENTURY

On the occasion of the 50th anniversary of IUCN, I would like to suggest that IUCN consider launching a Global Knowledge System for Ecological and Livelihood Security. Such a system should be designed in a manner that information on the art and science of sustainable development reaches every hamlet in our planet. The uncommon opportunities now available in the area of communications through electronic networks make it possible to spread knowledge much more effectively to all who need it. The IUCN Knowledge System should concentrate on "do how" and not merely on "know how". In a lecture on "Agriculture in the Spaceship Earth" that I delivered in New Delhi in 1973, I dealt with the contrasting ecological and technological needs of those surviving for existence, in contrast to those who are living in affluence. I then mentioned that developing countries need a "do ecology", which can show the way to sustainable livelihood security. In contrast, the industrialised nations need a "don't ecology" to prevent the further expansion of unsustainable lifestyles and consumption of natural resources (see Swaminathan, 1982).

The proposed IUCN Knowledge System Network could help to disseminate information on issues such as:

- o Population supporting capacity of ecosystems;
- o ISO 14000 standards of management of the environment;
- o Opportunities for eco-jobs and eco-business;
- o Training of eco-preneurs, i.e., entrepreneurs well versed in ecological ground rules;
- o Indicators of sustainable and unsustainable development;
- o Global Conventions on climate, biodiversity, and desertification and the UN Convention on the Law of the Sea;

- o Information contained in IUCN Red Data Books;
- o Biosafety, bioethics and biosurveillance.

The proposed IUCN system should also undertake the following tasks:

- o Providing scientific and technical databases to developing countries; and
- o Special websites for communicating with the developing world.

The emphasis of the proposed IUCN Knowledge System should be to spread an Ecology of Hope and not of despair. It should pay attention not only to frontier science and technology but also to traditional wisdom and technologies (as called for under Article 8(j) of the CBD). Unless the ecological security of an area and the livelihood security of the community living in that area are symbiotically linked, environmental degradation will continue. The emerging Biological and Knowledge Revolution offers scope to harmonise seemingly conflicting interests, such as:

- o Ecological security and economic progress
- o Conservation and commercialisation
- o Traditional knowledge, frontier science and technology
- o Economics and equity
- o Employment and economic growth
- o Poverty and degradation of common property resources
- o Affluence and unsustainable lifestyles
- o Private profit and public good.

CONCLUSIONS

We now have uncommon opportunities for linking environmental security with human welfare (Swaminathan, 1994). IUCN's unique role could be in spreading knowledge and awareness of such opportunities. Awareness is essential for analysis leading to action. IUCN was born 50 years ago against the backdrop of war, famine, nuclear explosion and disintegration of colonial rule. Drawing inspiration from its past achievements, IUCN now has the opportunity to become the flagship of a world wide movement for global ecological and livelihood security. By fostering a coalition of all concerned, IUCN can help to ensure that the Biological Century becomes an era of opportunity for every individual to lead a productive and healthy life.

The above goal can be achieved only if we work for an ever-green revolution world-wide, where green plants can not only help to harvest sunlight for food security, but also increase carbon absorption and provide the habitats essential for the conservation of biodiversity. An ever-green revolution is essential for conserving forests, meeting the needs of the growing population for food, fodder, fuelwood and other agricultural commodities and increasing the income and livelihood security of the rural and urban poor. Molecular mapping and breeding can make significant contributions to the spread of an ever-green revolution in the coming millennium by helping to produce novel genetic combinations, designed to overcome the environmental hazards associated with the green revolution of the last quarter of this century. Adherence, both in letter and in spirit, to the principles of equity and ethics enshrined in the Convention on Biological Diversity is however essential for ensuring that the biological revolution leads to harmony both within humankind and between humankind and nature. The proposed IUCN Global Knowledge System for Ecological and Livelihood Security can help to throw light where darkness persists and foster a global consensus for a better common present and future for humankind.

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RESPONSES TO KEYNOTE SPEECH

By: Carlos Joly, Monsanto Europe, (Belgium)

I am deeply honoured to comment on the ideas of a person so wise as Dr. Swaminathan, considered by many to be the father of the Green Revolution, which has brought so much to so many. I find myself in agreement with all he has said. I am reminded of a saying my mother used to repeat in Argentina: "*No hay mal que por bien no venga. Y no hay bien, que en mal no pueda terminar*". Every bad has some good in it. Every good can result in harm.

Biotechnology is a good that, managed improperly, could result in harm, just as Dr. Swaminathan warned about chemically-intensive agriculture in 1968. But managed properly, it can do a world of good.

Agricultural biotechnology, which some have called the Second Green Revolution, has been met with scepticism in some countries, particularly in Europe. Why? There are several reasons, in my view, but in the few minutes I have here, let me mention just two:

First, there is no economic imperative among farmers in Europe to produce more food with less cost and less inputs. At the risk of oversimplification, one could say that the Common Market farm subsidy system runs counter to eco-efficiency. Instead of producing more with less, European farmers do well by producing less with more. And biotech, so far, has delivered products that reduce the costs of agriculture by reducing the amounts of pesticides required and reducing the amount of tillage that has been customary, while at the same time increasing yields by 5, 10, or even 50%, depending on the crop and the conditions of infestation by insect pests.

There is accumulating evidence that biotech agriculture can lead to up to 90% reductions in soil erosion, and an increase in biodiversity in soils and in insects, as well as reductions of over 80% in insecticide spraying and about 20% reduction in herbicide use. These figures are based on independent data collected from commercial plantings in the US and comparable data can also be generated elsewhere, to see what actually happens in other agronomic and environmental conditions.

Second, the biotech industry is just beginning to communicate with the public and we have a long way to go. All the biotech crops and foods on the market today have been thoroughly tested by many regulatory bodies and proven safe for the environment and for eating. Nonetheless, consumers express concerns about possible unforeseen consequences or unintended effects from planting biotech crops commercially. And these concerns need to be taken seriously.

We all know that ecosystems are not deterministic, and that no form of agriculture can be predicted with certainty. We in industry are as concerned about potential risks as everybody else is. We do not ignore risks. We need to identify them if they occur, quantify them, and find out how to control them. The development of herbicide resistance or insecticide resistance would hit the biotech industry hard, eating into our revenues and profits while

farmers would immediately buy other seeds than ours; so the biotech industry is taking responsible measures to prevent, control, and manage these risks.

This is not to say "trust me"- it is to say that we are and will be pro-active about these issues and we support responsible regulations with effective environmental monitoring and response procedures. That is why we have worked closely with regulators in the UK and elsewhere to manage the commercial introduction of biotech crops in a controlled manner, and plan to incorporate environmental monitoring procedures so that if there should be any unexpected surprises, they can be analysed and dealt with expeditiously.

In the spirit of Dr. Swaminathan's remarks, I would like to propose for thought three principles for the introduction of agricultural biotechnology. Let me underline that these are just personal reflections, and do not represent an industry position or a proposal :

1. Biotechnology should attempt to redress existing environmental problems created by chemically-intensive agriculture. Genetic improvements in plants should try to result in: less toxic and persistent pesticide use; less desertification and soil erosion; increased yields; and increased biodiversity. When assessing risks versus benefits, performance along these dimensions should be taken into consideration, relative to mainstream industrialised agriculture.
2. Ethical considerations should apply. There are no generally accepted principles of bioethics, just as there is no generally accepted model of sustainable agriculture. Personally, and again I stress this is just a personal opinion, I would propose that two ethical criteria are relevant: the utilitarian maxim of the greatest good for the greatest number; and the Rawlsian principle to create benefits also for those least advantaged; that is, for small and subsistence farmers.
3. Policymakers should rely on the best available scientific evidence as a basis for decision-making, recognising that scientific uncertainty about the future should not be used as an excuse not to introduce new technology that can clearly benefit countries for whom agricultural eco-efficiency is an economic imperative. The precautionary principle should be applied when there is actual and sufficient evidence for precaution, balancing risks against benefits, and not simply when there is a supposition of possible harm.

As a former investment banker and funds manager, I consider that perhaps the greatest threat to food security and to the environment today are the indirect but real effects of excessive financial volatility and financial fragility in developing countries, largely imported from money centres in the developed world.

In recent months enormous damage has been done to small farmers and their ability to produce food - credit has disappeared for small farmers in developing areas, from Ukraine to Argentina. Without credit, how can farmers buy the quality seeds they need, as well as other necessary agricultural inputs? Lack of credit to farmers causes poverty, unsustainable farming, and food shortages.

So I'd like to end with a suggestion: the UN has a Global Environmental Facility - why not also create a Global Food Production Facility to help farmers, particularly small farmers, by providing credit on reasonable terms in conjunction with technical education and support? The best way to make sustainable agriculture happen is to give farmers the means to do it, and this includes not only knowledge and technology, but also working capital. That would be a real step towards reducing the gap between rich and poor that Dr. Swaminathan addressed.

By: Tom Lovejoy, Smithsonian Institution and World Bank (USA)

Ultimately, our species needs to return permanently to the biological basis of human existence. The Green Revolution has bought us some time, and conservationists certainly have a strong vested interest in supporting more efficient agriculture. In order to continue producing sufficient food for our species while enabling other ecosystems to function, agriculture will need to be made more effective, often involving intensification. The technology in doing so is likely to be neutral, with the serious challenges coming in how it is applied.

The return to biology goes far beyond agriculture, to include bioremediation to help restore damaged ecosystems and improved human health. Information technology can also help give us new forms of resource use, for example rubber tappers using global positioning systems to locate particular places in the Brazilian rainforest. We also need to be much more effective in the way we use existing information, for example through the use of field guides. Finally, we need to find more effective ways of ensuring that the various mass media are well informed about the critical environmental issues, and are able to cover these in a balanced and effective way.

By: Grethel Aguilar Rojas, Centro de Derecho Ambiental y de los Recursos Naturales (Costa Rica)

No less than 90% of biodiversity, taking the term to include species, ecosystems, and their genetic and biochemical material, is located in tropical and subtropical regions, in the care of indigenous peoples and communities, who contribute their basic traditional know-how to the management and use of all that biological diversity. Furthermore, the 7% of the earth situated in indigenous land contains 70% of the world's biodiversity.

I come from the Meso-American region, which has a population of over 15 million indigenous inhabitants, many of whom share their lands with protected areas. While some of these peoples in our region have recognised protected areas and have been co-operating with government authorities, other indigenous peoples do not recognise them and rather seek independence for their lands and lifestyles. This is why I would like to dwell on two points made by Dr. Swaminathan in his address which more than ever require the attention of the international community: first, the point that there is a considerable store of knowledge, innovations and practices of indigenous peoples related to biological resources; and second, the point that men and women working in rural areas tend to respond to technological progress and to the opportunity to access it as a means of securing and improving their living conditions.

These two points illustrate the keywords of the "Biological Century", namely knowledge and technology. Latin America is testing lucrative new markets; the pharmaceutical and agricultural industries have been focusing on the immense genetic diversity of the region and hence on the need to protect their investments through the intellectual property system. While the concern of these industries to safeguard their interests may be considered legitimate, a basic question still remains: how can we in the developing countries benefit from these systems, especially considering that the technological sector is now starting up in the region?

With regard to knowledge, I would like to recall the words of Dr. Swaminathan when he said that new knowledge and technologies were falling under monopolistic control through the Intellectual Property Rights system. This is why negotiations on biological diversity and intellectual property rights must also cover the protection of inventions derived from research into and the use of genetic resources, appropriate mechanisms for controlling abuses of dominant positions in markets generated on the basis of monopolies, and analysis of self-generated systems for the protection of inventions and innovations derived from the use of genetic resources.

It has to be recognised that when access to genetic resources depends on the knowledge of indigenous peoples or local communities, the informed right of those peoples to that knowledge and to a share of the profits arising from commercial use of those resources must be respected. Furthermore, clear guidelines (which some call codes of conduct) must be established very soon regarding the use made of the knowledge of indigenous peoples and local communities concerning natural resources and biological diversity.

With regard to emerging knowledge on agriculture, we must share the benefits of new technologies and we must learn from traditional knowledge, in an effort to ensure an equitable distribution of benefits. The sustainable use of biological resources is vital for the production of food and for the physical wellbeing of the populations involved. Mechanisms must therefore be proposed for offsetting the losses incurred by farmers who choose not to sow commercial varieties, which would be a way of compensating "Farmers' Rights" and will benefit the overall environment. This compensation may be considered as the additional cost arising from implementation of the CBD.

With regard to technology, while Article 16 of the CBD defines principles for the transfer of technology to developing countries, its terms in this respect are very general and do not specify any concrete obligations between the contracting parties. It is clear that in the developing countries we have a limited capacity when it comes to the knowledge and use of new technologies that imply the application of modern engineering and scientific methods, and it is equally clear that the transfer of this North-South technology is indispensable for our economic growth. Nevertheless, another form of technology is known as "informal technology", which I prefer to call "traditional technology", like the knowledge that an indigenous doctor has of the properties and medicinal use of plants. If we recognise this type of traditional technology, then we can forget the myth that the transfer of technology occurs only in a North-South direction (bearing in mind that it is chiefly a North-North phenomenon), and we will come to perceive that technology, albeit unrecognised, also flows South to North.

In the light of the above arguments, I would urge the countries of the world to concentrate directly, fairly and equitably on the search for better living conditions for present and future generations. On the 50th anniversary of IUCN, Latin America offers the world a laboratory of biodiversity giving hope to a world in need of food, medicines, clean water and clean air. I believe in the green revolution, in which plants will supply our needs, absorbing carbon, yielding food and curing our illnesses.

In the next century, IUCN can play a fundamental role by ensuring that traditional knowledge advances hand in hand with scientific knowledge, by safeguarding biodiversity for commercial purposes and by ensuring an equitable distribution of the benefits derived therefrom among the inhabitants of planet Earth.

By: Hervé LaPrairie, President, IFOAM (Germany)

Many developed countries are already well along this path, and many developing countries are also showing remarkable progress. In the agricultural sector, about 70% of the work is done by women in most countries. For them, the key issue is the security of resources that support food production. Organic agriculture also needs standards, so that consumers can have full confidence that the products they are purchasing have in fact been grown in the agreed manner.

Organic farming is based on healthy ecosystems and rich biodiversity, and therefore is entirely consistent with IUCN's mission. By contrast, much of modern agriculture is based on the inputs of significant amounts of energy, including for fertilisers and pesticides. Organic agriculture, by contrast, uses natural fertilisers and natural approaches to combating pests.

The organic agriculture movement opposes genetically modified organisms because such technology simply is not necessary. Agriculture still has great potential without recourse to GMOs. It is apparent that the primary beneficiaries of GMOs are the large "life sciences" corporations, who earn profits by making farmers dependent upon the products they provide. Because agriculture still has great potential without recourse to genetically modified organisms, we need to be very cautious in adopting such technologies. Customers of organic farmers simply do not accept genetically modified foods. IFOAM calls on IUCN to give more attention to the need to develop economic sectors that are sensitive to organic farming systems.

COMMENTS FROM PARTICIPANTS

IUCN should return to its core concerns regarding nature conservation. The proper IUCN role is that of the global ecological conscious, but this role is not being played very well. IUCN needs to be much more outspoken about environmental insults, such as the role of Southeast Asian timber companies or the shipment of ivory to Asia. IUCN needs to stick to its root concerns.

IUCN must denounce crimes against nature, being much more critical and outspoken. Ecology is the key science in sustainable development and certainly requires greater attention.

Finally, IUCN should focus more on management in the coastal zone, where most people live. We regret that IUCN is giving insufficient attention to marine issues, and call on IUCN to restore its leadership position in this field.

Biosecurity in a broad sense involves agriculture, so IUCN cannot afford to ignore agricultural issues as these affect IUCN's mission. Perhaps IUCN should become a monitor of abuses to the environment, a sort of International Security Council for the Environment. This might be called a "Biosecurity Council", as called for in its **Caring for the Earth**.

RESPONSE FROM M.S. SWAMINATHAN

The comments from the various respondents and from the floor were very significant and simply underlined the importance of biological factors in contributing to environmental security. I would like to see IUCN supporting a sort of Environmental Amnesty, a highly credible, dispassionate body that would ensure that environmental abuses are clearly identified and the guilty parties held responsible. Using the best modern technology, such an Environmental Amnesty could become a very powerful international force.

KEY CONCLUSIONS

The discussion today has demonstrated the need for a forum for discussing broader ideas, not just the narrow traditional interests of IUCN. For it is clear that the major issues facing the world today are far broader than just nature conservation, but on the other hand, nature conservation can be addressed effectively only by taking these larger forces into consideration. The knowledge system that IUCN has developed down through the years through its networks of experts has proven very effective, but this network needs to be applied in a carefully targeted way.

The discussions on bio-safety have demonstrated the very strong feelings that are held by IUCN Members, but it is still unclear about how IUCN should become engaged in this important field. But IUCN should not get dragged into the bio-safety negotiations of the CBD, instead working to ensure that biotechnology is harnessed in ways that support the IUCN mission.

1. CONSERVATION

1.c DEALING WITH EXTINCTION

Extinction is the permanent disappearance of a species. While extinction is the ultimate fate of every species, its rate has greatly accelerated in recent years, largely driven by human activities. IUCN's Red Data Books have generated broad public concern for the issue, but the political response has been inadequate. What is the current rate of extinction, what are the driving forces, and what can be done to deal with the problem?

Organizers: IUCN Species Programme and the Species Survival Commission (Simon Stuart)

Chair: George Rabb, Chicago Zoological Society and former Chair, SSC (USA)

Keynote speaker: Sir Robert M. May, Oxford University (UK)

Respondents:

- o Philippe Bouchet, National Museum of Natural History (France)
- o Russ Mittermeier, Conservation International (USA)
- o Ramon Perez-Gil, PG7 Consultores S.C. (Mexico)

CHAIR'S OPENING REMARKS

CHAIR: GEORGE RABB

RAPPORTEUR: SIMON STUART

Concerns about extinction rates were prominent in thoughts of the founders of the International Union for the Protection of Nature (IUPN) back in 1948. The first concerted attempt to document extinction started in the Red Data Book programme in 1963. In 1984 at the Madrid General Assembly the SSC held a symposium entitled *The Road to Extinction*, the proceedings of which were published in 1987. This led to a more objective approach in assessing extinction risk, culminating in the adoption of the new Red List Categories and Criteria by IUCN Council in 1994. The process to develop this new approach to listing threatened species was led by Dr Georgina Mace. The new system works for plant and animal species. A review of the system is in progress, with a particular emphasis on determining how it applies to fecund marine species. Site-based approaches to assessing threat and determining conservation priorities, such as the hotspot methodology used by Conservation International, are also important responses.

If the conservation movement is to have a real impact in reducing extinction rates, then there needs to be more of a focus on biodiversity as a whole, and less on flagship species (since this latter approach makes no sense on either evolutionary and ecological grounds). The major geographic mismatch between economic wealth and richness in biodiversity is a major handicap in reducing the global extinction rate. Extinction is everyone's problem.

Conservation: Dealing with Extinction

By: Robert M. May, Department of Zoology, Oxford University,
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ABSTRACT

The problem of species extinction is worsening. About 1.5 million species of plants and animals have been named to date, but we do not know the precise dimensions of the problem because we do not know how many species exist; the total number of species plausibly ranges between five and 15 million. Extinction rates are best known in the well documented groups, such as birds and mammals, where recent extinction rates are around 100 to 1,000 times faster than the average background rates; these rates are likely to increase by an order of magnitude over the next century or so. Recent syntheses by IUCN indicate that 5% to 20% of vertebrates and trees are threatened with extinction, and the better studied the group, the higher the proportion that tends to be assessed as threatened. Society is facing important decisions about how to invest scarce resources to conserve these species. It might be most appropriate to give priority to species with a long "independent evolutionary history", whose loss is likely to result in the loss of information developed over a long evolutionary history. Conservation priorities increasingly need to be based on a "calculus of biodiversity", along with more explicit recognition of political, economic, and social realities.

INTRODUCTION

Any discussion of current and likely future rates of extinction of species must begin by asking, how well do we know the world of plants, animals and micro-organisms with which we share this planet? The answer, by any one of a variety of objective measures, must be: not very well. First, estimates of the number of species that have been named and recorded (a simple, factual question, like how many books in the library catalogue) range from 1.4 million to 1.8 million. Second, estimates of the total number of species present on earth today range over more than an order of magnitude, from a low of around 3 million, to a high of 30 million or possibly much more. And third, we have even less idea of the rates at which species may currently be going extinct, as a result of habitat destruction and other consequences of human population growth.

In this brief overview, I outline my own best guess at the answers to these three questions. For the number of distinct species named and recorded, I emphasise the uncertainties caused by unresolved synonymies. For the likely total number of living species, I set out my reasons for leaning to the lower end of the range of published estimates. And for present and likely future extinctions, I sketch a relatively precise approach, based on comparative rates of extinction, which avoids some of the imprecisions inherent in dealing with total numbers of species.

THE PAST

The history of life on Earth, written in the fossil record over the past 600 million years (my) since the Cambrian explosion in the diversity of multicellular organisms, is one of broadly increasing diversity, albeit with many fluctuations and punctuated by episodes of mass extinction. As reviewed in more detail elsewhere (Sepkoski, 1992; May, 1998), the average lifespan of a species in the fossil record, from origination to extinction, is typically a few million years (that is, of the order 10^6 to 10^7 years); there is, however, much variation both within and among groups, and some groups have lifetimes significantly longer or shorter than this. Comparing this few million year average life-span with the 600my fossil record span, we might estimate that 1-2% of all species ever to have lived are with us today. But, allowing for the fluctuating but steady (very roughly linear) average growth in species diversity since the Cambrian, a better estimate might be 2-4%. And if we recognise that most of today's species are terrestrial invertebrates (mainly insects), whose patterns of diversification began around 450my ago and whose average species life-span may be characteristically longer than 10my, it could be that today's species represent more like 5%, or conceivably even 10%, of those ever to have graced our planet.

FOCUS ON EUKARYOTIC SPECIES

In what follows, I restrict attention to species, and eukaryotic species at that. Some justification may be in order.

Why species? As discussed more fully elsewhere (e.g., Wilson, 1992; Groombridge, 1992; May, 1994; Heywood, 1995; Collar, 1997), biological diversity exists at many different levels, from the genetic diversity within local populations of a species, or between geographically distinct populations of the same species, all the way up to communities or ecosystems. Any one of this nested hierarchy of levels can be of predominant importance, depending on the questions being asked. At the most basic level, genetic diversity within species is the raw stuff upon which evolutionary processes work their wonders. At the opposite extreme, "we do not have to embrace the wilder poetic flights of Gaians to acknowledge that ecosystems can usefully be regarded as supra-organisms for many discussions of the way biological and physical processes entwine to maintain the biosphere as a place where life can flourish" (May, 1994). A different kind of hierarchical stratification is oriented toward taxonomy, ranging from races and subspecies through genera and families to phyla and kingdoms.

Given this variety of ways of measuring the dimensions of life on earth, I nevertheless believe working with species is usually the best place to begin. For one thing, there is the practical reason that effective conservation action needs public support, and the public identify more easily with tangible biological species than with abstractions like gene pools or ecosystems. For another thing, although it is undoubtedly more important to preserve habitats and ecosystems than individual species, the choices we will increasingly be forced to make are likely ultimately to be species-based (Wilcove, 1994; Claridge *et al.*, 1997).

Why only eukaryote species? A molecular biologist could justifiably argue that plants, animals and fungi represent only a recently diversified tip of an evolutionary tree whose main

flowering is among bacteria and archaea. But what is meant by "species" among bacteria and the like is vastly different from the criteria employed among plants and animals (see, e.g., Vane-Wright 1992, Bisby and Coddington 1995). For instance, different strains of what is currently classified as a single bacterial species, *Legionella pneumophila*, have nucleotide sequence homologies (as revealed by DNA hybridisation) of less than 50%; this is as large as the characteristic genetic distance between mammals and fishes (Selander, 1985). Relatively easy exchange of genetic material among different "species" of such micro-organisms means, I think, that basic notions about what constitutes a species are necessarily different for animals than for bacteria. This holds even more strongly for viral species, many of which are best regarded as "quasi-species swarms" (Eigen and Schuster, 1977; Nowak, 1992).

NUMBERS OF DISTINCT SPECIES KNOWN TODAY

The systematic naming and recording of species began relatively recently, with Linneaus' canonical work in 1758 which recognised some 9,000 species. Today the total number of living species named and recorded has been estimated at around 1.7 to 1.8 million. Amazingly, no centralised catalogue exists. Synoptic and computerised catalogues have been compiled for some better-known groups, most notably birds and mammals. But more than half (roughly 56%) of all named species are insects, and the majority of these are still on card catalogues in individual museums and other collections. By one estimate (Stork, Priv. Comm.) around 40% of all named beetle species are known from only one site, and many from only one specimen.

The fact that some groups are much better known than others reflects patterns in the taxonomic workforce, which derive from intellectual fashions rather than analytic assessments of priorities. Bird and mammal species are comparatively well documented; even though 3-5 new bird species and around 10 new mammal species are found each year, such numbers are small fractions of the totals recorded in these classes (approximately 9,000 species of birds and 4,000 of mammals). The roughly 270,000 recorded species of vascular plants probably represent 90% or so of the true total. But comprehensive explorations of invertebrates and other groups in previously-unstudied places - tropical canopy insects; deep sea benthic macrofauna; fungi - typically find that 20 to 50%, or even more, of the species are new to science. Taxonomists are distributed roughly evenly between vertebrates, plants, and invertebrates. But there are roughly 10 plant species for each vertebrate animal species, and conservative estimates suggest around 100 insect species for each vertebrate one. Thus current patterns of knowledge reflect the fact that the average vertebrate species receives 10 times more taxonomic effort than the average plant species, and 100 times more than the average invertebrate (Gaston and May, 1992). This is a bad way to run a business.

Hammond's (1995) assessment of the total number of distinct species that have been named and recorded emphasises the uncertainties caused by synonyms. His survey estimates that around 13,000 new species are currently named each year, but current rates of resolving synonymies reduce this number to around 10,000 distinct new species added yearly to the known total. In effect, this corresponds to a synonymy rate of around 20% in named species, a figure elsewhere cited as representative on more direct grounds (Gaston and Mound, 1993; Solow *et al.*, 1995). Altaba (1996) has, however, drawn attention to the great variation in

known synonymy rates among groups (as exemplified by mollusc taxa in Mediterranean regions, where he cites synonymy rates from as low as 5% to as high as 90%).

But any such assessment of known synonymy rates must be a lower limit, with other synonyms yet to be uncovered or accumulating in new work. Sow *et al.*, (1995) have made a start on estimating this true rate of synonymy, using data on thrip species. Here the observed synonymy rate is around 22%, but they estimate the true rate to be more like 39%. For a more detailed review of these synonymy issues, see May (1998).

Allowing for all this, my recent assessment (May, 1998) is that the current global total of distinct eukaryotic species that have been named and recorded is around 1.5 million (see Table 1). This is lower than Hammond's (1995) 1.74 million or the 1.6 million total obtained using Nielsen's (Priv. Comm.) estimates of known insect species (in both cases mainly owing to my greater discounting for synonymies among insect species), but is consistent with Wilson's (1988) estimate of 1.4 million ten years ago (augmented by 0.01 million each year for 10 years). I re-emphasise, however, that this basic fact - the total number of distinct eukaryotic species so far named and recorded - is uncertain to within around 10%, mainly because of uncertainties about synonymies, which in turn derive largely from our lack of synoptic and intercollated databases for the more speciose, but less fashionable, groups.

TABLE 1

Number of named, distinct species of eukaryotes (in thousands)

Group	Hammond (1995)	May (1998)
Protozoa	40	40
Algae	40	40
Plants	270	270
Fungi	70	70
<u>Animals</u>	<u>1,320</u>	<u>1,080</u>
<i>Vertebrates</i>	45	45
<i>Nematodes</i>	25	15
<i>Molluscs</i>	70	70
<i>Arthropods</i>	1,085	855
(<i>crustaceans</i>)	(40)	(40)
(<i>arachnids</i>)	(75)	(75)
(<i>insects</i>)	(950)	(720)
(<i>other</i>)	(20)	(20)
<i>Others</i>	95	95
Total	1,740	1,500

WHAT IS THE TOTAL NUMBER OF SPECIES EXTANT TODAY?

The true total of extant species, as distinct from those we have named and recorded, is hugely uncertain. My recent assessment of the evidence and uncertainties led to a guess of around 7 million in total, with a plausible range of 5 to 15 million (see Table 2, after May, 1998). This

is lower than Hammond's (1995) guess of 12 million eukaryotic species, but higher than one based on Nielsen's (Priv. Comm.) guess of 2 million insect species in total. Estimates as low as 3 million, or as high as 100 million or more, can be defended.

TABLE 2

Estimated total numbers of living eukaryotes species (in thousands)

Group	Hammond (1995)		May (1998)
	High – low	Working Figure	
Protozoa	200 – 60	200	100
Algae	1,000 – 150	400	300
Plants	500 – 300	320	320
Fungi	2,700 – 200	1,500	500
Animals	100,000 – 3,000	9,800	5,570
Vertebrates	55 – 50	50	50
Nematodes	1,000 – 100	400	500
Molluscs	200 – 100	200	120
Arthropods	100,000 – 2,400	8,900	4,650
(crust)	(200 – 75)	(150)	(150)
(arachnids)	(1,000 – 300)	(750)	(500)
(insects)	(100,000 – 2,000)	(8,000)	(4,000)
Others	800 – 200	250	250
Total	100,000 – 3,500	12,200	6,800
Range	: 100 - 3 million		
Plausible range	: 15 - 5 million		
Best guess	: 7 million		

Such estimates are usually dominated by insect totals. I favour an estimate of around 4 million insect species in total, partly based on the methods developed by Gaston and Hudson (1994). This is lower than Hammond's 8 million insect species, but higher than Nielsen's 2 million, either of which could be correct. My total also reflects a distrust of the dramatic upward revision of fungal species numbers by Hawksworth (1991) and of marine macrofaunal species by Grassle and Maciolek (1992), among other things. For a more detailed review, see May (1998).

For the purpose of "dealing with extinction", however, the essential point is that we have only the vaguest idea - uncertain to within an order of magnitude - about how many species of plants and animals are alive today. Even if we had accurate information about overall extinction probabilities, today and in the likely future, any estimate of the number of

threatened extinctions would necessarily reflect this order-of-magnitude uncertainty in species' numbers. And, in fact, we know even less about extinction probabilities than about species' numbers.

EXTINCTION RATES

Over the past century, IUCN's rigorously documented extinctions in well-studied groups - primarily birds and mammals - have run around one species per year (Baillie and Groombridge, 1996). Because tropical species typically receive less attention, true extinction rates of birds and mammals are undoubtedly higher (Diamond, 1989; Baillie and Groombridge, 1996; May, 1998). But even one per year among the roughly 13,000 species of birds and mammals translates to expected species' lifetimes, based on documented recent extinction rates, of around 10^4 years. Although seemingly long, this is shorter by a factor of order 10^{-2} to 10^{-3} than the background average lifespan of 10^6 to 10^7 years seen in the fossil record. That is, recent extinction rates in well-documented groups have run one hundred to one thousand times faster than the average background rates.

Looking toward the immediate future, four different approaches to estimating impending rates of extinction suggests species' life expectancies of around a few hundred to one thousand years. One of these approaches is based on the above-mentioned species-area relations, coupled with assessments of current rates of tropical deforestation or other habitat loss (if tropical forests are being lost at the rate of 1-2% each year, the species-area relation implies that this commits 0.25-0.5% of their species to extinction, which inverts to a rough estimate of species' lifetimes of roughly 200-400 years). Two other methods are based in different ways on IUCN's current catalogue of "endangered" or "vulnerable" species. As reviewed elsewhere (May *et al.*, 1995), one of these estimates the average rate at which species in better-studied groups (birds, mammals, palm trees) are climbing the ladder of IUCN categories of endangerment; this suggests expected species' lifetimes in the range 100 to 800 years in these groups. A more precise variant of this approach uses species-by-species assessments of extinction probability distributions as functions of time. Using 10 vertebrate groups (3, 4, 3 orders or families of reptiles, birds, mammals, respectively), Mace (1994) estimated average species' lifetimes in the range 100 to 1000 years, and mainly in the 300 to 400 year range for mammals and birds. The fourth method uses models for branching processes in phylogenetic trees, along with recent data for bird and mammal orders, to project average times to extinction within bird and mammal orders (McKinney, 1998); under a range of assumptions about branching processes, these models suggest species' lifetimes again of the order of a few hundred years (characteristically shorter for mammals than birds). Thus all four of these methods, each of which is unreliable in its own distinctive way, agree in suggesting a further shortening of expected species' lifetimes, to around 100 to 1000 years.

Such figures correspond to likely extinction rates of a factor of ten thousand, give or take at most an order of magnitude, above background, over the next century or so. This represents a sixth great wave of extinction, fully comparable with the Big Five mass extinctions of the geological past, but different in that it results from the activities of a single other species rather than from external environmental changes.

THREATENED SPECIES OF ANIMALS AND PLANTS

The preceding section attempted to assess extinction rates, in relation to the average background rates seen in the fossil record, based on the best available data. I now turn briefly to survey more detailed information about the numbers of species threatened with extinction, in the sense of species classed as "endangered" or "vulnerable" by the IUCN Red Data criteria (which themselves are, for understandable reasons, evolving; for an overview, see Oldfield *et al.*, 1998, pp. 630-631).

Table 3 sets out the most recent synoptic IUCN compilation for animals (in this table "threatened" includes the categories "probably extinct, endangered, vulnerable", but not "rare, or insufficiently known"). Roughly half the recorded extinctions have occurred this century. Many authors have emphasised the biases and shortcomings in these data, which speak eloquently for the greater attention lavished on vertebrates (and particularly on birds and mammals) compared with invertebrates. The true situation is even worse than suggested by Table 3, because (as noted above) the fraction of extant vertebrates that are known to science is higher - probably much higher - than for invertebrates.

It is notable that among the best known groups, 24% of all mammal species and 12% of all bird species are threatened. There is every reason to believe that true rates of threat run similarly high for the less well studied other vertebrate groups (arguably, freshwater fish are the most threatened of all vertebrates), and for invertebrates.

Table 4 gives figures for vascular plants that parallel those of Table 3 for animals. As discussed above, plant species are less well documented than birds and mammals, but better than most other animal groups (especially invertebrates). It is therefore interesting to note that the overall fraction of plant species recently documented to be extinct - a few tenths of a percent of the total - is in the same range as for vertebrates other than birds and mammals, although much higher than invertebrates. Likewise, the overall proportion of vascular plant species listed as threatened runs around 6%, less than birds and mammals, more than other vertebrates, but in the same ballpark.

More particularly, a recent report on the conservation status of the world's roughly 100,000 tree species ("a woody plant, growing on a single stem, usually to a height of over 2 metres") gives the following figures: 95 extinct (including 18 extinct in the wild); 976 critically endangered; 1,319 endangered; 3,609 vulnerable (Oldfield *et al.*, 1998). This corresponds roughly to proportions of 0.1% extinct and 6% threatened (here I take "threatened" to have the usual meaning of "endangered" or "vulnerable", but exclude other categories of lower risk which are included in the report). So, again, the proportion of all trees documented to be threatened with extinction lies around the 6% figure noted above.

In short, assessments of the conservation status of vertebrates and of trees and other vascular plants tend to suggest that 5% to 20% of species in these groups are threatened with extinction. Broadly the better studied the group, the higher the proportion assessed as threatened. These are disquieting numbers, and they give local habitation and name to the sweeping generalities about extinction rates presented above.

Does it matter more if we lose 25% of all mammal species than if we lose 25% of the vastly more numerous insect species? Or does it matter equally? Or less? There is need not only for more taxonomic information, but also for a "calculus of biodiversity" based on this information. Such a calculus should, among other things, quantify the taxonomic uniqueness, or amount of independent evolutionary history, inherent in individual species.

TABLE 3

Extinct and Threatened Species of Animals, as listed in the 1996 IUCN Red List (Baillie and Groombridge, 1996).

TAXON	NO. SPECIES CERTIFIED EXTINCT SINCE 1600S	NO. SPECIES LISTED AS THREATENED	APPROX. TOTAL OF RECORDED EXANT SPECIES (THOUSANDS)	APPROX. EXTINCT (%)	APPROX. THREATENED (%)
Vertebrates	315	3,314	47	0.7	7
Mammals	89	1,096	4.5	2.0	24
Birds	108	1,107	9.5	1.1	12
Reptiles	21	253	6	0.4	4
Amphibians	5	124	3	0.2	4
Fish	92	734	24	0.4	3
Invertebrates	326	1,891	1,340	0.02	0.1
Insects	73	537	1,000	0.007	0.05
Molluscs	239	920	100	0.2	0.9
Crustaceans	10	407	40	0.03	1.0
Other	4	27	200	0.002	0.01
Total	641	5,205	1,400	0.05	0.4

Ideally, if we had some quantitative measure of the branch lengths within the phylogenetic tree of the group in question, we could unambiguously quantify the amount of "independent evolutionary history" (IEH) vested in a species, by adding up the lengths of the branches which connect it to the base of the tree and appropriately discounting all shared branches. If we could preserve only, say, half the species in the group, the optimum choice would then be found by maximising the summed branch length that was preserved. But generally we have only the topology of the tree, without quantitative measures of the various branch lengths; in this case, the best procedure would be to assign the branches the lengths that are, on average, most likely for this particular topology, and then go forward on this basis. Such a procedure will, of course, often in fact be sub-optimal, because the underlying evolutionary tree differs from the statistically "expected" one. In general, however, extensive theoretical simulations of choices made on a topological basis, from artificially-generated trees whose underlying branch lengths are known, suggest that values assigned in this way are close to the "true" ones. Ultimately, our question is how much of the IEH within a group will be preserved if we can only save, say, 10 of 20 species? The simulations referred to above suggest that, for the

10 of 20 case, we can on average preserve 82% of the group's IEH if we have quantitative information about branch lengths, 77% if we have only topological information about the branching structure of the phylogenetic tree, and 63% if we must choose at random. For details of such calculations, and a review of the background literature, see Nee and May (1997).

TABLE 4

Extinct and Threatened Species of vascular plants, as listed in the 1997 IUCN Red List (Walter and Gillett, 1998). I have listed as "Threatened" those in the categories "probably extinct, endangered, vulnerable" (but not "rare" or "indeterminate") by IUCN/CITES criteria.

Taxon	Certified recently extinct	No. species listed as threatened	Approx. total of recorded extant species (thousands)	Approx. extinct (%)	Approx. threatened (%)
True ferns and allies	9	228	10,371	0.1	2
Gymnosperms	4	279	807	0.5	35
Angiosperms (dicots) (monocots)	367 (272) (95)	14,337 (11,209) (3,128)	230,835 (167,224) (63,611)	0.2 (0.2) (0.1)	6 (7) (5)
Total	380	14,844	242,013	0.2	6

Real situations will obviously involve many other important considerations, including other measures of the relative values of species (in preserving "ecosystem services", for example), and political and economic constraints on which areas may be preserved. But there is no doubt that, increasingly, agonising choices will have to be made (Williams *et al.*, 1991). I would like to see such a "calculus of biodiversity", along with more explicit recognition of constraining political, economic and social realities, replace emotion in assigning conservation priorities and places on the Ark (although emotional elements should, perhaps, also be part of such a quantification).

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RESPONSES TO KEYNOTE SPEECH

By: Philippe Bouchet, Muséum National d'Histoire Naturelle, Paris, France

In the closing words of his lecture, Professor May says he would like to see a "calculus of biodiversity, along with more explicit recognition of constraining political, economic and social realities, replacing emotion in assigning conservation priorities and places on the Ark". I happen to be the only invertebrate biologist on the Steering Committee of the IUCN Species Survival Commission, and I am used to making my case - or rather, the case of invertebrate conservation - heard based on scientific facts rather than emotion. The earthworm lobby is not very powerful and there is no "Save The Spiders And Slugs" society. A direct result of this lack of emotional support is that only a handful of countries world wide pay specific attention to invertebrate conservation. In fact, the legal definition of "fauna" in many countries simply does not include invertebrates. However, because of this lack of lustre, invertebrates provide us with a relatively unbiased measurement of the impact of man on global biodiversity, and I would like here to use invertebrates to convey two messages on extinction and conservation.

The 1996 *Red List* lists more extinct species of molluscs than all land vertebrates combined. But the telling message is that there are proportionally 300 times as many extinct land and freshwater molluscs as there are marine molluscs. I can assure you that this is not the result of biased scientific information. In fact, the opposite is true: there is globally considerably more scientific expertise available on marine molluscs than on the non-marine ones. When we look at fish, which is another animal group with representatives both in the sea and on the continents, the same pattern emerges.

Does this mean that all is well with the biodiversity of the seas and oceans of the world? We have many other environmental indicators - from the physiological impact of TriButylTin to escalating alien invasions - that bring a clearly negative answer to this question. It simply means that levels of ongoing extinctions are not the right indicator to assess threats to marine biodiversity. The marine environment has no or few geographical barriers, it is a very open and buffered one. In fact, I would like to compare the marine biodiversity crisis to the problems of the ozone layer and greenhouse gases: the problems are geographically so unlocalised that they can be appropriately addressed only at the global - as opposed to local - level. Of course, this is not an arena that the Union has the capacity to enter alone. However, my first message is that, given the increasing international recognition of IUCN analyses, I would like to see more awareness of the limitations of indicators based on extinction rates when it comes to marine biodiversity conservation.

My second message is a consequence of the mind-boggling numbers of invertebrate species shown by Professor May. It is clear that the levels of scientific expertise, public awareness, and economic support for their conservation do not permit a species-by-species approach as is the case for birds and mammals. This has long been admitted by conservationists who are promoting the umbrella species concept. Conservation under the umbrella of a charismatic species is probably the only conservation strategy that can be bestowed to millions of invertebrate species. However, the umbrella species strategy rests on assumptions. It lacks proper demonstration that it is an adequate strategy to safeguard the centres of endemism and species hotspots of invertebrates and plants. As an extreme situation, I would like to single

out the many oceanic islands that have lost their endemic birds, leaving the remaining native fauna and flora without a charismatic species that can act as an umbrella for their conservation. But the umbrella species concept also needs to be evaluated as a strategy to conserve, for example, freshwater species, limestone hills in tropical forests, and other cases of narrow-range endemism. As DIVERSITAS, the international programme for the study of biodiversity, prepares to launch an International Biodiversity Observation Year, I would like to see the issue of the umbrella species strategy rest on a series of documented case studies rather than on assumptions. Fish, snails and plants need our attention not only because birds and mammals feed on them.

By: Russell A. Mittermeier, President, Conservation International,
Washington DC, USA

I would like to begin with a reaffirmation of the fact that maintenance of biodiversity is the single most critical environmental issue, really the core issue in our field. Although we face many different environmental problems, especially the so-called brown or urban issues, which attract much more investment, these can be resolved through technology. Although sometimes we lack the political will or economic incentive to put them in place, we can find tech-fixes to most or all of the brown environmental issues that plague us today. Biodiversity loss is another story. It is irreversible; once a species of plant or animal goes extinct, it is gone and will never be seen again, and of course, we are at risk of not just losing individual species, but rather entire communities and ecosystems and of descending into the sixth major extinction episode.

In the brief time available to me, I would like to make five main points.

First, we are incredibly ignorant about biodiversity as we enter the next millennium. This is best reflected by the uncertainty about species numbers. Bob May's latest estimate is on the order of 5-15 million species. The fact is that almost every time we look at a group of organisms in any detail, we find out how much more diverse it is than we had originally expected. Take, for example, primates from Brazil, with 7 new species since 1990; at least 120 new species of frogs are sitting in museum jars in Colombia, which is already the richest country on earth for amphibians; a recent RAP trip to Irian Jaya discovered roughly 30 new species of frogs in an area the size of a football field; and of course, we have heard a great deal about what is coming out of the deep ocean trenches. However, the actual estimate is less important than the fact that we are still *amazingly ignorant* about biodiversity. Here we are, at the dawn of the 21st century, with an incredibly hi-tech society. We can send spaceships to the farthest reaches of the solar system, we can work out the human genome, we have highly sophisticated information superhighways and can put millions of bits of information onto tiny computer chips, and yet we don't know, certainly to one and maybe to within two orders of magnitude, how many other life forms share the planet with us. As Bob May pointed out, we don't even have a *centralized catalogue* documenting what little that we do know. Our ignorance of the multitude of ecological processes and ecological interactions among the many different life forms is even more profound. And certainly represents several orders of magnitude more.

On top of this, we are still in the Dark Ages in terms of getting a handle on the economic value of *current* biodiversity use - to say nothing of future potential use. We *do* put values on products like timber, rubber, Brazil nuts, etc., that enter into international export, but we are still guessing on watershed protection values, and we really don't have a clue about the regional, local and household values of biodiversity use to the communities and the countries in question. Indeed, for the most part, we don't even have the appropriate metrics in place to begin such assessments. If we take a realistic look at what we don't know, I find that talking about sustainable development based on natural resource use is a little like trying to put together one of these spaceships I mentioned using nothing more than a hammer, a few pieces of scrap metal, and some rusty nails.

What can IUCN do? Well, we certainly can't undertake all that is needed in furthering understanding of the scope and scale of life on earth, but we can be clearer about articulating it as a priority for the international community and for the next century.

The second point relates to the risk of biodiversity loss, and what we find acceptable. Some experts believe that we stand to lose one-third to two-thirds of all species, and a recent very stimulating article by writer David Quammen implies that this is almost *inevitable*, and that we are doomed to end up as a Planet of Weeds - that is, a planet where only the most adaptable and hardy weed species, animals and plants, ourselves included, are likely to persist.

I simply find this *unacceptable*, and think we have to set for ourselves an *ideal* - a *moral high ground* - a *Holy Grail* - of zero biodiversity loss. As soon as we start *accepting, justifying, or rationalising* some level of loss, we wind up in a very dangerous downward spiral from which it will be very difficult to extricate ourselves.

Now, I'm also a realist, and understand this is not entirely achievable. However, if we start packaging the biodiversity crisis in more manageable units, we can become much more effective in our efforts to maintain biodiversity - and this implies *clear priority setting*. There are many priority setting approaches, but the one that we focus on at CI is what Norman Myers has called *biodiversity hotspots*. We are now just finishing up a reanalysis of these hotspots, which, if you are not familiar with them, are the areas with highest concentrations of biodiversity, very high endemics, and under greatest threat. This reanalysis has identified 25 such areas in the terrestrial realm that occupy only about 1.4% of the land surface of the planet that have with them *at least* 50% and probably 60% of terrestrial biodiversity. Given that all of these have already lost 75-98% of their original natural vegetation, it is difficult to avoid the conclusion that these hotspots - places like the tropical Andes, Mesoamerica, the Caribbean, Madagascar, the Atlantic forest region of Brazil, the Philippines, Sundaland, Indo-Burma, the Guinean forests of West Africa, New Caledonia, and others - need to be a major focus of investment in the years to come - *not* to the exclusion of other places, but in rough proportion to the diversity that they harbour.

Fourth, another priority, aside from the endangered hotspots, is presented by the last large blocks of wilderness that still exist, what I call the *major tropical wilderness areas* and what the World Resources Institute calls *frontier forests*. These are few and far between, but are still out there, most notably in the Guyana Shield region of north-eastern South America, the

upper Amazon, the Congo Basin, the island of New Guinea, and the boreal forests of the far North. These areas are still largely intact, and have very low human populations, but they too are now coming under assault. We have a very small, very short, window of opportunity to do something about them before it's too late, by setting up a combination of *very large* pristine protected areas and demarcated indigenous territories, and linking them through corridors and huge biosphere reserves. These include the Guyana Shield, covering 20-50 million hectares occupied by 200,000 to 300,000 people; and the Upper Amazon: maybe 100 million ha or more including 22 million ha of *resguardas* in Colombia with just 60,000 indigenous people living in them.

Doing something in these wilderness areas will involve a serious commitment of resources over the next 2-3 years, and we are looking first and foremost to the private sector to come up with the seed money for getting all of this started, which I think initially might be on the order of \$250 million. Sounds like a lot, but it really isn't. This is only about the cost of one Martian space probe which, after all, was sent out with what I consider to be a biodiversity rationale - the search for life on other planets.

Finally, on the issue of justifying biodiversity conservation through use. Whilst I strongly believe that we should try to demonstrate economic value of biodiversity wherever possible - indeed, my own institution has invested a *lot of money* in this issue over the past decade - I think that inevitably we will only be able to justify conserving a small portion of biodiversity through use. Ultimately, in keeping with the vision of the founders of IUCN 50 years ago, I think that we will have to conserve biodiversity first and foremost simply because it's the right thing to do, and that it represents *the only appropriate course of action* for civilised 21st century society. If IUCN could begin preaching this over its next 50 years, along with the gospel of sustainable development, much could be accomplished.

By: Ramón Pérez Gil Salcido, PG7 Consultores, S.C.(Mexico)

In my view, the subject we are dealing with, namely extinction, is the most critical of all the problems that make up the biodiversity crisis.

A Vision of Extinction

Paul Ehrlich, with whom many of us are acquainted, is fond of using a metaphor to illustrate the problem of extinction and he would tell a story that went more or less as follows. A traveller about to board a plane met a man at the foot of the steps who was selling a collection of rivets that he and his assistants were busy removing from different points of the fuselage and from the plane's wings. The surprised passenger enquired from the vendor whether he knew what he was doing, and whether he realised how dangerous it was for the safety of all those flying in the aircraft to weaken the aircraft's structure by removing rivets in that way.

The salesman replied that they had been engaging in that activity for some time without any problem and that both he and the airline needed the money produced by the sales. He assured the passenger that the plane's manufacturers had no doubt allowed ample safety margins when they had decided how many rivets to use and where to put them, so that as far as he could see there was nothing to worry about.

The meaning Ehrlich attached to the metaphor was that the planet Earth is like the plane and the species are its rivets. We do not know at what point the removal of one more rivet will cause the plane to collapse, a wing to fall off or the fuselage to crack. In the same way, the indiscriminate removal of species may reach a point at which unpredictable synergies are unleashed that might cause a complete breakdown.

Ignorance

Just as there is no way the rivet seller can know in advance which particular rivet will make the crucial difference, so we are in a similar position in the face of the accelerating extinction of species. As Sir Robert May rightly points out, we know very little about the earth's biodiversity. We only have an approximate notion of how many species exist altogether, and we are even more ill equipped to talk about probabilities of extinction; nor can we speak with any authority, except in a few cases, about the diversity and subtleties of the mechanisms that are driving species to the verge of disappearance.

For example, genetic erosion is a form of biological impoverishment that precedes disappearance, about which we know very little, even though we are aware that genetic diversity is the starting point of the evolutionary process. Other blatant gaps in our knowledge concern the varying vulnerability of individual species to extinction, which depends not only on external factors such as the fragmentation, reduction or destruction of their habitats and other pressures to which their populations are exposed, but also on their intrinsic predispositions, to return to Humphrey's expression. Which are in fact the most vulnerable: initially rare populations, or those placed at high trophic levels, or those geared to net reproduction? Is it those that are superspecialised or those that have very specific habitat or eating requirements? And in any case, do we really know how many of the species, as Sir Robert said, have at least been described by science?

In his talk, Sir Robert told us that what is striking as one delves deeper into a major group is the proportion of its species that is found to be threatened. It may be suggested that this just indicates understandable scientific bias, but I feel that quite on the contrary it provides further proof of how little we know of biodiversity and the mechanisms of disappearance.

I am also concerned at the general paucity of knowledge and at the scarcity of the means, opportunities and aids afforded to science to generate it, but even more so at the fact that the little we do know is not devoted to solving the problems of the use, management and protection of biodiversity, and worse still that even when knowledge is made available, it is misunderstood, ignored or disqualified.

A number of examples illustrate the still incipient link between knowledge and the efforts undertaken to counter the processes favouring the disappearance of species. As soon as we began to apprehend the correlation between extinction and the size of protected areas, we realised how poorly in general many types of protected areas have managed to fulfil one of their main objectives, namely the preservation of species. And we are now coming to the same realisation with regard to genetic depression and erosion by cross-breeding of captive stocks, as part of *ex situ* conservation efforts based on our knowledge of minimum numbers.

Needless to say I am not advocating paralysis as a means of furthering analysis. The truly alarming prognosis of extinction rates that Sir Robert has given us points to the immediate need to act on many fronts.

The Priority of Prioritising

Even if we attach a certain value to all species, in relation to their use, change, opportunity or the intrinsic value of their existence, we are still faced with the painful problem of having to prioritise. Sir Robert May suggests that we should look further into the discipline of Biodiversity Calculation as a promising approach to attributing priorities, which would enable us to determine the quantity of "independent evolutionary history" of each species and would leave us in a better position to select either the species or groups of species that are most "profitable" in terms of conservation. In the same way, other approaches to prioritisation are tasks that cannot wait. We obviously cannot undertake them all; nor do we have the necessary human, material or financial resources to do so; nor do we have enough time, as we are starting late. How many of these processes are already in their final stages, so that it is already too late for our action, however well intentioned, to achieve the desired results?

Local Extinction

Strictly speaking, extinction implies that there are no more individuals of a species anywhere on earth, that is to say, extinction is an irreversible phenomenon which is global in nature, while disappearance (or as other authors refer to it, local extinction) means that populations of a given species are lost in particular regions of the planet, although in global terms other populations of the same species may still exist elsewhere.

Rather than extinction as a global phenomenon, I have always felt that disappearances or local extinctions, which precede the former, are more worrying. The reasoning is quite simple: it is easier to put out a match than a bonfire and a bonfire than a roaring blaze. I am therefore of the opinion that it is essential that on a local level, and starting from the criteria proposed by the Species Survival Commission for the global analysis of the status of species, we should build up listing systems and procedures based on compatible and equally sound, accurate and sensible criteria.

Hypotheses Concerning the Biodiversity Crisis

The different hypotheses concerning the causes and nature of the biodiversity crisis, of which extinction is a central element, also originate from different perceptions and concepts. Each one illustrates a type of possible approach to action and highlights paths that we must avoid in future.

According to the social hypothesis, the loss of species is not a scientific problem, but rather one of social and economic inequality. It maintains that we do not need to research any further into threatened species, and that the biodiversity crisis is nothing more than another symptom of social injustice and poverty. Consequently, if we want to tackle the problem at its roots, we need to combat poverty for the greater benefit of nature.

According to the demographic hypothesis, nature has deteriorated because of the growth of the human population, so the only way of halting the biodiversity crisis and by the same token the socio-economic crisis (to the extent that these are seen as separate) is to reduce the rate of growth of the human population to as close to zero as possible.

According to the resource management hypothesis, on the other hand, there is an urgent need for appropriate management of ecosystems and resources, and it argues that the real problem is the way the benefits of biodiversity are used and distributed and not the number of people. In this view, the best approaches to the crisis lie through better care of biosphere reserves combined with their sustainable use.

According to the ignorance hypothesis, also known as the research and development hypothesis, there is still a lot to learn about the processes related to extinction and the survival of species and that we therefore need to find out more about those processes and the best methods of handling natural resources.

All the above hypotheses have something to offer, but considering the complexity of the subject we are dealing with, it also has to be admitted that they must all be seen as either half lies or half truths. Well then, how are we supposed to deal with the problem of the disappearance of species? What a question! There is no single answer, and in fact what we need is a variety of responses, by scientists, by businessmen, by civil society, by governments, by the communication media, by users, by political parties, by multilateral agencies, etc.

It is clear that even though there is a growing awareness of the relevance of worsening extinction rates, there is still no widespread feeling that urgent action is needed to reverse the trends. Extinction is the tip of the iceberg, a symptom of the biological impoverishment of the planet, and in my view, it is the most critical of all the components of the so-called biodiversity crisis.

COMMENTS FROM PARTICIPANTS

It is possible to hold out some hope. The species-area relationship for sedentary communities of species, such as plants, are notable in that the curves tend to flatten out quite quickly. This means that conservation can save the left hand of the curve, whereas loss takes out only the relatively flat right-hand of the curve. This provides hope, and support for protected areas. IUCN should do three things in this regard: a) undertake full inventories of plant communities; b) provide support to the notion of a universal register of species; and c) provide strong support for the training and recruitment of taxonomists.

IUCN should not forget endemism on islands; the focus should not just be on continents. Low-lying islands often lack endemics, including marine endemics around their coastline. Yet they are still important, and these ecosystems need conserving. Second, are invertebrates included in the identification of hotspots? And third, it is important to convince donors that all species are equal.

Why is IUCN not audacious enough to launch a megaproject to address all knowledge of species. We should stop being modest and undertake a major enterprise on life on earth.

Many projects have been planned as a result of the CBD process. Concerning biodiversity in Togo, animals are increasingly killed by rural people, especially since democratisation process began. What can IUCN do about this? People still wonder what IUCN is, even after 50 years of existence. More field action is needed.

IUCN should investigate the extent to which current protected areas covered species' distributions. The World Bank has prioritised biodiversity, but Ministers of Finance must be willing to borrow for biodiversity. However, there have been two important developments. First, the Bank can now give urgent, very small loans. Second, there are now small and medium-sized NGO grant windows in the Global Environment Facility. Less and less money is now available for research, so it is important for IUCN to emphasise education and training.

Very endangered species should be considered part of the world's responsibility, not just of a specific country.

Increasing numbers of television programmes and documentaries support nature conservation. Scientists are now more involved in these programmes. There is increasing impoverishment of human communities and threats to the environment. Many people who are unemployed could be used for nature conservation.

KEY CONCLUSIONS

It is important to realise that there are emotional aspects to conservation. Conservation, caring and beauty go together. Deficient as our knowledge is, lack of information is not holding back behavioural change. So perhaps we should concentrate more on these emotional elements. We need to investigate how we go about changing human behaviour.

1. CONSERVATION

1.d SUSTAINING USE OF SPECIES AND ECOSYSTEMS

Sustainable use is one of the three objectives of the Convention on Biological Diversity and is one of the most important imperatives for the conservation community. What do managers need to know to carry out sustainable use? What is the experience in various parts of the world? How does it relate to issues of land tenure? What are the ecological, social, economic and political obstacles, and how may they be overcome?

Organizer: IUCN Sustainable Use Initiative (Steve Edwards)

Chair: Bertrand des Clers, Director of the International Foundation for Conservation of Fauna (France)

Keynote speaker: Marshall Murphree, Chair, IUCN Sustainable Use Initiative (Zimbabwe)

Respondents:

- o Wang Sung, Chinese Academy of Sciences (China)
- o Gaikovina Kula, IUCN Regional Councillor (Papua New Guinea)
- o Champion Chinhoyi, Zimbabwe Trust (Zimbabwe)

CHAIR'S OPENING REMARKS

CHAIR: BERTRAND DES CLERS

RAPPORTEUR: STEVE EDWARDS

The focus of the session is on sustainable use of species and ecosystems in the wild, which is the principal remit of IUCN. Sustainable use is stipulated as an objective of the *World Conservation Strategy*, and its successor *Caring for the Earth*, which were formally adopted by the members. Furthermore, sustainable use is expressly referenced in the Union's mission statement. Sustainable use is also one of the three objectives of the Convention for Biological Diversity. That said, not all parts of IUCN have the same view of sustainable use. While the Union has always emphasised the need for good science in its conservation, in practical terms, managers of wild renewable resources are not necessarily trained scientists. Nevertheless, they know a lot about the biological characteristics and requirements of the species they are managing.

In this session, as we examine incentives to promote greater sustainability of uses of wild species, the IUCN Secretariat and networks of volunteer specialists may wish to consider how they can lend greater authority to the knowledge of local managers of wild resources. "Western" concepts of resource management, which are being imposed on rural peoples in developing countries, are often derived from studies and research in the developed countries, which have entirely different ecosystems and biodiversity. When the knowledge of the local managers is respected, they will have greater incentive to manage wild species in a sustainable manner.

Studies conducted through IUCN/SSC's regional Sustainable Use Specialist Groups have concluded that enhancing the sustainability of uses of wild species is a process of choice, which must consider economic, social and biological factors. It is also generally understood that sustainable development (which is beyond the scope of this workshop) in rural societies and communities is dependent on enhanced sustainability of uses of wild living resources, which are necessary for them to meet their subsistence requirements and fuel their economic development.

Participants at the United Nations Conference on Environment and Development (Rio de Janeiro, 1992) underscored the need to seek balance and consistency between conservation and development in their endorsement of the Convention on Biological Diversity and the establishment of the Commission for Sustainable Development.

The key to achieving the desired balance will be in the incentives (both positive and negative) which apply to resource managers, local and national governments, and international conventions.

Incentives for Sustainable Use

By: Marshall W. Murphree, Professor Emeritus, University of Zimbabwe,
Chair, Sustainable Use Specialist Group, Species Survival
Commission, IUCN, Box MP 167, Mount Pleasant, Harare, Zimbabwe

ABSTRACT

Sustainable use needs to address issues of supply, demand, competition and control. Control systems involve sets of incentives, both positive and negative, with the most efficient such systems relying primarily on positive inducements. While large scale regimes, for example at global level, may tend to rely on negative incentives, positive incentives become increasingly important at smaller scales; even at the small scale, the most successful sets of incentives will vary widely according to the context. Urban and industrial locations tend to emphasise intrinsic, recreational and existence valuations, while rural and agricultural locations tend to emphasise instrumental and economic valuations; the differences between the two are largely in means-end sequencing. Current strategies being promoted by conservationists tend to emphasise "incentive compatibility" as a means to reconcile scale and valuation differences, but success is impeded by "aborted devolution" that arises from the reluctance of elite sectional coalitions to surrender appropriate power to local stakeholders. Over the past decade, IUCN has democratised its own policy processes, making them more responsive to incentives for sustainability at local level. However, its analytic agendas and activities continue to be driven by its cognitive and bureaucratic location in an epistemic community of thinking and planning, remote from local incentives for sustainability. Thus IUCN has not made sufficient progress in producing analyses and advice incorporating grounded managerial experience and situated scholarship. The democratisation of IUCN's scholarship remains a central challenge to the Union.

INTRODUCTION

Let me begin with a quote from two historians. In their book **The Lessons of History**, Will and Ariel Durant have this to say:

"So the first biological lesson of history is that life is competition. Competition is not only the life of trade, it is the trade of life - peaceful when food abounds, violent when the mouths outrun the food. Animals eat one another without qualm: civilised men consume one another by due process of law" (quoted in Kurlansky, 1998).

I use this quote at the beginning of this paper because it contains three seminal pointers for a discussion of the topic of this session. It speaks of supply, it speaks of demand, and it speaks of competition and control. Mankind's use of species and ecosystems (and, I might add, mankind's use of man) is critically determined by these three variables. And it is in the relationships between the three that the clues are to be found as to whether our use of natural resources is likely to be sustainable or not. Currently our work in IUCN's Sustainable Use Specialist Group is exploring a conceptual framework, stated as follows:

The likelihood that use will be sustainable will depend on the relationships which exist between the demand for a resource, the controls over exploitation of a resource and the resulting supply of the resource. A use is likely to be sustainable when the controls over the resource are sufficient to ensure that its supply does not exceed its biological potential for renewal under all situations of demand (SUSG, 1998).

From this conceptual framework springs a wide range of issues which have been placed on our analytic agenda. Space does not allow me to go into details, other than to say that we place emphasis on comparing "the effectiveness and efficiency of various systems of regulatory control under a range of conditions of demand for and supply of resources" (SUSG, 1998).

This emphasis on control is also the focus of this presentation. In part this is because other themes in this Symposium deal with supply (e.g. "Dealing with Extinction," "The Biological Century," and "Producing More with Less") and with demand (e.g. "Living Within Our Limits"). More important, however, control is a necessary (if not sufficient) condition for sustainability in use and unless we get this condition right our objective will not be attained.

All forms of environmental management are essentially regulatory in function. They are of course more than this and are usually also directed at improving environmental productivity. But as they are above the level of individual management, systems of collective action for collective good must have the institutional means to induce collective conformity if they are to work.

All of this may sound commonplace, and it is an assumption which runs through the international environmental culture of which IUCN is a part. This includes the plethora of environmental conventions with which we interact, such as CITES and the Convention on Biological Diversity (CBD). Thus Article II of CITES in describing its appendix listings speaks of "particularly strict regulation" (Appendix I), "strict regulation" (Appendix II) and "effective control" (Appendix III). The CBD uses similar vocabulary, and in Article 8 we find, for instance, the words "regulate," "manage," "control" and "prevent."

What is unfortunately not so commonplace, however, is the recognition by this international environmental culture that effective regulation is far more than a matter of proscriptive legislation. We only grasp this when we understand a central sociological insight, that regulation is comprised of a set of incentives, both negative and positive.

Incentive is thus the fulcrum of regulation. Regulation almost invariably requires an element of negative incentive ("disincentive"), proscriptions backed by powers to enforce them. But any regulatory system which relies primarily on negative incentives is - in the long term - in trouble. Enforcement costs are high and the legitimacy of the system in the eyes of the enforced is called into question. History shows that such systems are unstable and that sustainable systems of regulation are those that rely primarily on positive incentives - economic, cultural and institutional - which are affordable.

If we take this lesson from social history seriously and apply it to environmental governance, we must conclude that one of the main reasons our efforts have not generally produced the

results we seek lies in the fact that they have the balance between negative and positive incentives wrong. They emphasise negative and expensive proscriptions which are beyond their capacities of enforcement. They give insufficient attention to positive inducements, which are more cost-effective and incentively powerful. This balance must be redressed. The issue is not one of negative or positive incentives *per se*, but one of finding the right mix of these ingredients in specific systemic contexts. We need to reprofile our approaches so that they represent incentive packages of regulatory compliance in which negative sanctions can be enforced because they are held to affordable levels and in which the burden of compliance is shifted to positive, more viable and implementable incentives.

INCENTIVES AND SCALE

I have stressed the need to find the right mix of negative and positive incentives, which work in specific systemic contexts. Are the incentive regimes which we advocate congruent with the characteristics of the resource or ecosystem concerned and with the profile of management dynamics involved? We cannot begin to answer the first part of this question until we disaggregate resources and ecosystems into categories determined by their management requirements rather than by Linnaen or other typologies. When we do so we discover that the required regime varies widely. What is required for sand grouse and what is required for migratory waterfowl are likely to be vastly different in scale.

We cannot answer the second part of the question unless we also grasp the importance of scale on institutional efficiency. Generally, the smaller a regime is the more effective and efficient it will be. Increases in scale complicate communication and decision-making, and beyond certain levels regimes must bureaucratise with attendant costs. Compliance inducement shifts from low-cost modes of moral and peer pressure to the high cost methods of policing and formal coercion. Beyond this, increase in scale erodes the sense of individual responsibility. These insights led Garrett Hardin to once remark that in environmental affairs "globalisation favours evasion." He than went on to advocate a simple rule: "Never globalise a problem if it can possibly be dealt with locally" (Hardin, 1985).

Thus our search for effective incentive regimes must reconcile scale effects on institutional dynamics with the regime requirements of specific environmental problems. Some global environmental problems require collective international incentives to control them. The ozone layer continues to thin, with climatic effects which are hotly debated in their specifics but are nevertheless likely to significantly alter the extent and configurations of biological diversity. Toxic pollutants seep through aquifers or spread through the atmosphere, inhibiting ecosystem resilience and negatively affecting populations far from their source. Issues of this type are truly global and require collective international controls. And, indeed, there has been no lack of international response to these issues. To date nearly 200 multilateral environmental agreements have been produced. Many of these are 'soft' agreements, statements of mutual concern and voluntary intent to carry out remedial action. But, as Douglass (1998) points out, "voluntary agreements tend to have little direct behaviour-modifying effect on nations." Thus 'soft' agreements become largely "an intermediate step to a 'hard' agreement which will bind the parties to a common, enforceable goal".

So far, so good. But when we examine 'hard' multilateral agreements and conventions, we find that the incentives for compliance they contain are almost exclusively punitive and negative. Furthermore, punitive mechanisms which are politically viable are limited. In fact "non-compliance protocols" usually boil down to one measure: trade sanctions against the offending state. "Economic sanctions have become the policy enforcement tool of choice for international enforcement" (Douglass, 1998). Leaving aside any discussion of the costs involved in using this instrument, and the conflict between it and another major global trend - the dismantling of protectionist barriers and the encouragement of free trade - we can note that little if anything by way of positive incentive is offered in these treaties and conventions. The Convention on Biological Diversity, with its emphasis on the sustainable use of biodiversity and the equitable sharing of the benefits of such use, is a notable exception. There is, of course, one other important exception to this. National and international environmental bureaucracies "become both the benefactors and beneficiaries of environmental treaty development" (Douglass, 1998). As Wiener (1997) observes, "The diplomats negotiating the treaty often come from the very government agencies and elite cliques which would be enlarged and enriched by the task of handling these resource transfers".

This profile of incentive packages in our global efforts to address global problems - heavily skewed towards negative and expensive sanctions of questionable impact - is the prescription for stasis and inefficiency, for discord and disillusion. The world is understandably becoming impatient with the noise of our solemn assemblies, with expensive gatherings which turn into choirs singing hymns of pious environmental rectitude, strong in proscriptive resolutions reflecting intent but weak in approaches which link intent and consequence through incentive regimes which work.

I will return shortly to the implications of this for IUCN. But, returning for the moment to the issue of scale, we need to recognise that most of the problems involving the sustainable use of natural resources will be determined by the policies and actions of people at a smaller scale, at national and sub-national levels. The further down the hierarchy of scale we go the closer we get to hands-on management and use. And it is here that the determinative decisions on use are made. At these levels decisions are personal rather than abstract, they are operational rather than propositional, they emphasise positive effort rather than passive compliance and their implementation is direct, carried out by those who make them. Because they are generally made in contexts distanced from any effective instruments of international or state coercion they are relatively autonomous, responsive to private or local agendas rather than those set by the abstractions of the international conservation discourse.

Two important points arise. First, since these determinative decisions are taken in contexts insulated from, and indeed often hostile to, externally imposed regulatory proscription, incentives for sustainable use at this level must give particular attention to positive inducements. Second, since these contexts represent a myriad number of specific situations, no single incentive profile can be universally applicable. As the SUI's report to the World Conservation Congress in 1996 stated, "There are a multitude of configurations of biological, social and economic conditions at which sustainability of use might be achieved". John Robinson (1998) puts this more colourfully: "Sustainable use is not an exercise in colouring by numbers. Instead what you have is an identification of the social, economic and biological

factors that always need to be considered, and which sometimes enhance, or not, the sustainability of resource use, and the sustainability lies not in the factors themselves but the interaction between the factors". This complexity and variability should serve as a warning against our reductionist proclivity to search for polyvalent 'guidelines' rather than principles.

INCENTIVES IN SOCIO-ECONOMIC CONTEXT

I turn now to the importance of values and goals in constructing effective incentive packages for sustainable use. Socio-economic and socio-cultural location importantly shapes what these values and goals are. For those located in urban and industrialised society, wildlife and habitat have little direct economic significance and emphasis is placed on the intrinsic or recreational values derived from these resources. Our definitions of conservation are couched in abstract terms such as "biodiversity" and "ecosystem maintenance" and our objectives become those of the maintenance of species and habitats for aesthetic, recreational or scientific purposes. Incentive packages for sustainability responsive to these objectives are likely to emphasise the role of the state, the guidance of scientific technicism and the compliance of the citizenry in preserving the little of what urbanisation and technology has left of "the natural."

For rural farmers and pastoralists where the presence of wild land and wildlife has important economic implications, conservation incentives take a different, more instrumental form. While they too hold profound and powerful intrinsic valuations of nature, conservation is for them an investment (in direct of opportunity costs) for present and future value, the goal being the maintenance or enhancement of their livelihoods. Sustainable use *is* conservation, whether it involves regulated off-take of biological productivity or the designation of areas for tourism enterprises.

There is nothing intrinsically incompatible in the two incentive profiles I have just described. The differences between them can be seen as differences in means-end sequencing, the one stance being livelihood enhancement as a means to conservation and the other being conservation as a means to continued well-being. Dissonance arises when the two are brought together in one arena of action and where one stance is accorded what Hirschman (1963) has called "privileged problem" status. At present the tendency is for intrinsic and existence valuations to be accorded higher order level status and to regard local and instrumental conservation incentives as lower level factors to be co-opted in the pursuit of these values. This produces an impasse. Allied to international and state coercive instruments, intrinsic and existence valuations impose proscriptions that inhibit the implementation of local, instrumental incentives. However, local incentives also have a powerful veto dimension. Unless they are accommodated, international and national values and goals will be subverted by local responses ranging from defiance to covert non-compliance.

INCENTIVE COMPATIBILITY AND CONFLICT

To get around this impasse, one approach is to identify the congruent aspects of incentives that operate at different levels of scale and bind them together in structures and processes

which enhance their potential for synergy. Bromley (1994) refers to this as "incentive compatibility," which, he says:

"... is established when local inhabitants acquire an economic interest in the long-run viability of an ecosystem that is important to people situated elsewhere ... Such ecosystems represent benefit streams for both parties; those ... who seek to preserve biodiversity and those who must make a living amid this genetic resource".

A great deal can be said in support of strategies of incentive compatibility. Environmental conflicts do not necessarily involve a zero-sum game and rightly structured, the interests of the larger collective whole and those who use and manage its constituent elements can often be brought together for co-active, mutual benefit. This is the implicit assumption which lies behind the many programmes that flourish today under such titles as "integrated conservation and development" and "community conservation."

But we should not allow our enthusiasm for the "win-win" solution, for incentive compatibility, to cloud our grasp of politico-economic realities. Providing effective incentive packages for sustainability at local levels will usually require significant transfers of power, of rights and resources. There will be losers as well as winners. This is an unpalatable fact, particularly for an organisation like IUCN, dedicated as it is to promoting cooperation rather than conflict. But, unless we face it, our prescriptions will continue to deal with symptoms rather than causes.

Let me illustrate with the case of "community conservation" projects mentioned above. Recently I have been involved with a number of colleagues in a comparative study of such projects in Eastern and Southern Africa (AWF, CASS, and IDPM, N.D.). We have found that performance rarely approximates promise and is sometimes abysmal, for a number of reasons. Some of them relate to planning and implementation. Some are demographic or ecological and involve resource/demand ratios. Some, importantly, are institutional and organisational. ***But the single most important reason for failure is aborted devolution***, the failure to confer the necessary level of rights and responsibilities required to achieve efficient localised control regimes enhancing sustainability. The incentive package, in both its negative and positive dimensions, is incomplete and inadequate.

Why this aborted devolution, in spite of all the rhetoric by governments and funding agencies about "community-based management" and "decentralised control" over natural resources? The answer lies fundamentally in the value of natural resources and the importance of power to control and benefit from them. The history of colonial Africa is a history of the appropriation of this power and benefit by the state from those who live with and use natural resources. This was done largely by claiming the *de facto* and often *de jure* ownership of natural resources for the state and conferring only weak, usufructual rights to the land on which these communities live. This condition has persisted into the modern post-colonial state almost without exception. As in colonial times, "communal lands" continue to be in various degrees the fiefdoms of state bureaucracies, political elites and their private sector entrepreneurial partners.

My examples have been from Africa, but their characteristics can be found in a multitude of examples from around the world - not only the "developing" world but the "developed" world as well. Devolution in tenure, in responsibility, in rights and access to benefit streams is a fundamental allocative and political issue. Power structures at the political and economic centre are not disposed to surrender their privileges and will use their power, including their abilities to shape policy and law, to maintain the monopolies of their position.

All this is not new in essence. An 18th Century rhyme put the issue succinctly for that period of English history:

*The law doth punish man or woman
That steals the goose from off the common,
But lets the greater felon loose,
That steals the common from the goose.*

And so we are back to the observation of my opening quote. In the competition which is the trade of life, "civilised men consume one another by due process of law." I am not suggesting here that we dispense with law, with socially legitimised proscriptions against deviance which form an important negative incentive in our search for sustainability. What I am suggesting is that the processes which lead to policy and law be further democratised and made more responsive to the incentives for sustainability which lie with those who are the primary users, producers and managers of our natural resources. To put my point differently, good civil governance is an indispensable component in the search for sustainability.

CONCLUSION: THE ROLE OF IUCN

In conclusion, let me comment on the role of IUCN in providing incentives for sustainability. On our 50th anniversary, and at the dawn of a new millennium, we need to revisit our history and candidly examine the implications of our structure and location.

First we can note with satisfaction that IUCN, as a global Union uniquely made up of a membership which includes governments, environmental interest groups, research and academic institutes and management agencies and organizations, was one of the first of the major international environmental organizations to give prominence to sustainable use approaches to conservation during the past half century. Sustainable use has always been on its agenda and at its General Assembly in 1990 the subject was given heightened prominence by a resolution calling for more analytic and programmatic attention to the topic. At its following general members' meetings (Buenos Aires in 1994 and Montreal in 1996) the centrality of sustainable use to the Union's objectives has been further emphasised.

This reflects the enlarging membership and constituency of the Union and a concomitant shift in its prioritisation of the issues with which it deals. In this respect the Union represents, in its own politics, a trend towards that democratisation of policy processes which makes them more responsive to the on-the-ground users and managers of natural resources which I have advocated in this paper.

This representative characteristic of its governance is one of the great strengths of the Union. Its other great strength is the reputation it has developed, through the contributions of its professional members, for an ability to deliver sound and relatively balanced analysis and advice on environmental matters. This is its strength; it is also its challenge, since if the Union's advice is to be sound and balanced this must be based on analyses produced by grounded managerial experience and situated scholarship. This applies *a fortiori* to our analysis of sustainable use.

On this point our judgement of the Union's performance must be more ambiguous. There are examples where the Union's delivery of professional advice has made important and positive contributions to policy decisions, such as the contributions of the SSC's African Rhino Specialist Group to Zimbabwe's Rhino Management Plan. However, our global organizational and professional location can also bias our advice away from "grounded management experience and situated scholarship." In large measure IUCN's professionals - both volunteer and paid - are part of an international epistemic intellectual community comprised of agency specialists, scientists and consultant experts which at international levels sets the analytic agenda, defines the privileged problems and solutions and determines what constitutes cognitive authority.

History and economics locate this establishment in the industrialised and urbanised world, and it inevitably draws its paradigms of conservation from this source. In implementation, its scholarship involves a division of labour, paralleling that which Mkandawire (1998) describes for African studies which, he says, "has essentially meant that the 'North' carries out the conceptual work and designs the field work programmes for African researchers who conduct the interviews and fill in the forms." He suggests that this reduces the role of local scholars to that of "barefoot empiricists" and encourages the "invisibility of African scholarship." He goes on to complain that, "We are probably the only part of the world about which it is still legitimate to publish without reference to local scholarship".

Mkandawire was speaking of the nexus between African and international scholarship but his points have equal salience for the nexus between the epistemic community of intellectual environmentalism and the world of managers and users everywhere. To what degree does the Union's scholarship consign managers and users to the role of "barefoot (or booted) empiricists"? To what degree does it render invisible the results of their own experimentation and analyses in the arena of sustainable use? The answers will give us a measure of the degree to which the Union, in its professional and scientific role, has been responsive to the challenge of fashioning effective, situated incentive profiles for sustainable use.

It is at this point that the ambiguity emerges. The robust devolutionism that incentives for sustainability require involves not only a fundamental reallocation of rights to resources and benefit streams. It also involves a reallocation of the roles and rules in cognitive discourse, a new configuration of scholarship more pluralist, more inductive, more experimental in its approaches and more contingent in its conclusions. It involves the "mainstreaming" of adaptive management in environmental science. It requires, in a phrase, cognitive devolution.

A move in this direction is evident among environmental scientists concerned with evolutionary biology and system approaches to ecology which extend the scope of

investigation beyond physical and biotic data to include the structures and dynamics of human activity. Scientists in this school recognise the inherently contingent nature of scientific knowledge and emphasise its role as an actor, with policy and management, in social experiment (Holling, 1993). They recognise that sustainability is a social goal, not a "fixed end-point to be reached but a direction that guides constructive change" (Lee, 1993).

This perspective on professional science's epistemology and role, in its applied form, has "emerged regionally in new forms of resource and environmental management where uncertainty and surprises became an integral part of an anticipated set of adaptive responses" (Holling, 1993). Dissonance remains, however, where bureaucracies retain the expectation that science can provide *a priori* certainties. As Constanza (1993) remarks, "most environmental regulations *demand certainty* and when scientists are pressured to supply this non-existent commodity there is not only frustration and poor communication, but mixed messages in the media as well". One can also add that this pressure is a perverse incentive for the integrity of science itself, since it carries with it the temptation to assert as definitive that which is tentative.

Unfortunately, a strain in our scholarship remains where science is still regarded as a specialised domain outside the realm and mandate of local people. Our language often betrays this, as when for instance we read the following criterion for sustainable use: "Governments involve local people in decisions affecting the use *while continuing to base management decisions on science*" (SSN, 1993). That last phrase is the telltale clause. We can "involve" and "consult" local users and managers, but the decision-making base for management must remain ultimately with a professional scientific establishment separate from them.

A frank examination of our record must conclude that IUCN's scholarship has been complicit in this aborted cognitive devolution. It arises from our intellectual roots in an epistemic environmental establishment located at an international scale distanced from the levels where most of the operational decisions on sustainability are made. It is fed by professional and bureaucratic self-interest, with their imperatives of centralised control. It acts as a magnet for recidivism - habitual or chronic relapse into old patterns or habits, drawing the reality of our scholarship back from the rhetoric of our policy.

These assertions will, I have no doubt, be vigorously denied by many within our membership and among our professional staff. They will cite, with considerable justification, the significant progress made in engaging the insights of local management and scholarship in policy debate through the fora organized by the Union's Biodiversity Policy Coordination Division. They will instance the various policy inputs being made by scholarship in our regional Sustainable Use Specialist Groups at national and international levels. These are significant advances in cognitive devolution and should not be discounted. But if we candidly examine our stratagems of knowledge production with their reliance on paid professionals and glossy publications, if we review our allocations of programmatic and administrative budgets in terms of the locus of control and direction of scholarship, a persistent profile emerges. The world of on-the-ground use and management remains largely the intellectual fiefdom of an entrenched professional-cum-bureaucratic elite.

As I have already noted, in the past decade IUCN has in its politics made vast strides towards the democratisation of policy processes responsive to effective incentives for sustainability. The democratisation of its scholarship in this arena remains as a central challenge to the Union as it enters the next half-century of its existence.

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On Enclosures, 18th century, anonymous: my thanks to Rowan Martin for drawing this quote to my attention.

RESPONSES TO KEYNOTE SPEECH

By: Professor Wang Sung, Chinese Academy of Sciences, China

Sustainable use is a concept which many people, both within government and in the private sector, find easy to promote. However, China is a developing country with an enormous population and a long and rich history of wildlife utilisation. It is therefore not surprising that as a nation the people are facing a crucial problem of non-sustainable use of wildlife resources - especially during this period of rapid reform and change. For a long time, I have observed that sustainable use of wildlife is easy to say, but much harder to achieve. Analysis of the current situation in China has led me to conclude that many factors impede application of sustainable use principles:

1. China is a very large country with a very large population, with many poor people. In recent years national policies have shifted to encourage entrepreneurship among the people. Under these policies, people now see many opportunities to make money, so it is now common to find people exploiting wild species for profit. At the same time there has been an erosion of peoples' respect for wild species.
2. People from China have a long history of using wild species, especially for traditional medicines. Even Chinese living in developed countries still prefer traditional medicines (which include parts of plants and wild animals) and contribute to the global demand and consumption. For example, the musk from musk deer is used for over 300 different treatments. Therefore, the people see nothing wrong in using wild species products. In fact prefer them over western drugs. Changing cultural norms among the people will be very difficult.
3. People in China do not know how to manage the species that they are using. There is a tendency to try to manage them in captivity, such as the bear farms that were established in the 1980s to harvest bear bile. Over 6,000 bears were captured and put in cages. The procedures have been widely criticised by the international animal welfare community.
4. Understanding of the economic importance of wild species is lacking. For example, there is little understanding of the ecological values wild species provide, in maintaining water supplies, preventing erosion, etc.
5. Inadequate funds are available to set up model sustainable use programmes. Without such models, the dominant economic forces favour those use activities for which the profits are highest, and the capital investment is minimal. In the case of the captive management of bears, this translated into overcrowding of the animals, little or no treatment for disease, and minimal day-to-day care and feeding for the animals.
6. Laws and regulations concerning wildlife conservation are far from satisfactory. For example, the First and Second Categories of State Key Protected Wildlife Lists are not clearly defined, and have a limited scope of coverage of fauna. They are not supportive of sustainable use. They do not provide incentives for rural people to use resources sustainably and do not provide government with the authority to support and assist rural

peoples' sustainable use of wild species. With the exception of penalties imposed on harvesting of high profile species like the giant panda (which are very severe), there are few means to hold local people accountable for poor management.

To respond to these problems needs a comprehensive, national education and awareness campaign. To provide a focus for such a campaign, a workshop should be held in China at which a sustainable use demonstration project (or projects) would be developed. One of the projects should involve ecotourism.

By: Gaikovina Kula, Conservation International, Papua New Guinea

The Pacific region has over 20 countries. All are island states and they all are dependent on maintaining the marine ecosystem and sustainable use of marine resources. As an example, in Papua New Guinea over 90% of the land is owned by the people. This land ownership by resident peoples is similar throughout the region.

Development in the Pacific Islands has been dominated by 'western' approaches, which when applied in the region have had a negative impact on the marine ecosystem. Greater degree of lateral thinking is required in the region, including greater involvement of local people in decisions about how a resource should be managed. They need to be given more authority over the resources in concert with their ownership of the land. Government must devolve more authority to the local people.

Key lessons:

1. Local people need to be given a larger role in resource management.
2. Governments need to give greater respect for knowledge of the local people.
3. More incentives need to be provided to the local people to promote sustainable resource management.
4. Means to balance authority between the local people and the government need to be sought.
5. IUCN needs to develop better mechanisms to use information from the region to take actions which incorporate resource security and community participation. More incentives need to be identified in the local cultural context which will promote conservation of biodiversity.

By: Champion Chinhoyi, Zimbabwe Trust, Zimbabwe

Regulations to grant local people access to resources must be balanced, taking account of local people and government responsibilities. This approach should be promoted by IUCN in international treaties and agreements.

Before authority is granted for local use of a species, the requisite incentive package must be in place. This is the only way forward in Southern Africa. IUCN should not disregard cultural

and spiritual incentives and over-emphasise economic incentives. Often the former will have greater influence among local people.

The biggest threat to sustainability is the government's failure to grant communities the formal authority to manage wild resources. It is recognised that government devolution of power to local communities is difficult, in part because government officials and international NGOs tend to believe that local people lack the capacity to manage wild resources.

IUCN has failed to devolve scholarship that is relevant to local people. There is need for greater democratisation of decision-making at all levels (from rural communities to local and national governments to international conventions). There is need to help local people communicate their understandings and knowledge of wild resources. IUCN must devolve and respect cognitive scholarship to/by local people.

COMMENTS FROM PARTICIPANTS

The following main points were made in discussion:

- o IUCN should provide guidance to policy makers and government officials on how to develop and implement balanced incentive systems that promote sustainability of uses of wild resources.
- o The IUCN/SSC Sustainable Use Specialist Group has prepared a draft policy statement on sustainable use (which was called for by the members in their adoption of resolution 1.89 at the 1st World Conservation Congress). This draft has been reviewed within the Commissions and by technical staff. Soon, it will be circulated to the members of IUCN for their comments. As required by the resolution, a final text will be submitted to the members for adoption at the next World Conservation Congress.
- o Conserving biodiversity in arid lands needs greater attention. Many ancestors of cereal and other economically important plants are found in these ecosystems. Today many of these ancestral species are endangered. To ensure that the world population has continuing access to these valuable genetic resources, it is important that IUCN support their conservation, management and sustainable use in their native arid land ecosystems.
- o In all instances, sustainable use must be culturally reinforcing.
- o A recent study indicated that the scientific community is more cautious about achieving long-term sustainability in uses of wild resources. In the past the concern was about meeting biological requirements. Today it is recognised that the biggest concerns relate to social and economic issues, which may be more important than the biological.

In responding to the issues raised in the discussion, the Keynote Speaker said:

In my address, I examined "incentives for enhancing sustainability" in relation to three variables: supply, demand, and control. While I have no doubt that controls which will ensure

that demand for a resource is limited to the available supply of that resource will promote greater sustainability, it is important that we not fall into a trap of "misplaced optimism". Rarely do we find performance living up to our expectations in any activity as complex as those envisaged for sustainable use. Nevertheless, it is crucial that adequate resources are available to implement the controls, which will likely involve both governments and local people.

In closing I wish to disabuse the perceptions of some people that sustainable use is anti-conservation. This is not correct. We all want the same thing. To achieve sustainable use (which would be considered conservation by some of my colleagues), controls are necessary. And such controls must be a bundle of positive and negative incentives that influence local managers, with full accountability to government.

At the same time I disagree with the premise that legislation alone is the best way to conserve species. We must look for new ways to regulate harvests of wild renewable species. If those means are to be effective we must involve the users.

KEY CONCLUSIONS

Key points noted in the workshop that should be considered by IUCN in its future programming are:

1. Sustainability in the use of natural resources is determined, *inter alia*, by effective controls.
2. Controls which promote greater sustainability involving both positive and negative incentives. Such incentives should be developed to fit the scale of the use regime. Likewise, they will vary from one use regime to another, and from one culture to another. In regards to international agreements, balanced incentives will enhance sustainability of uses of wild renewable resources.
3. Devolution of responsibility for management of renewable natural resources is a determining factor in successful examples of sustainable wildlife use. Therefore, giving greater authority to local knowledge about use and management of wild flora and fauna should be a priority in programming.
4. Respect for local managerial experience is very important, which takes account of local cultures and encourages action plans and activities be developed locally, nationally and regionally.
5. IUCN should develop techniques and methodologies which promote the democratisation of local environmental programmes and projects. Once such techniques and methodologies are developed, IUCN should provide training in their application.

2. COMMUNITIES

2.a CULTURAL DIVERSITY AND GLOBALISATION

A significant part of the great cultural diversity seen in the world today is the result of different adaptations to the different resources available locally, both wild and domestic. But over the past several hundred years, a limited variety of agricultural species have been promoted in all parts of the world, often in genetically very homogeneous forms; forests have been nationalised; and populations have increased. The historically great diversity of species and varieties is being replaced by many fewer varieties that often require high inputs of pesticides and fertilisers. This is more than an agricultural problem, as it may lead to the loss of cultural diversity, accelerated by other trends in globalisation; it is also leading to a decline in landscape and ecosystem diversity. Is the process of globalisation leading to a homogenous global culture? If so, what are the implications for conservation? How can highly diverse and endemic ecosystems be restored at the local level, leading to the maintenance of cultural diversity?

Organizers: IUCN Regional Office for Europe, (Rachel Kyte); and IUCN Social Development Programme, (Eduardo Fernandez)

Chair: Professor Joseph Ki-Zerbo (Burkina Faso)

Keynote speaker: Philippe Descola, College de France, Paris (France)

Respondents:

- o Henriette Rasmussen, IUCN Councillor (Greenland)
- o Antonio Claparols, IUCN Councillor (Philippines)

CHAIR'S OPENING REMARKS

CHAIR: PROFESSOR JOSEPH KI-ZERBO

RAPPORTEUR: EDUARDO FERNANDEZ/RACHEL KYTE

Culture is not folklore. It is not the icing on the cake of learning. It is not just a simple structural reflection of a given production pattern. Culture is the meaning given to the actions we take in our lives. It is a code, a key to explain and change the world. It is an acquired programme, software to induce attitudes to reality, to interests and to values.

But a cultural system is not a fossilised, static mass of metaphysics: it is a process which is both object of and subject to history. Cultures are like ecosystems; they are highly complex and dynamic entities. They evolve over the long term as self-regulated, and yet open, systems.

Ecological and cultural systems are in permanent interaction, with each feeding into and off the other. The historical factors conducive to cultural uniformity and to the elimination of unique indigenous cultures include the spread and dominance of capitalism through science, technology and the economy; urban development and the growing pervasiveness of telecommunications; and the imposition of one single path to development. The international financial institutions and transnationals, dominant states and economic unions reveal globalisation as a steamroller which takes no heed of the cultural exception, the tenet that culture is not just another commodity, and that cultures, just like nature (biodiversity), must be kept outside the market.

Here we must distinguish between technical and physical globalisation, through science and management and legal processes; passive globalisation is foisted upon fragile countries and social groups, and active globalisation is an aggressive mode of production and is a vector for an implicit culture, sweeping up everything in its path, and constitutes a long-term threat to cultural and biological diversity (two dialectically-related realities). Tell me what you eat and I'll tell you what you are.

This means that particular cultural identities run the risk of extinction. The concept of risk is just as valid for cultural systems as for environmental ecosystems, as is the concept of immune defence. As long as a cultural system or an ecosystem can keep up its immune defence mechanism to protect it from lethal harm it can avoid environmental and cultural AIDS, but once the resistance threshold is crossed, breakdown occurs, and it is sometimes irreversible.

I suggest three antidotes to this poisoning of culture:

- o *Regionalisation.* Regional integration is the strongest antidote for the negative effects of globalisation, since it alone can counterbalance the weight of economic, scientific, biological and political forces on the outside. It alone can give culture the structure and strong production base of goods, services and values it needs.
- o *Decentralisation.* The true matrix for unique cultures, the basis for the creation of living communities, is giving them the power and authority to make their own decisions.

- o *Training for change.* Excluding original languages from the educational system is tantamount to ethnocide, since language is the umbilical cord which channels the sap and the lifeblood of cultural heritage. This is why the vital concept of common wealth and common heritage is meaningless if each separate component (whether biological or cultural) is not taken into account.

In conclusion, all cultures are dynamic processes, the continuous confluence of a river fed by its many tributaries. The challenge and the stakes are there for each community to confront: they have the absolute responsibility for forging new syntheses, a new cohesion and compatibility between what they contain and what is outside them, between the particular and the Universal. The Universal cannot be just the particular culture of one group imposed on all, nor can it be the arithmetical sum of its parts: it must be a fertile marriage of the best of all the particular parts, aspiring to the heights of unity among people and of people.

The idea is not for the fragile cultures of the world to coalesce into a hybrid on the rapid road to stereotypy, but to strengthen the capacity of each culture to thrive and face new challenges.

We must exclude exclusion, for that way lies barbarity. Instead, we must enable cultural diversity to serve as the last bastion in the defence of biodiversity and the environment.

Biodiversity and Cultural Diversity

By: Philippe Descola, College de France, Paris (France)

ABSTRACT

The relationship between conserving biodiversity and the rights of indigenous and traditional peoples to preserve their ways of life has become an important issue in recent years. All ecosystems on our planet have been influenced by people, and so-called "virgin ecosystems" in the Amazon are in fact the cultural product of very old agricultural practices of local people over the past 10,000 years or so. These traditional practices often have actually increased the diversity of plants, creating a matchless patrimony of cultivated varieties of plants and appropriate techniques for their sustainable use. This evidence has contributed to changing the perception of human populations as sources of disturbance and degradation and to involving them in conservation strategies. A main challenge in this process is to address the very different perceptions of the relationship between people and nature held by industrial and traditional societies. Many modern industrialised societies clearly separate humans from the not-human, considering that humans have jurisdiction over nature, as reflected in the very idea of nature conservation. Traditional communities, on the other hand, do not see such a separation between people and the rest of nature. Some Amazonian communities for example, give social attributes to plants and animals and establish with them social relationships based on egalitarian treatment between humans and not-humans, thus deeply integrating nature into their social lives and behaviour. It is not realistic to expect that we might change our own relationship with nature. However, the dependency of an increasing amount of the planet's biota on human action to guarantee its survival and the modifications of the conditions of existence for many species might contribute indirectly to changing the idea that society and nature are to be managed as separate entities. In the short term, effective action must avoid excluding indigenous and tribal populations from the policies and projects carried out in their territory, and indeed conservationists - and IUCN as an institution - would do well to listen and learn from the indigenous vision of the world and respect the cultural diversity that enriches our planet.

INTRODUCTION

For some years now, particularly since the Rio Earth Summit, the idea has been emerging that nature protection and biodiversity conservation also include the right of tribal populations to preserve their territories and lifestyles in areas where natural resources are safe from predation. Many biologists, accustomed to perceiving human populations as factors that disrupt and degrade ecosystems, have long held such an idea to be iconoclastic. This is a vestige of the prejudices of colonial agronomy that for so long considered that certain subsistence techniques in the tropics, such as slash and burn, were both unproductive and harmful to the environment. Such attitudes also motivated the forming of the many natural parks, particularly in Africa, which were originally designed on the European model of game reserves. The selective hunting practised by local populations for subsistence could thus not fail to appear to be a form of poaching endangering the survival of some animal populations. But the epistemological divorce between natural and human sciences, which had gone their

separate ways by the end of the 19th century, was the major factor which, even today, leads fundamentalist biologists to reject the idea that the presence of human populations using traditional techniques in areas with fragile ecosystems could help to preserve and diversify wildlife populations.

We now know that hardly any ecosystems anywhere on earth are not more or less subject to human influence, not to mention systems like oases and some of the European forests which are entirely man-made. We can also better gauge how far certain traditional subsistence techniques have not only helped to preserve plant biodiversity, but in some cases to increase it. We are also beginning to understand that skills and techniques developed by tribal populations over thousands of years of patient biotechnological and agronomic experimentation all go to make up a rich body of natural lore, as well as forming the basis for a gigantic storehouse of cultivated varieties, a precious plant heritage for mankind. Finally, we have realised that the extremely complex management of animal populations and their demography in some protected areas in developing countries is made less difficult when the local people are allowed to resume the selective hunting which for centuries had helped to regulate the delicate balance between predator and prey.

This growing awareness made it possible, in contrast with what we hope is a bygone era, for nature protection policies to increasingly accept that local populations be given pride of place as partners in strategies for the preservation of species and endangered habitats. In a break with decades of purely biological assessments of natural environments, this favourable shift in thinking should not however conceal the complexity of the problems involved when trying to seek a convergence between western concepts of nature conservation and the extremely diverse ways in which other peoples and civilisations perceive their relations with the environment.

We should not close our eyes to the fact that the very idea of nature protection is peculiar to the contemporary western world in that it assumes a clear-cut duality between two distinct ontological domains, humans and not-humans, the former being vested with the mission of ensuring the survival of the latter. In other words, this concept implies belief in the existence of nature separated from social activities and peopled with entities subject to universal laws, which humans "master and possess", as Descartes put it, in order to exploit and, more recently, to preserve its resources. Now, nature as a world of realities entirely distinct from human activity is an idea that has only been with us in the west for a few hundred years, and is of no meaning whatsoever for the many peoples for whom plants and animals have most of the attributes of social life. For the idea of nature protection to have occurred at all, nature had first to exist as such. Therefore a certain part of the universe had to be given objective existence as a domain of entities and phenomena obeying its own logic, a place of order and necessity, where nothing happens without cause, whether that cause be a higher intelligence (Spinoza's 'Deus sive natura'), or inherent in the fabric of the world ("the laws of nature"). This concept, born where Greek philosophy and science meet the transcendence of Creation introduced by the scriptural religions, only acquired its full scope in the 17th century with the mechanistic revolution.

All of the foregoing shows that the naturalism of western cosmology is just happenstance: other peoples know nothing of the duality of nature and society which is the source for the

development of positive science, and, despite the spread of scientific culture based on this paradigm, our vision of nature as something outside of man is far from universally held. This does not mean that the people still spared by western ideological uniformity are devoid of environmental concerns: far from it. It is simply that their representation of the destiny of those not-humans present in their environment is far removed from ours. Because to imagine conserving nature, not only must nature be believed in as an autonomous domain over which man can have some form of jurisdiction, it must also have been mistreated beforehand, with precisely quantifiable effects; and this twofold approach only became possible with the development of specifically western techniques and science, which many societies never experienced. Consequently, so many misunderstandings between nature conservation movements and local populations in developing countries arise from the all too frequent unawareness of these cultural differences in environmental perception on the part of experts and activists who are more familiar with the management of biological ecosystems, considered ideally as closed, than they are with the anthropological realities of the people on whose lands they operate.

What precisely are these cultural differences? The limited frame of this presentation prevents me from giving a full list so I will keep to a part of the world that I am more familiar with than with others, indigenous Amazonia. Let us begin by recalling that the present appearance of the Amazonian forest is partly the result of several thousand years of human occupation which has wrought deep changes: nature there has been culturally shaped over time by the Amerindians, and is only virgin in the imagination of westerners. This long unrecognised phenomenon of indirect human influence on forest ecosystems was nicely described in William Balée's studies of the ecological history of the Ka'apor Indians in Brazil. He was able to establish that gardens abandoned for more than forty years are twice as rich in useful woodland species as the virgin tracts of primary forest, which they can barely be distinguished from at first sight. In their gardens the Ka'apor plant many non-domestic plants which, when the land is left fallow, then thrive to the detriment of the cultivated species which rapidly disappear for lack of tending. Plots of cleared land, whether active or recently abandoned, also attract animal predators whose droppings resow the seeds of the woodland plants they feed on. Over generations and as land is cleared and then left to grow over, a significant part of the forest turns into an orchard whose artificiality the Ka'apor recognise, without necessarily ever having intended to achieve such an effect. The Indians are also well able to assess the effects of old fallow land on hunting, since areas with a high concentration of edible woodland plants are more frequented by animals, which in the long term has an influence on game demography and distribution. It is currently estimated that about 12% of Brazilian Amazon forest is man-made, but it is highly likely that the proportion was much greater before the mass deforestation which has affected the region over the last few decades. Some specialists even venture to suggest that at the time of the conquest there were already no climax forests left, that is, forests untouched by human agency. In this region the forest is therefore far from natural; on the contrary, it may be considered as the product of age-old manipulation by people of the native flora and fauna. Although invisible to the untrained eye, the consequences of human activity are far from negligible, particularly for biodiversity, which has been proved to be higher in areas of man-made forest than in the untouched tracts. We can thus appreciate the total absurdity of the position held by those who wish to keep out of future Amazonian protected areas the very people whose thousands of years of activity have given the forest its present aspect.

Let us also recall, if at all necessary, that the indigenous people of the Amazon and the Guyanas have been able to implement strategies for resource use which, while making lasting changes to their natural environment, did not create any upheavals in its basic functioning or endanger its conditions for reproduction. Ecological and ethno-ecological studies carried out over the past thirty-odd years have shown both the fragility of Amazonian ecosystems and the range and variety of skills and techniques developed by Amerindians to benefit from their environment and adapt it to their needs. We have discovered that the soils of the Amazon region are poor, acid and fragile, except for the great alluvial plains of the Amazon and its main tributaries. Therefore the forest can only ensure its continued existence through deposits of organic matter which it produces itself by decomposition: in the Amazon a young tree can only grow on the remains of a dead one.

Low population densities combined with sophisticated farming techniques and selective hunting have allowed Amerindians to exploit their fragile ecosystem for thousands of years without upsetting the balance. Domestication of plants in the South American lowlands is an age-old practice: it is believed that sweet potato, yam and manioc were domesticated almost 5000 years ago, and that taro *Xanthosoma* was grown even earlier. Several dozen species have been domesticated in tropical South America, and some, like manioc, have several hundred varieties.

Constant biotechnological experimentation on plants went hand in hand with the use of sophisticated agronomic skills. Shifting slash and burn, apparently the most simple technique, is in fact the most suited to fragile tropical soils, since one can exploit the shallow stratum of humus enriched with the ashes of the burnt vegetation. Furthermore, the planting together of many crops of different heights provides temporary protection for the soils from the destructive forces of the climate, just like the different tree strata in the forest. However, three or four years later, heavy rains and solar radiation have leached all the nutrients from the soil, weeds have become a greater problem, and the garden is abandoned. The forest colonises the clearing and grows back naturally within thirty years. Unlike this traditional technique which is perfectly suited to tropical forest ecology, mass clearance to open up plantations or grazing land does not allow the forest to regenerate. Soils degrade rapidly through erosion and hardening, and become totally useless for permanent cultivation. Therefore other forest has to be cleared, leaving in its wake a sterile savannah. Each year more than seven million hectares of forest disappear in this way in the Amazon.

Let us recall that Amazonian Indians are far from the playthings or protectors of alien nature: they have integrated the environment into their social life in such a way that humans and not-humans are treated on an equal footing. Most of the cosmologies in the region draw no clear distinction between nature and society, but confer the principal human attributes on many plants and animals. In other words, as distinct from the more or less watertight dualism which in our modern view of the world separates humans and not-humans into two discrete ontological domains, Amazonian cosmologies operate on the basis of a scale of beings where differences between men, plants and animals are differences of degree and not of kind.

Let me provide an illustration based on my ethnographic experience of the Achuar Jivaros in Ecuadorian Amazonia. They state that most plants and animals have souls (*wakan*) similar to those of humans, a faculty which classifies them as "persons" (*aents*) since it endows them

with awareness in thought and intention, and which makes them able to feel emotions and to exchange messages with their peers and with members of other species, including man. Extralinguistic communication is possible thanks to the *wakan's* recognised ability to soundlessly convey thought and wish to the soul of another being whose state of mind and behaviour can thus be altered, sometimes unbeknownst to the latter. For this same purpose humans have a vast range of magic incantations, *anent*, which they can use to act upon their fellow men, but also upon plants and animals, spirits and some artefacts.

In the mind of the Achuar, technical skill is inseparable from the ability to create an intersubjective environment where personal relationships blossom between the hunter, animals and the spirits which rule game animals, and between women, garden plants and the mythical being which engendered cultivated species and which continues to guarantee their life force. Far from being mere places where food is to be gathered, forests and cleared gardens are the scene of subtle social intercourse where, day in day out, people come to placate the beings whose only difference from humans lies in their diverse appearances and their lack of speech. Forms of social interaction do however differ depending on whether one is dealing with plants or animals. Women, mistresses of the gardens to which they give so much of their time, speak to plants as they would to children who need a firm hand to guide them to maturity. This maternal relationship is explicitly based on the guardianship exercised by Nunkui, the spirit of the gardens, over the plants she once created. Men, on the other hand, consider game as a brother-in-law, a difficult, unstable relation who requires mutual respect and prudent handling. In-laws are the very basis for political alliances, but are also the most immediate adversaries in vendettas. The opposition between consanguinity and affinity, the two mutually exclusive categories which govern the Achuar scheme of social classification and their relations with others, is also reflected in the pattern of prescribed behaviour toward not-humans. As blood relations for women and as in-laws for men, beings in nature become full partners in society.

Can we really speak here of beings of nature other than for ease of reference? Is there room for nature in a cosmology which confers most human attributes on plants and animals? Can we even speak of wilderness when referring to the forest which the Achuar have hardly touched but which they describe as an enormous garden carefully tended by a spirit? What we call nature is not some object to be socialised, but the subject of a social relationship. Nature is an extension of home and hearth; it is truly domestic, even in its farthest-flung corners.

Does this mean that the Achuar recognise no natural entity in the environment they occupy? Not quite. The great social continuum which mixes humans and not-humans does not include everything; some elements of the environment do not communicate for want of a soul of their own. Most insects and fish, herbs, mosses and ferns, pebbles and rivers thus remain outside the social sphere and the interplay among different subjects. Their mechanical and generic existence might correspond to what we call "nature". But does that mean that we can legitimately keep using that concept to designate a segment of the world which, for the Achuar, is incomparably more restricted than what we understand by the same term? Furthermore, in modern-day thinking, nature only has meaning in opposition to things created by men, whether we choose to call them culture, society or history in the language of the social sciences or philosophy, or man-made space, technical mediation or ecumene in more specialised terminology. A cosmology where most plants and animals are a part of a

community of persons sharing all or some of the faculties, behaviour and moral codes ordinarily attributed to men can hardly meet the criteria for such an opposition.

The Achuar are far from exceptional in the Amazon world. A few hundred kilometres to the north, for example, the Makuna Indians of the eastern forests of Colombia have an even more radical version of a resolutely non-dualistic world theory. Like the Achuar the Makuna categorise humans, plants and animals as "people" (*masa*) whose principal attributes - mortality, social and ceremonial life, intentionality, knowledge - are identical in every way. The internal distinctions in this community of life are based on specific characteristics which myth-based origin, diet and mode of reproduction confer on each class of being, and not on how close these classes of being are to the Makuna in their completeness. Interaction between man and animals is also seen as a relationship of affinities, although slightly different from the Achuar perception, since the hunter treats game as a potential spouse and not as a brother-in-law. Ontological classifications are much more flexible than for the Achuar, because of all beings' recognised faculty for metamorphosis. Humans may become animals, animals may change into humans and animals can change species. Taxonomy only has a relative, contextual hold on reality, since the continuous shifting of appearance makes it impossible to attribute stable identities to the living components of the environment.

The sociability imputed to not-humans by the Makuna is also richer and more complex than that recognised by the Achuar. Just like the Indians, animals live in communities, in longhouses which, tradition has it, are located at the heart of rapids or at a particular point inside a hill. They tend manioc gardens, travel in dug-out canoes and, led by their chiefs, practice rituals which are just as elaborate as those of the Makuna. The visible aspect of animals is only a disguise. When they return to their homes they shed their outer appearance, don ceremonial feather head-dresses and regalia and turn back into the "people" they always were even when swimming in the rivers or foraging through the forest.

Many cosmologies similar to those of the Makuna and Achuar have been described in the forests of the South American lowlands. Despite differences in their internal arrangements, they all share the feature that they make no clear-cut ontological distinction between humans on the one hand and a large number of animal and plant species on the other. Most entities which inhabit the world are interlinked in a vast continuum imbued with unitary principles and governed by an identical system of social interaction. Relations between humans and not-humans appear as relations among communities, partly defined by the utilitarian constraints of subsistence that may vary from tribe to tribe and thus serve to distinguish between them. This is nicely illustrated by the Yukuna, a neighbouring tribe in Colombian Amazonia. Like other tribes in the Tukano language group, the Yukuna have developed preferential associations with certain species of animals and varieties of cultivated plants which make up most of their diet, since their mythical origin and, for the animals, their common homes, are within the limits of the tribe's territory. The local shamans have the task of watching over the ritual regeneration of these species, which are prohibited for the other Tukano tribes living near the Yukuna. Each tribal group thus bears responsibility for the particular plants and animals it feeds on, and this division of labour helps to define local identities and the system of interethnic relations as a function of relationships to differentiated sets of not-humans.

The sociability of humans and of plants and animals are analogous because their respective forms of collective organization seem interchangeable. Many Amazonian peoples understand relations among humans on the same model as the symbiotic relations they observe among species in their ecosystem, while they use the processes and explicit categories which structure their own social lives to describe relationships among plants and animals. For the Secoya, for example, dead Indians are thought to perceive living people in two contrasted avatars: they see men as oropendola birds and women as Amazon parrots. In its social and symbolic construct of sexual identity this dichotomy is based on the ethnological and morphological characteristics of the two species, whose 'totemic' function, in the broad sense, thus becomes clear, since natural discontinuities among not-humans make it possible in turn to determine the natural discontinuity among humans, while giving it social significance. Conversely, the Yagua in the Peruvian Amazon region have developed a categorisation system for plants and animals based on relations between species depending on the varying degrees of consanguinity, friendship or hostility which define the relationships. The use of social categories to define relations of proximity, symbiosis or competition among natural species is all the more interesting here in that it spills over into the plant kingdom. Thus great trees have hostile relations: they challenge each other to fratricidal duels to see which bends first. Hostile relations also prevail between bitter and sweet manioc, the former seeking to contaminate the latter with its poison. Palm trees, however, have more peaceful relations, as between uncle and nephew or cousins, depending on the level of resemblance among the species. The Yagua, like the Aguaruna Jivaro, also interpret morphological similarities between wild and cultivated plants as the sign of a family relationship, although they do not take that similarity as a sign of common ancestry for the two species.

The diversity of classificatory signs used by Amerindians to describe relations among organisms shows the flexibility of the limits in living taxonomy. The characteristics attributed to beings in the cosmos depend less on a prior definition of their essence than on their relative positions as a function of their metabolic needs, particularly diet. The identity of live and dead humans, of plants and animals and spirits is all to do with relationships, and therefore can change depending on the observer's standpoint. Each species, in the broad sense, is supposed to apprehend other species on the basis of its own criteria, so that in normal conditions a hunter will not realise that his prey sees itself as a human, nor that it sees him as a jaguar. The jaguar sees the blood it drinks as manioc beer, the spider monkey that the cacique bird thinks it is chasing is only seen by man as a grasshopper, and the tapirs which the snake thinks it is going to seize are really humans. Thanks to permanent changes in appearance caused by shifts of perspective the animals believe in good faith that they have the same cultural attributes as humans: their crests, they believe, are crowns of feathers, their hide is clothing, their beaks are lances and their claws are knives. The extreme perceptive relativism of the Amazonian cosmologies engenders an ontology, sometimes referred to as "perspectivism", which denies humans the viewpoint of Sirius in its affirmation that multiple visions of the world can coexist without contradicting one another. Unlike contemporary dualism, with its many cultural differences set against the backdrop of immutable nature, Amerindians see the whole cosmos as animated by one cultural regime with diversity introduced by the various ways we see each other. The shared reference point for the entities which inhabit the world is not man as a species but humanity as a condition.

This way of representing relations among entities which populate the world is not peculiar to Amazon Indians. Many tribal peoples in Oceania, south-east Asia, Siberia and North America have similar relations with animals and plants in their environment, which are seen as persons with whom one can live in harmony, even if they end up being eaten. It is not so much the oft-heard idea of respect for nature, but a conception of the world radically different from our own, where humans see themselves not as social groups managing relationships in an ecosystem, but as simple components of a greater whole where no true discrimination exists between human and not-human. Western respect for nature is a product of modern dualism, an attitude that has evolved as people's sensitivity to and awareness of the biological and climatic risks of industrialisation have grown. Historians have shown that this attitude was born out of the new sensitivity to the way in which household pets are treated, which then spread to wild species and natural environments, and out of our appreciation for the beauty of a landscape, as symbolised by pleasure gardens. Protecting environments and endangered species by imposing duties upon humans in respect of them, or by conferring rights on not-humans as the proponents of deep ecology wish, merely extends to a new class of beings the juridical principles which govern persons, without calling into question the modern distinction between nature and society. Society is the source of the law administered by men, and harm caused to nature becomes subject to sanctions because harm done to humans is sanctioned. Nothing of the sort is to be found in pre-modern societies which consider plants and animals not as wards in care, but as fully autonomous moral and social persons, and hence feel themselves no more obliged to protect them than they feel it necessary to preserve the well-being of distant neighbours.

What can we conclude from this excursion into ethnology? First, that we would be deluding ourselves if we thought that we could be directly inspired by the concepts of relations with not-humans which still exist in some parts of the world in order to change our own relationship with nature. No historical experience can be transposed, and it is difficult to see how in our centuries-old dualistic framework we could revert to concepts where plants and animals are people who have souls and social lives. The most fervent animal liberationists do recognise the intrinsic rights of those whom Michelet called "our lesser brethren", but none of them imagine that cows, pigs or guinea-pigs lead double lives and that hiding behind the animal avatars are beings with the same culture as ours. Nature protection movements, with their view of nature as something fragile no longer controlled by the predatory capitalism of yesteryear but by modern, rational resource management techniques, do not call into question the bases of western cosmology, they rather help to consolidate the ontological dualism so typical of modern ideology. Nature is becoming a scarce resource whose renewal cost must be factored into economic calculations. As for declining biodiversity, it is perceived at least as much as a threat of depleted gene stocks for wild and cultivated species of potential use for humans as it is as a world poorer in diversity.

Nevertheless, the idea of environmental protection, probably unintentionally, does harbour the ferment that could break down the dualism that has for so long been the key feature of our world view. This is because the survival of a growing number of not-humans that enjoy better protection from human harm is becoming increasingly subjected to that self-same human action, namely the protective and preventive measures adopted under national and international conventions. In other words, the nature-society duality is no longer watertight, since the conditions for the continued existence of the panda, the blue whale, the ozone layer and the Antarctic will soon be no more "natural" than the present natural conditions of wild

animals in zoos or genes in gene banks. Our paternalistic view of nature protection will probably be modified, as will the idea that government of men and government of things are worlds apart. Another more immediate conclusion has to do with the role tribal peoples can play in environmental preservation policies. As I said in my introduction, the idea is not just to stop excluding them from policies and projects which affect their lands, but also and especially to listen to what they have to say about their environment and to respect their lifestyle choices now and in the future. Between the blind predation of so many regions of our planet, the fusion utopia of some of the New Agers, and the managed ecology of the environment conservation movements, another voice must be heard. Davi's voice, for example. He is a Yanomami shaman, who says, "We do not use the word 'environment'. We just say that we want to protect the whole forest. 'Environment' is somebody else's word, it's a white man's word. What you call 'environment' is what's left once you've destroyed the rest." A penetratingly lucid remark which lays bare the West's good and bad conscience in its relationship with nature as object torn between conservationism and productivism. A remark we would do well to heed, since it conveys both criticism of our dearest illusions and an appeal to listen more closely to the manifold diversity of the world and of those who tell its story.

RESPONSES TO KEYNOTE SPEECH

By: Ms Henrietta Rasmussen, IUCN Councillor (Greenland)

The mythology of the Inuit deals very much with the relationship between nature and people. Inuit people are very concerned about nature. The Inuit are concerned that European and US youth have a paternalistic approach to nature, a view that clashes with the views of the Inuit. For example, the simplistic approach to conserving whales and seals by banning hunting ignores the fact that the Inuit have used these species sustainably for millennia and their cultural survival is tied up with their capacity to hunt and use natural resources.

Among the indigenous peoples, the common woman and the common man have always known how to cope with nature. The indigenous peoples have from time immemorial been the users, but also the guardians of nature. They have contributed significantly to the maintenance of many of the earth's most fragile ecosystems, through their traditional sustainable resource use practices and their profound, culture-based respect for nature. The knowledge of indigenous peoples spans the extremes of this planet, from the rainforest to the arctic, from the driest desert to the great oceans.

But today we are worried about our common environment, because more and more it is the knowledge and concern of the scientist, how to deal with nature, while the common citizen, the woman and the man, has become the consumer, alienated from nature and the condition it is in. It is now the scientist who is in charge. It is therefore a big challenge for the scientists, politicians and the bureaucrats gathered here to involve the citizen and make her aware of the situation of the nature.

IUCN has, in its resolutions, formulated policy about the role of indigenous peoples in this process. But they still need to be endorsed. The United Nations is working on a Declaration of the Rights of the Indigenous Peoples, but it needs to be adopted during the UN Decade for the Rights of Indigenous Peoples that will end in the year 2004. It is good that the ILO has its Convention on the rights of indigenous peoples, but these are minimum standards and the Convention must be ratified to be legally binding.

Indigenous peoples world wide want to be taken seriously. We deserve to be recognised, as equal partners in the world of tomorrow and to enjoy the fruits of sustainable use, in a new partnership for development of the diversity of cultures.

By: Antonio Claparols, IUCN Councillor (Philippines)

Two issues are relevant to this topic:

- o Bioprospecting and genetic engineering can be threats to both nature conservation and cultures, as they earn profits at the cost of indigenous peoples.
- o GATT and globalisation have not helped us much towards a more sustainable society.

All of us need to learn from the tribes and indigenous peoples of the world to secure a better future for our planet.

COMMENTS FROM PARTICIPANTS

It will be difficult to conserve biodiversity when people go hungry, so it is critical to integrate development and conservation.

A conflict between cultural perceptions of nature is often seen in countries that were once colonised and maintain laws from the colonial era, while still maintaining traditional cultures.

KEY CONCLUSIONS

- o Conservation field workers should have some training in anthropology and work with anthropologists.
- o Representatives of tribal groups could also be trained in biology so that they can better work with conservation and development workers.
- o The role of the state is shrinking. Services offered by the state have retracted since the 1970s and many states are divesting responsibilities to NGOs. This is not a good thing; the state should maintain its proper responsibilities, so there is a need to rethink roles between stakeholders.

2. COMMUNITIES

2.b GREENING URBAN SOCIETY

By the time of the 50th anniversary, roughly half of the world population will be living in cities. People who live in cities are well insulated from nature, tending to enjoy it vicariously or as tourists. At the same time, urban people have significant political influence and many support conservation, though often based on a rather abstract - almost mythological - understanding of the relationship between people and biological systems. What are the implications of this for conservation? What new approaches are required to work more effectively with urban communities? What is IUCN's role in cities?

Organizer: IUCN-US (Scott Hajost)

Chair: Mark Hildebrand, Habitat, Nairobi (Kenya)

Keynote speaker: Herbert Girardet, Sustainable London Trust (UK)

Respondents:

- o Juliana Chileshe, IUCN Regional Councillor (Zambia)
- o Nobutoshi Akao, Ministry of Foreign Affairs (Japan)
- o Julian Gaxiola, Federacion Conservacionista Mexicana (FECOMEX) (Mexico)

CHAIR'S OPENING REMARKS

CHAIR: MARK HILDEBRAND

RAPPORTEUR: SCOTT HAJOST

The 21st century will be the age of the city. The majority of the world's population will be urban citizens, and the impacts of cities on communications, financial flows and world trade are likely to increase further. Even now, the bulk of the world's resources are being consumed in cities and most of the pollution affecting the world's atmosphere, land and oceans emanates from cities. Urban centres, on only two percent of the world's land surface, accommodate half its population and use 75% of its resources. Given that half of humanity lives less than 60 km from coastal zones, efforts at marine conservation necessarily need to address the impacts of cities on marine ecosystems.

On the other hand, urbanisation has some very positive features: for example, it provides the opportunity for settlements to be efficient in their use of space. The potential also exists for cities to make extremely efficient use of resources. Significant efforts at ecologically sustainable development should be directed at transforming the way cities function. Furthermore, given that cities harbour a great variety of plant and animal species, they offer opportunities for biodiversity conservation that often are not sufficiently realised.

Over the next 30 years the urban population will increase from 2.7 billion to over 5 billion, and almost all of the increase will be in developing country cities. The implementation of sustainable city development and urban poverty reduction are imperatives.

It is important that IUCN take a position on urbanisation. Such a position should not see urbanisation as the enemy of conservation, but rather the position should be more sophisticated and recognise the positive role of urbanisation. Given the challenge of addressing population increase, unless we take draconian measures with population control then we can only hope to cope with population increases through urbanisation.

IUCN needs to turn away from simply protecting the natural environment from urban areas and take on a wider view that considers how we can work to change the way cities work and reduce their impact. IUCN needs to recognise ecological efficiencies of cities and to we need to find a role for IUCN in the issue.

Greening Urban Society

By: Herbert Girardet, Visiting Professor, Environmental Planning,
Middlesex University, London, United Kingdom and Chairman,
Schumacher Society, United Kingdom

ABSTRACT

The world is becoming increasingly urbanised, and by the turn of the century, half the world's population will live in cities. These three billion people live on about 2% of the world's land surface, yet they use over 75% of the world's resources. Urban people have much higher levels of consumption than rural dwellers, consuming large amounts of fossil fuels, metals, timber, meat, and manufactured products; cities leave large footprints, and the total territory required to support London is equivalent to Britain's entire productive land. Modern cities are particularly dependent on fossil fuel, and indeed it appears that fossil fuel is necessary to the modern approach to urban life. Most cities have a linear metabolism, with resources flowing through the system without much concern about their origin or disposal; this is profoundly different from nature's circular metabolism where every output by an organism is also an input which renews and sustains the whole living environment. Continuing urbanisation will require that outputs will also need to be inputs into the production system, with routine recycling of paper, metals, plastic, and glass, and the conversion of organic materials into compost, thereby returning plant nutrients to maintain the productivity of farmland. But urban people must also reduce their throughput of resources, maintaining an acceptable standard of living with less consumption of resources. This will lead to a "sustainable city" that works so that all its citizens are able to meet their own needs without endangering the well-being of the natural world or the living conditions of other people, now or in the future. Many cities already are relatively green; for example, in 1990, urban metropolitan areas produced 40% of the dollar value of US agricultural production. Refocusing urban investment from resource extraction to resource conservation and recycling could generate many employment and business opportunities, drawing on the dissemination of best practices from experience around the world. This will involve reducing the impact of urban living through education and information dissemination, as well as the better use of technology. Cities for a new millennium will be energy and resource efficient, people friendly, and culturally rich, with active democracies assuring the best uses of human energies.

THE URBAN AGE

City growth is changing the condition of humanity and the face of the earth. In one century, global urban populations will have expanded from 15 to 50% and this figure will increase further in the coming decades. By 2000, half of humanity will live and work in cities, while the other half will depend increasingly on cities and towns for their economic survival. In the UK, a pioneer of large-scale urban development, over 80% of people live in cities.

The size of modern cities, too, in terms of numbers as well physical scale, is unprecedented: in 1800 the world had only one city with a million people, London. At that time the largest 100 cities in the world had 20 million inhabitants, with each city usually extending to just a few thousand hectares. In 1990 the world's 100 largest cities accommodated 540 million people and 220 million people lived in the 20 largest cities, mega-cities of over 10 million people, some extending to hundreds of thousands of hectares. In addition, there were 35 cities of over 5 million and hundreds of over one million people.

In the 19th and early 20th centuries, urban growth was occurring mainly in the North, as a result of the spread of industrialisation and the associated rapid increase in the use of fossil fuels. Today, the world's largest and fastest growing cities are emerging in the South, because of unprecedented urban-industrial development, and frequently as a consequence of rural decline.

We are used to thinking about cities as places where great wealth is generated, and also where social disparities and tensions have to be addressed. The urban social agenda is certainly a critical one, and much effort has gone into addressing these problems. Cities as cultural centres have also received much attention. However, an issue which has received much less attention is the huge resource use of modern cities and the implications of that on both local and global environments.

World wide, increased resource consumption is closely associated with urban development. This tends to cause increases in human living standards which can be witnessed today in developing countries where urban people typically have much higher levels of consumption than rural dwellers, with massively increased through-put of fossil fuels, metals, timber, meat and manufactured products. However, increased resource throughput in urban centres is also a threat to the health of city people as they are exposed to high concentrations of disease vectors and pollutants. Many third world cities don't have the infrastructures to cope with the accumulation of wastes. Diseases such as cholera, typhoid and TB, well known in London 150 years ago, are occurring in many developing cities, with epidemics threatening particularly the poorest districts.

In global environmental terms, too, increased resource use is becoming a pertinent issue. Asia is currently undergoing the most astonishing urban-industrial development. China alone, with 10% economic growth per year, is increasing the number of its cities, from just over 600 today to over 1200 by 2010. Some 300 million people are expected to be moving to cities, converting from peasant farming and craft-based living to urban-industrial lifestyles. The increased purchasing power is already leading to increased demand for consumer goods and a more meat-based diet.

CITIES AS SUPERORGANISMS

Urban systems with millions of inhabitants are unique to the current age and they are the most complex products of collective human creativity. They are both organisms and mechanisms in that they utilise biological re-production as well as mechanical production processes.

Large cities have unique characteristics of their own, developing extraordinary degrees of specialisation. The vast array of productive enterprise, capital and labour markets, service

industries and artistic endeavour could be described as a symbiotic cultural system. However unlike natural systems they are highly dependent on external supplies: for their sustenance large modern cities have become dependent on global transport and communication systems. This is not civilisation in the old-fashioned sense, but mobilisation, dependent on long-distance transport routes.

Demand for energy defines modern cities more than any other single factor. Most rail, road and aeroplane traffic occurs between cities. All their internal activities - local transport, electricity supply, home living, services provision and manufacturing - depends on the routine use of fossil fuels. As far as I am aware there has never been a city of more than one million people not running on fossil fuels. Without their routine use, the growth of mega-cities of ten million people and more would not have occurred. But there is a price to pay. Waste gases, such as nitrogen dioxide and sulphur dioxide, discharged by chimneys and exhaust pipes, affect the health of city people themselves and, beyond urban boundaries, forests and farmland downwind. A large proportion of the increase of carbon dioxide in the atmosphere is attributable to combustion in the world's cities. Concern about climate change, resulting mainly from fossil fuel burning, is now shared by virtually all the world's climatologists.

Concentration of intense economic processes and high levels of consumption in cities both increase their resource demands. Apart from a monopoly on fossil fuels and metals, humanity now uses nearly half the world's total photosynthetic capacity as well. Cities are the home of the 'amplified man', an unprecedented amalgam of biology and technology, transcending his biological ancestors. Beyond their limits, cities profoundly affect traditional rural economies and their cultural adaptation to biological diversity. As better roads are built, and access to urban products is assured, rural people increasingly abandon their own indigenous cultures which are often defined by sustainable adaptation to their local environment. They tend to acquire urban standards of living and the mind set to go with these.

Urban agglomerations are becoming the dominant feature of the human presence on earth, with supplies brought in from an increasingly global hinterland. All in all, urbanisation has profoundly changed humanity's relationship to its host planet, with unprecedented impacts on forests, farmland and aquatic ecosystems. The human species is changing the very way in which the 'the web of life' on earth itself functions, from a geographically distributed interaction of a myriad of species, into a punctuated system dominated by the resource use patterns of just the one species: cities take up only 2% of the world's land surface, yet they use over 75% of the world's resources.

With Asia, Latin America and parts of Africa now joining Europe, North America and Australia in the urban experiment, it is crucial to assess whether large-scale urbanisation and sustainable development can be reconciled. While urbanisation is turning the living earth from a self-regulating interactive system into one dominated by humanity, we have yet to learn the skill of creating a new, sustainable equilibrium.

LONDON'S FOOTPRINT

A few years ago I produced a documentary on deforestation in the Amazon basin and the resulting loss of biodiversity. Filming at the port of Belem I saw a huge stack of mahogany timber with 'London' stamped on it being loaded into a freighter. I started to take an interest in the connection between urban consumption patterns and human impact on the biosphere. It occurred to me that logging of virgin forests, or their conversion into cattle ranches and into fields of soybeans for cattle fodder (in Brazil's Mato Grosso region) or of manioc for pig feed (in the former rainforest regions of Thailand), was perhaps not the most rational way of assuring resource supply to urban 'agglomeration economies'.

Recently the Canadian economist William Rees started a debate about the ecological footprint of cities, which he defines as the land required to supply them with food and timber products, and to absorb their CO² output via areas of growing vegetation. I have examined the footprint of London which also happens to be the city that started it all: the 'mother of megacities'. Today London's total footprint, following Rees's definition, extends to around 125 times its surface area of 159,000 hectares, or nearly 20 million hectares. With 12% of Britain's population, London requires the equivalent of Britain's entire productive land. In reality, this land, of course, stretches to far-flung places such as the wheat prairies of Kansas, the tea gardens of Assam, the forests of Scandinavia and Amazonia, and the copper mines of Zambia.

But large modern cities are not just defined by their resource use. They are also centres for financial services. When discussing urban sustainability we have to try to assess the financial impact of cities on the rest of the world.

A friend of mine recently told me about a startling experience:

"A couple of years ago I attended a meeting typical of those which take place every day in the city of London. A group of Indonesian businessmen organized a lunch to raise £300 million to finance the clearing of a rainforest and the construction of a pulp paper plant. What struck me was how financial rationalism often overcomes common sense; that profit itself is a good thing whatever the activity, whenever the occasion. What happened to the Indonesian rainforest was dependent upon financial decisions made over lunch that day. The financial benefits would come to institutions in London, Paris or New York. Very little, if any, of the financial benefits would go to the local people. Therefore when thinking about the environmental impact of London we have to think about the decisions of fund managers which impact on the other side of the world. In essence, the rainforest may be geographically located in the Far East, but financially it might as well be located in London's Square Mile".

A crucial question for a world city such as London is how it can reconcile its special status as a global trading centre with the new requirement for sustainable development. London's own development was closely associated with gaining access to the world's resources. How can this be reconciled with creating a sustainable relationship with the global environment and also with the aspirations of people at the local level?

London was a pioneer in large-scale urban development. Today businesses in cities such as London certainly have the desire to continue. They wish to be sustainable in their own right. The question now is how the momentum for sustainable development can encompass the aspirations of business, assuring that people can lead lives of continuity and certainty, while together achieving compatibility of the urban metabolism with the living systems of the biosphere.

THE METABOLISM OF CITIES

Like other organisms, cities have a definable metabolism. The metabolism of most 'modern' cities is essentially linear, with resources flowing through the urban system without much concern about their origin, and about the destination of wastes; inputs and outputs are considered as largely unrelated. Raw materials are extracted, combined and processed into consumer goods that end up as rubbish that can't be beneficially reabsorbed into living nature. Fossil fuels are extracted from rock strata, refined and burned; their fumes are discharged into the atmosphere. In distant forests, trees are felled for their timber or pulp, but all too often forests are not replenished. Similar processes apply to food: nutrients that are taken from the land as food are harvested, and not returned. Urban sewage systems usually have the function of collecting human wastes and separating them from people. Sewage is discharged into rivers and coastal waters down stream from population centres, and is usually not returned to farmland. Today coastal waters are enriched both with human sewage and toxic effluents, as well as the run-off of mineral fertiliser applied to farmland feeding cities. This open loop is not sustainable.

The linear metabolic system of most cities is profoundly different from nature's circular metabolism where every output by an organism is also an input which renews and sustains the whole living environment. Planners designing urban systems should start by studying the ecology of natural systems. On a predominantly urban planet, cities will need to adopt circular metabolic systems to assure the long-term viability of the rural environments on which they depend. Outputs will also need to be inputs into the production system, with routine recycling of paper, metals, plastic and glass, and the conversion of organic materials into compost, returning plant nutrients to keep farmland productive.

The local effects of urban use of resources in cities also need to be better understood. Cities accumulate large amounts of materials within them. Vienna with 1.6 million inhabitants, every day increases its actual weight by some 25,000 tonnes. Much of this is relatively inert materials, such as concrete and tarmac. Other materials, such as heavy metals, have discernible environmental effects: they gradually leak from the roofs of buildings and from water pipes into the local environment. Nitrates, phosphates, or chlorinated hydrocarbons accumulate in the urban environment and build up in watercourses and soils, with as yet uncertain consequences for future inhabitants.

The critical question today, as humanity moves to full urbanisation, is whether living standards in our cities can be maintained while curbing their local and global environmental impacts. To answer this question it helps to draw up balance sheets comparing urban resource flows. It is becoming apparent that similar-sized cities supply their needs with a greatly varying throughput of resources. Most large cities have been studied in considerable detail

and in many cases it won't be very difficult to compare their use of resources. The critical point is that cities and their people could massively reduce their throughput of resources, maintaining a good standard of living while creating much-needed local jobs in the process.

ARE SOLUTIONS POSSIBLE?

It seems unlikely that the planet can accommodate an urbanised humanity which routinely draws its resources from a distant hinterland. Can cities therefore transform themselves into sustainable, self-regulating systems - not only in their internal functioning, but also in their relationships with the outside world?

An answer to this question may be critical to the future wellbeing of the biosphere, as well as of humanity. Maintaining stable linkages with the world around them is a completely new task for city politicians, administrators, business people and people at large. Yet there is little doubt that the world's major environmental problems will be solved only through new ways of conceptualising and running our cities, and the way we lead our urban lives.

Today we have the historic opportunity to implement technical and organizational measures for sustainable urban development, arising from agreements signed by the international community at UN conferences in the 1990s. Agenda 21 and its prescriptions for solving global environmental problems at the local level are well known. Building on Agenda 21, the Habitat Agenda, signed by 180 nations at the recent Habitat II conference in Istanbul, will also strongly influence the way we run cities. It states: "Human settlements shall be planned, developed and improved in a manner that takes full account of sustainable development principles and all their components, as set out in Agenda 21. We need to respect the carrying capacity of ecosystems and preservation of opportunities for future generations. Production, consumption and transport should be managed in ways that protect and conserve the stock of resources while drawing upon them. Science and technology have a crucial role in shaping sustainable human settlements and sustaining the ecosystems they depend upon."

What, then, is a sustainable city? Here is a provisional definition:

A 'sustainable city' is a city that works so that all its citizens are able to meet their own needs without endangering the well-being of the natural world or the living conditions of other people, now or in the future.

This definition concentrates the mind on fundamentals. In the first instance the emphasis is on people and their needs for long term survival. Human needs include good quality air and water, healthy food and good housing; they also encompass quality education, a vibrant culture, good health care, satisfying employment or occupation, and the sharing of wealth; as well as factors such as safety in public places, supportive relationships, equal opportunities and freedom of expression; and meeting the special needs of the young, the old or the disabled. In a sustainable city, we have to ask: are all its citizens able to meet these needs?

CONDITIONS FOR SUSTAINABLE DEVELOPMENT

Given that the physiology of modern cities is currently characterised by their routine use of fossil fuels to power production, commerce, transport, and water supplies as well as domestic comfort, a major issue for urban sustainability is whether renewable energy technologies may be able to reduce this dependence.

London, for instance, with 7 million people, uses 20 million tonnes of oil equivalent per year, or two supertankers a week, and discharges some 60 million tonnes of carbon dioxide. Its per capita energy consumption is among the highest in Europe, yet the know-how exists to bring down these figure by between 30 and 50% without affecting living standards, while creating tens of thousands of jobs in the coming decades.

To make them more sustainable, cities today require a whole range of new resource efficient technologies, such as combined heat-and-power systems, heat pumps, fuel cells and photovoltaic modules. In the near future enormous reductions in fossil fuel use can be achieved by the use of photovoltaics. According to calculations by BP, London could supply most of its current summer electricity consumption from photovoltaic modules on the roofs and walls of its buildings. This technology is still expensive, but large-scale production will massively reduce unit costs.

Looking back, the physiology of traditional towns and cities was defined by transport and production systems based on muscle power. Dense concentration of people was the norm. Many cities in history adopted symbiotic relationships with their hinterland to ascertain their continuity. This applies to medieval cities with their concentric rings of market gardens, forests, orchards, farm and grazing land. Chinese cities have long practised the return of nightsoil onto local farmland as a way of assuring sustained yields of foodstuffs. Today most Chinese cities administer their own, adjacent areas of farmland and, until the recently, were largely self-sufficient in food.

A major effect of the routine use of fossil fuel based technologies was for cities to replace this density with urban sprawl. Motor transport has caused many cities to stop relying on resources from their local regions and to become dependent on an increasingly global hinterland.

However, some modern cities have made circularity and resource efficiency a top priority. Cities right across Europe are installing waste recycling and composting equipment. Austrian, Swiss, Danish and French cities have taken the lead. In German towns and cities, dozens of composting plants are under construction. Throughout the developing world, too, cities have made it their business to encourage recycling and composting of wastes.

Some writers have argued that cities can actually be beneficial for the global environment, given the reality of a vast human population. They suggest that the very density of human life in cities makes for energy efficiency in home heating as well as in transport. Systems for waste recycling are more easily organized in densely inhabited areas. And urban agriculture, too, if well developed, could make a significant contribution to feeding cities and providing people with livelihoods.

Urban food growing is certainly common in the late 20th century and not just in poorer countries. A new book published by UNDP proves the point: "The 1980 US census found that urban metropolitan areas produced 30% of the dollar value of US agricultural production. By 1990, this figure had increased to 40%. Singapore is fully self-reliant in meat and produces 25% of its vegetable needs. Bamako, Mali, is self-sufficient in vegetables and produces half or more of the chickens it consumes. Dar-es-Salaam, one of the world's the fastest growing large cities, now has 67% of families engaged in farming compared with 18% in 1967. 65% of Moscow families are involved in food production compared with 20% in 1970. There are 80,000 community gardeners on municipal land in Berlin with a waiting list of 16,000."

POLICIES FOR SUSTAINABILITY

Today we have a great opportunity to develop a whole new range of environmentally friendly technologies for use in our cities. Efficient energy systems are now available for urban buildings, including combined heat-and-power generators, with fuel cells and photovoltaic modules waiting in the wings. New materials and concepts of architectural design allow us to greatly improve the energy performance and to reduce the environmental impact of materials use in buildings. And waste recycling technologies for small and large, rich and poor cities, can facilitate greater efficiency in the urban use of resources. Transport technologies, too, are due for a major overhaul. Fuel-efficient low emission vehicles are at a very advanced stage of development. In US cities, rapid urban transit systems are starting to reappear even where people had come to depend almost exclusively on private transport.

With over 75% of the population in the North living in cities, and with cities using most of the world's resources, it is critically important to develop new policies for the sustainability of our cities - social, economic and environmental. This means, above all else, self-financing investment in end use efficiency, reducing resource use while simultaneously generating urban jobs and business opportunities.

Using Agenda 21 and the Habitat Agenda as the basis, we have the opportunity to refocus investment from resource extraction to resource conservation and recycling, with many employment and business opportunities. While a policy based on high resource productivity would reduce employment in mining, much of it abroad, it would enhance job creation in end use efficiency - in the building trade, environmental technology industries and the electronics sector - in places where they are most needed: our cities.

Policies proposed here aim to create synergies between various business sectors: the waste outputs of cities can be a basis for new business ventures. Energy efficiency, so far tackled half-heartedly, should be given top priority. Governments can do a great deal to facilitate sustainable urban development, using regional and national legislation, planning regulation and budgetary signals to initiate change.

SMART CITIES

Cities are centres of communication and new electronic systems have dramatically enhanced that role. Information technologies have given cities a global reach as never before, particularly in further extending the financial power of urban institutions. The daily money-go-round from Tokyo to London and on to New York and Los Angeles is the most striking example of this. The new economy is organized around global networks of capital, management, and information, whose access to technological know-how is at the roots of productivity and competitiveness. But will this power ever be exercised with a sense of responsibility appropriate to an urban age? If this is the global network society, who controls its ever-growing power?

The global economic and environmental reach of cities today needs to be matched with communication systems that monitor new impacts - early warning systems that enable city people to ring alarm bells as soon as new, unacceptable developments occur, whether it is the dumping of toxic waste or the transfer of environmentally undesirable technologies from one city or territory to another.

Much more needs to be done to ensure processes by which cities monitor and ameliorate their impact on the biosphere. I would like to postulate that modern cities could develop cultural feedback systems, responding to the challenge of achieving sustainability by limiting urban resource consumption and waste output through technological and organizational measures.

It is of critical importance to recognise the great inherent creativity of city people in solving problems. In the end only they can implement measures for sustainable urban development - technical fixes are not enough. But people need a good knowledge base. For this purpose the most important thing is the collection and dissemination of best practices to assure that people in cities worldwide actually are informed about existing projects. That would be an indication that cities were becoming smart in the best sense of the word.

THE LEGACY OF HABITAT II

The Habitat II Conference in Istanbul made a great deal of the fact that cities, more often than not, are considered places where problems are concentrated, yet, in reality, given half a chance, people wherever they are, seek to improve their situation wherever possible. This information is now available via e-mail and through direct contacts with urban groups all over the world. Exchange programmes for disseminating this information are now reaching even some of the poorest urban communities.

Five lessons emerged out of Habitat II:

1. **The power of good examples.** There are fascinating initiatives throughout the world's cities. Habitat and its partners have helped groups from around the world to prepare reports and to make films about their own activities. It is also undertaking the dissemination of best practices. This process will deepen our understanding of urban challenges and opportunities so that realistic steps can be taken at local, national and

international levels to develop new partnerships for solving problems and enriching the life of cities.

2. **Complexity of issues.** The contributions Habitat received also illustrated just how complex modern cities are. In this context, obstacles to successful implementation must be analysed and effective processes for implementing projects identified. In situations of rapid urban growth it is particularly important for the development of urban infrastructure problems to be overcome.
3. **Local level action has large-scale repercussions.** Implementation must be tailored very closely to local situations. We then have to ask: how applicable are best practices outside their own regions? For urban best practice to be transferable from one city to another, implementation must be closely tailored to local situations. It is particularly important to establish under what circumstances and with what types of partners successful projects have materialised.
4. **Exchanges take place between peer groups in different cities.** The sharing of best practice between cities is an essential tool for sustainable urban development. Once outside interest in a project has been established, site visits are of critical importance. By learning from example, local transformation can lead to global change.
5. **Changing the way urban institutions work.** The power of allowing people direct access to best practice examples through a dynamic process of decentralised co-operation has become very apparent. The material collected under the Habitat 'best practice initiative' is a gold mine for the world's cities and its dissemination will be of paramount importance for all the potential partners concerned.

By 2020, more than a billion and a half people in the world's cities could face life, and health, threatening environments unless we create a revolution in urban problem solving. We could also see ever-greater impacts by cities on the global environment. We need a new global partnership between national governments and local communities, between the public and private sectors. The sustainable development of cities is becoming a priority challenge for the international community.

CONCLUSIONS: CULTURAL DEVELOPMENT

With the whole world now copying western development patterns we need to formulate new cultural priorities. Cultural development is a critical aspect of sustainable urban development, giving cities the chance to realise their full potential as centres of creativity, education and communication. Cities are nothing if not centres of knowledge and today this also means knowledge of the world and our impact on it. Reducing urban impacts is as much an issue of education and of information dissemination as of the better uses of technology.

Ultimately that cannot be done without changing the value systems underpinning our cities. Adopting circular resource flows will help cities reduce their footprint, and thus their impact on the biosphere is a cultural issue. Initiatives to that effect are now in evidence all over the

world. In many cities there is growing awareness that the urban super-organism can become a sustainable, self-regulating system through appropriate cultural processes. In the end, only a profound change of attitudes, a spiritual and ethical change, can bring the deeper transformations that can make cities truly sustainable.

We need to revive the vision of the city as a place of culture and creativity, of conviviality and above all else of sedentary living. As I have suggested, currently cities are not centres of civilisation but mobilisation of people and goods. A calmer, serener vision of cities is needed to help them fulfil their true potential, as places not just of the body but of the spirit. Great cities of the past were above all else places of beauty, with their great public spaces, their magnificent bridges and the rising spires of their religious buildings.

Cities are what their people are. The greatest energy of cities should flow inwards, to create masterpieces of human creativity, not outwards, to bring in ever more products from ever more distant places. The future of cities crucially depends on the utilisation of the rich knowledge of their people, and that includes environmental knowledge. Eco-friendly urban development could well become the greatest challenge of the twenty-first century, not only for human self-interest, but also for the sake of a sustainable relationship between cities and the biosphere on which humanity ultimately depends.

Cities for a new millennium will be energy and resource efficient, people friendly, and culturally rich, with active democracies assuring the best uses of human energies. In northern mega-cities, such as London and New York, prudent inward investment will contribute significantly to achieving higher levels of employment. In cities in the South, significant investment in infrastructure will make a vast difference to health and living conditions.

Thought has created the unstable world in which we now live, manifested in mega-technology, mega-cities, global power structures and vast environmental impacts. Practical visions and working examples of innovative, alternative systems are now urgently needed. We also urgently need new thinking on sustainability, peace and personal empowerment. By emphasising human-scale solutions we can contribute to a core transformation of contemporary urban culture. City people the world over have a crucial responsibility for implementing such a process.

RESPONSES TO KEYNOTE SPEECH

By: Juliana Chileshe, IUCN Regional Councillor (Zambia)

The role of cities would not have been an issue for discussion 50 years ago in IUCN. We need to look at how cities in the North relate to the South where the bulk of biodiversity is found. How do we get commitment, a sense of responsibility and decisions from the North and how can we avoid emulating consumption patterns of Northern cities in Southern cities?

There is still a legacy of colonialism in many cities in Africa, and as a result rural communities are attracted to cities. At independence there was freedom of movement but the systems have not been strong enough to counter the migration of rural people to urban areas. The urban issue is important at a time when IUCN is embracing the private sector.

By: Nobutoshi Akao, Ministry of Foreign Affairs (Japan)

We need to consider how we can keep green spaces in urban areas. Urban fringe agriculture is often not very productive, as it needs massive applications of fertiliser and often results in pollution. We should promote the development and assessment of more sustainable cities. Some cities have joined a 20% club, which will require these cities to reduce their impact by 20% by 2002, for example through reducing waste production and changing transport systems.

By: Julian Gaxiola, Federacion Conservacionista Mexicana (FECOMEX) (Mexico)

We need to work together to solve the problems of urban areas, and to create the necessary culture and economic incentives that will enable change. We need to act now and to use the media to bring about cultural change in urban areas.

COMMENTS FROM PARTICIPANTS

The bid process for the Olympic games has an environmental component. Even if the bid is not successful there are often changes that result due to the bid process. Perhaps IUCN could build on the opportunities provided by the Olympic games search process.

The impact of financial crisis in Asia has hit cities far more than in rural areas, and this may have happened elsewhere. The current financial crisis is also seeing large flows of outside assistance to megacities, which may not be sustainable.

IUCN does not itself have the resources to tackle the problems of cities but it can contribute in its area of expertise by publicising examples of positive initiatives at restoration of natural areas in cities. Such an example is the city of Christchurch, New Zealand (population 300,000+) where an Agenda 21 Committee of volunteers has taken the concept of biogeography and, using the skills of a wide range of natural scientists, has mapped the natural ecosystems of the city area. These are available to community groups and citizens along with planting lists which are available from Christchurch City Council which is co-operating in programmes to revegetate areas such as streamsides to indigenous New Zealand flora, replacing species introduced by English settlers 150 years ago.

IUCN should not forget the role of urban people when they use the environment for recreation and in the role of natural environments in spiritual and physical well being of urban people. IUCN can play a role in education, for example working with town governments and school systems to maintain green systems in urban areas

We need indicators of sustainability that include cities and their ecological footprint. We should also strive to link inputs with outputs, though progress on this issue has been slow. We need to green the curricula and green the cities, so IUCN should take up the challenge to call for sustainable city initiatives as a commitment to the new millennium.

KEY CONCLUSIONS

It is clearly very important for IUCN to develop a strategy on cities. This is particularly relevant because cities:

- o have major impacts on forest, wetland and marine ecosystems;
- o affect traditional cultures and their sustainable resource management systems;
- o are centres of illicit wildlife trade; and
- o are major emitters of greenhouse gases affecting the world's climate and biodiversity.

IUCN should become an advocate for making cities more resource efficient, adapting the concept of the circular metabolism of ecosystems to urban resource management. To achieve this, IUCN should extend its education role to encompass best practices on urban policies, administrative practice and stakeholder participation to foster a culture of urban sustainability and conservation.

Wherever possible, IUCN should also encourage scientific and business innovation to introduce a new generation of sustainable urban technologies for energy, transport, waste management and architecture. This is of direct relevance to IUCN's resource conservation goals.

IUCN should work in partnership with the United Nations Centre for Human Settlement (UNCHS) and others to foster improved information flows to urban administrators and business leaders on environmental performance and conditions of cities. This could include a ranking of cities through the use of urban environmental indicators.

In summary, IUCN has to face the reality that the future of life on earth may be decided in cities and that it has a critical opportunity to influence decision making on how cities shape human relations with the biosphere.

2. COMMUNITIES

2.c FAIR SHARES

At the same time that economic globalisation is reaching even the most remote parts of the world, most governments are promoting greater decentralisation. This process is sometimes forced on local communities before they are properly prepared, and sometimes responsibility is decentralised without sufficient authority or funds. Decentralisation provides both opportunities and dangers for conservation, depending on how it is managed. What experience is available from various parts of the world to guide governments and conservation organizations on the appropriate balance between the different levels of government? What are the implications of decentralisation for conservation, and for IUCN?

Organizer: Forest Conservation Programme (Bill Jackson)

Chair: Gerardo Budowski, University for Peace and former Director General of IUCN (Costa Rica)

Keynote speaker: Jeff Sayer, Director General, CIFOR (UK)

Respondents:

- o Jean Lariviere, Scientific Counsellor of the Nicholas Hulot Foundation for Nature and Humankind (France)
- o Seydina Issa Sylla, Director of National Parks (Senegal)
- o Eduardo Guerrero, Fondo para la Protección del Medio Ambiente de Colombia (Colombia)

CHAIR'S OPENING REMARKS

CHAIR: GERARDO BUDOWSKI

RAPPORTEUR: BILL JACKSON

We have progressed a long way on the issue of fair shares - the equitable participation of stakeholders in both the conservation and the development programmes that affect them - since an IUCN conference first addressed this subject in 1968. There were only two large international conservation organisations at the time, IUCN and the World Wildlife Fund. Things have changed a great deal since then. In real terms the expenditure today on environmental issues is 600 to 1000 times greater than in 1968. Most of the expenditure was through the UN system and no one really questioned this. But things have changed and conservation through governments alone is no longer feasible. The relationship between various stakeholders, government, NGOs and the private sector is still emerging, offering IUCN an opportunity to contribute to an important process.

IUCN should never compete with other organisations but rather we should be one step ahead and aim to make allies and partnerships. IUCN really needs to address the issue of making allies, as such partnerships will be critical for the 21st century.

Globalisation, Localisation and Protected Areas

By: Jeffrey A. Sayer, Director General, CIFOR, P.O. Box 6596 JKPWB, Jakarta, Indonesia

ABSTRACT

Processes of economic integration and growing economic influence of corporations are leading to greater efforts among people in all countries to protect the lifestyles and habitats that they value. For conservation organizations, the first challenge is clearly defining objectives and priorities on what to conserve, followed by mobilising the best available science and emerging techniques of working with local human communities to determine the most efficient way of achieving the agreed conservation goals at the least social cost. Greater transparency, objectivity and fairness must be essential elements in the process of allocating land for various purposes. For conservationists, the critical task is to determine the optimal extent, location and management of areas needed to achieve an acceptable balance between the development needs of local people and global biodiversity conservation needs. The inevitable trade-offs between biodiversity conservation and other uses of natural areas are more likely to be widely accepted if they are made in a transparent manner with the full participation of all people concerned, with related economic costs and benefits allocated in an equitable manner. IUCN needs to play a leadership role in helping people protect their land against global pressures and enable them to be fairly compensated for any costs they may incur when they live in areas whose biodiversity values are primarily global and not local.

WHERE ARE WE HEADED?

We live in a rapidly changing world. Current economic orthodoxy is pushing us inexorably in the direction of globalisation. Capital, goods, information and, increasingly, people move freely between countries. The power of sovereign governments is being eroded (Ohmae, 1995), and multinational corporations are acquiring more and more power (Korten, 1995). Some people fear that market forces will inevitably lead us to a world that is less diverse and less driven by human values; that our future world may be more efficient but perhaps less pleasant to live in, and certainly less sustainable. Fig. 1 portrays the divergence between futures which maximise consumption and those that are more value driven (Bossel, 1998). Market forces will be the primary determinants of patterns of land use in the future; and managers of protected areas ignore this reality at their peril (Sayer and Byron, 1996).

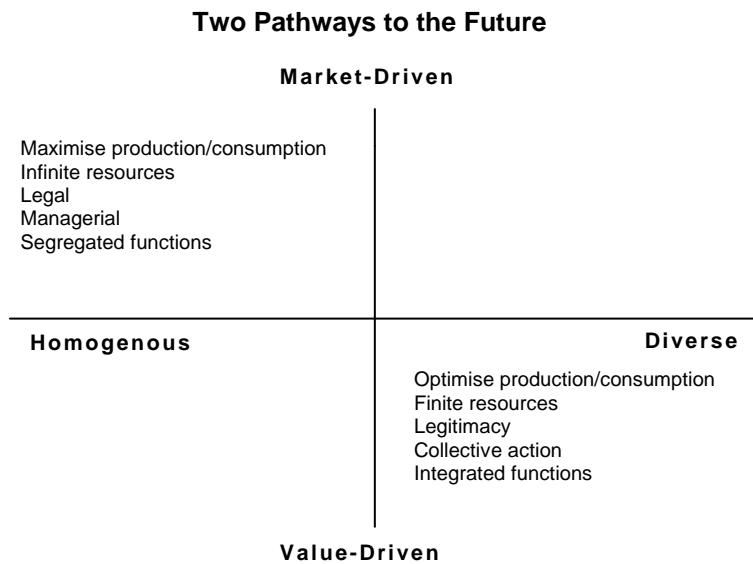


Figure 1. Market and Value Driven Futures

In the market-driven world, resources and power will no longer be in the hands of elected governments and the international bodies they have established. For example, recent growth in the budget of the Turner Broadcasting System relative to that of the United Nations (Fig. 2) suggests that in many ways that corporation will have greater influence over our lives than the world body.

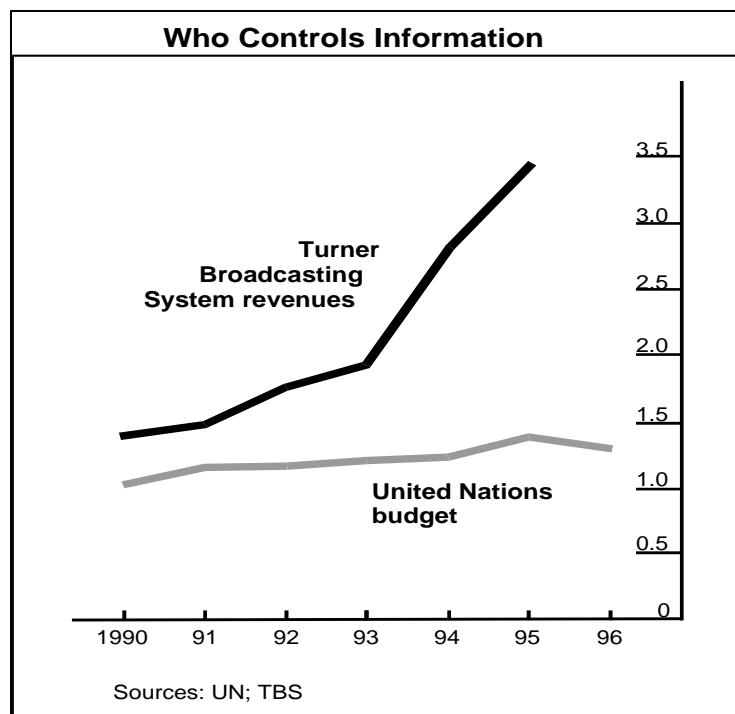


Figure 2. Recent growth of budgets of Turner Broadcasting and the United Nations

At the same time, the World Wide Fund for Nature (WWF) now has resources that dwarf those of the United Nations Environment Programme (Fig. 3) and will inevitably have a greater capacity to influence environmental outcomes.

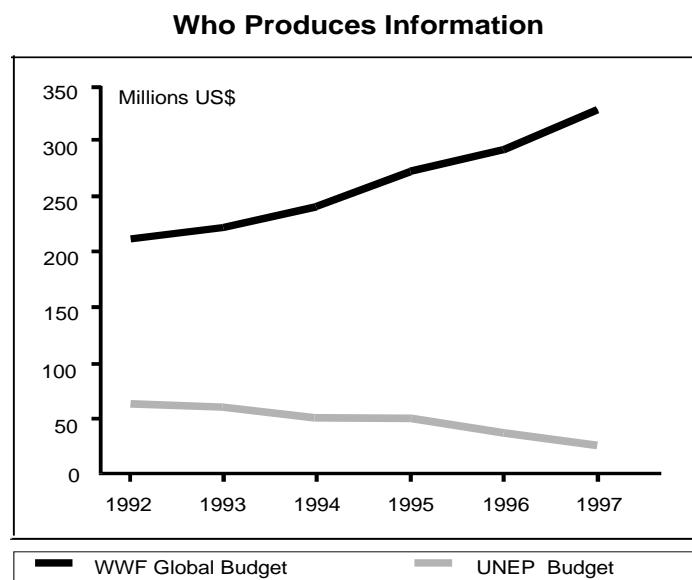


Figure 3. Recent growth of budgets of UNEP and WWF

In the new market-driven world, international aid agencies will play a lesser role than the private sector in determining the financial health of poorer countries (Fig. 4). We may reach a point where only a handful of multinationals will determine what we eat and where it is grown, and what we consume and where it is produced. They will undoubtedly respond more to the purchasing potential of the rich than to the subsistence needs of the poor.

What does this mean for protected areas? Globalisation challenges managers of protected areas in two ways. First, it forces us to realistically confront the trade-offs between global conservation values and local development needs, and to decide how we might address these tensions. Second, it requires us to look more carefully at the widely accepted paradigm of achieving conservation objectives through ecologically based local-area management. As information, markets and corporate economic expansion increasingly penetrate even the remotest parts of the world, we cannot expect local populations who live in or near areas that are valued for their rich biodiversity and overall environmental importance to remain in the slow lane when the rest of humanity is travelling in the fast lane.

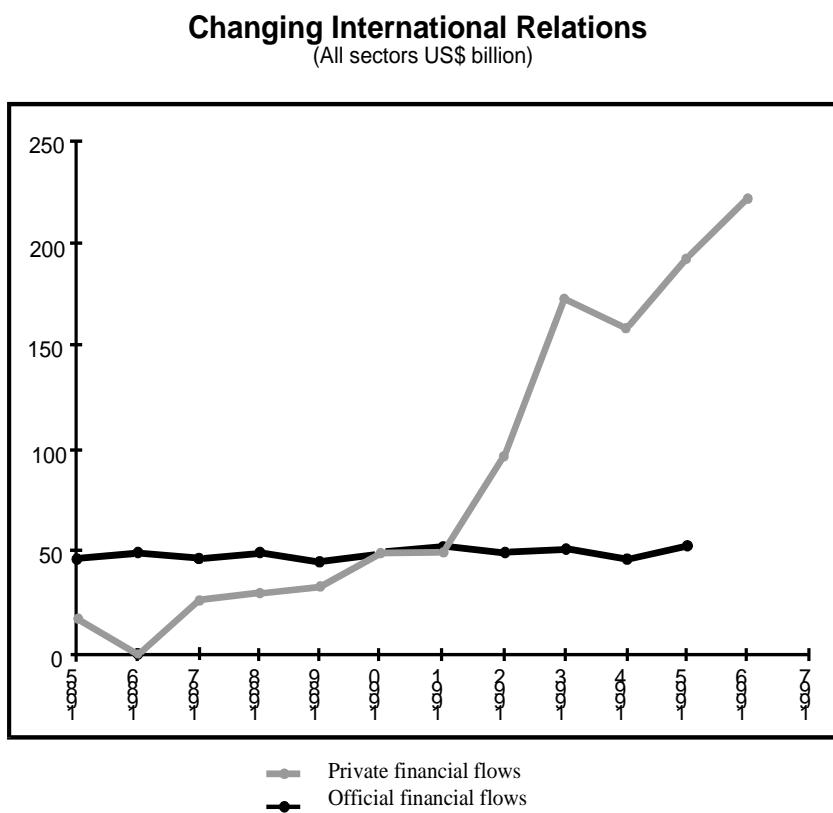


Figure 4. Private and official financial flows 1985 - 1997

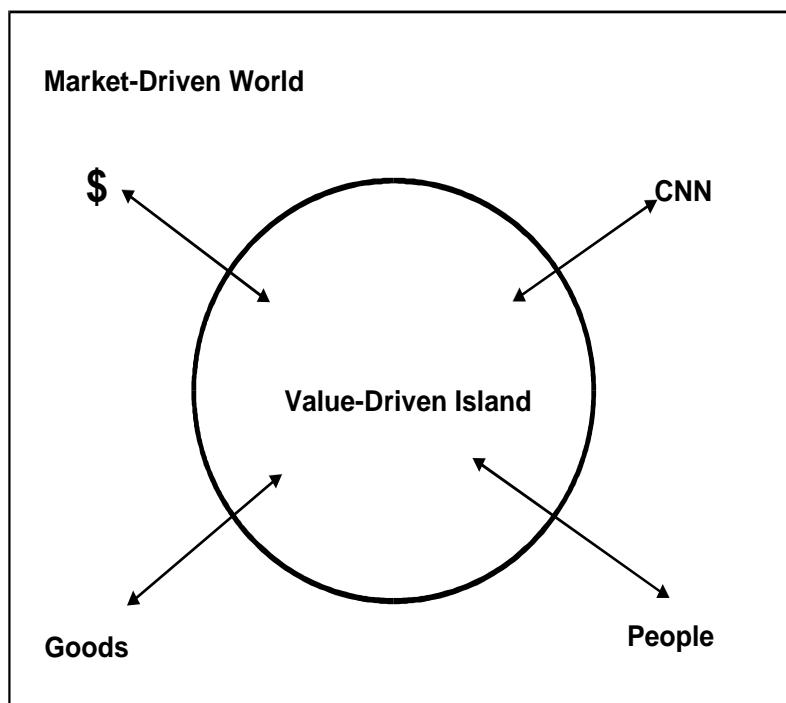


Figure 5. The myth of ecdevelopment in a value driven world

Historically, the conservation community has fought primarily on two fronts. First, we have struggled to defend many biologically valuable **local areas** around the world from the threat of corporate encroachment. The forests of Amazonia have been threatened by cattle ranchers. Subsistence gardens in Indonesia have been expropriated to plant industrial estate crops. Wetlands throughout the world have been drained and flooded in the name of progress. For many local communities, especially those that are too small or weak to defend the areas they cherish for spiritual and material needs, economic progress has often come at a heavy cost.

We also have fought on a second front. Increased awareness of the importance of preserving biodiversity has led us to recognise the global value of a number of areas that have high species richness, high levels of endemism and unusual assemblages of fauna and flora. But often, efforts to conserve these **global priority areas** have been challenged by local communities who fiercely protect access to the land and resources that they deem important in satisfying their own immediate wellbeing.

So, we can see that just as the pressures and opportunities from globalisation are increasing, the tension between local and global needs and influences is also growing. The purpose of this paper is to consider the new challenges that this development poses for conservation, and to speculate on the implications that this may have for IUCN.

COUNTER-CURRENTS ARE UNDERWAY

The erosion of local cultural and environmental diversity as a result of corporate economic expansion and national government policies is already provoking a backlash. People in rich and poor countries alike are organising themselves to protect the lifestyles and habitats that they value, and to strengthen their defences against the impersonal uniformisation that is spreading throughout the world.

Rubber tappers in the Amazon have organised to defend themselves against loggers. Dayaks in Borneo have banded together to resist the expropriation of their land by government-sponsored colonisation schemes. And many local communities throughout the industrialised world have mounted campaigns to resist the development of airports, power stations and waste disposal operations in their midst.

The tensions surrounding the establishment of protected areas do not arise only from pressures for development. Groups of local people who value natural landscapes for subsistence or spiritual reasons often band together to resist what they see as the "expropriation" of their land by distant bureaucracies for conversion to protected areas.

Given these competing demands, is it possible to arrive at a world wide system of protected areas that represents a happy medium between local and global conservation objectives? I believe that the answer is yes, and that IUCN can play a unique role in helping to achieve this.

First, we must define exactly what it is we want to conserve. Then, we must combine the best knowledge about conservation biology with social sensitivity to define a network of areas that will enable us to achieve our conservation goals at the least social cost. It is a question of

efficiency and prioritisation. It requires us to acknowledge that we cannot conserve everything, and to recognise that we must introduce greater transparency, objectivity and fairness into the process of allocating land for biodiversity and other environmental goals.

For too long, conservationists have been pretending that most biodiversity conservation problems have win-win solutions. In reality, however, there are always trade-offs. Most conservation projects are attempts to reconcile conflicts between global and local views of conservation and development. *The critical task we conservationists are facing is to determine the optimal extent, location and management of areas that are needed to achieve an acceptable balance between local people's development needs and global biodiversity conservation needs.*

The trade-offs between biodiversity conservation and economic uses of natural areas are inevitable, and the final decisions they lead to are more likely to be widely accepted - and the areas at issue to remain more sustainable - if such decisions are made in a transparent manner with the full participation of all people concerned, with related economic costs and benefits allocated equitably.

Past experience offers countless examples in which decisions about the extent and location of protected areas have been made at a national, or even international, level with the intention that local social and economic issues would be addressed later. And regrettably, there are many examples, especially from developing countries, in which international pressures have led to the establishment of unrealistic conservation objectives, with the result that managers of protected areas have been condemned to never-ending and irreconcilable conflicts with local people.

An important lesson for us in hindsight is that protected areas should not be designated until a wider range of biophysical, economic and social issues have been considered, and compromises achieved that maximise the probability of outcomes that will support both local and national and global values.

SUBSIDIARITY, OR AT WHAT LEVEL SHOULD DECISIONS BE MADE?

One of the most important things to keep in mind as we face these new challenges in regard to maintaining protected areas is the changing nature of governance and authority. Greater globalisation and corporate dominance is occurring at a time when many communities around the world are renegotiating their relations with government. More and more national governments are devolving decision-making about many aspects of life to regional and local levels - a trend that has been influenced in part by a Catholic dogma known as "subsidiarity," which says that it is unjust to centralise power at levels higher than those needed for functional efficiency.

In line with this, the legitimacy of the authority of central governments is being widely contested. People are indicating they will no longer tolerate the primacy of central dictates. This is likely to have far-reaching consequences for protected areas. It is likely to mean, for example, that the targets set by international conservation organizations of having 10% of the

world's terrestrial biomes allocated as totally protected areas is likely to be contested, especially in countries with large populations of poor people.

The implications of this decentralisation and localisation of authority for resource management are not yet fully understood. Studies by Kaimowitz *et al.* (1997) in Bolivia suggest that decentralisation of authority for natural resource management may be good for the sustainability of certain types of forestry activities, but less good for protected areas. Total protection for esoteric biodiversity objectives does not usually represent a good economic option for poor farmers or people dependent on natural products.

A large body of opinion would like to see even more devolution of management decisions about natural resources to local levels. However, most protected area systems exist in locations where there are conflicting and overlapping sets of values that range from local to global. Such situations need some form of shared management responsibility.

Good models of collaborative management of protected areas already exist in some countries; unfortunately, they are often complex, have high associated transaction costs and take time to develop. Nature conservation agreements between government agencies and private landowners in the United States and several European countries are good examples. But successful models of resource co-management in tropical developing countries are scarce. At least part of the reason for this is that government agencies and even international conservation organizations have been reluctant to genuinely recognise the legitimacy of local claims on land.

For many areas targeted for protection, maintaining global values incurs local costs. In these situations, it will be necessary to retain management authority at the level of central governments, and to base conservation programmes on regulation and compensation. Most countries have institutions whose aim is to conserve nature at the national level. And for the conservation of resources of global value, we need global institutions. A number of these already exist for biodiversity. The Convention on Biological Diversity (CBD) is the leading example, but the Convention on International Trade in Endangered Species (CITES) and other instruments related to particular habitats or groups of species also operate at this level.

Most sovereign states are reluctant to alienate control of conservation areas to multinational bodies. But the conservation organizations that comprise IUCN often transcend national boundaries in their action and influence. The conservation community, led by IUCN, must help local people protect their land against global pressures and, at the same time, develop mechanisms that will enable local stakeholders to be fairly compensated for the costs they incur when they live in areas whose values are global and not local.

Clearly, whatever the level of decision-making and management, the success of protected areas depends to a great extent on how successful we are in arriving at a balance between global costs and benefits and local costs and benefits. Every case must be assessed on its own merits, but Fig. 6 provides a conceptual framework that could help managers of protected areas determine appropriate strategies for different situations.

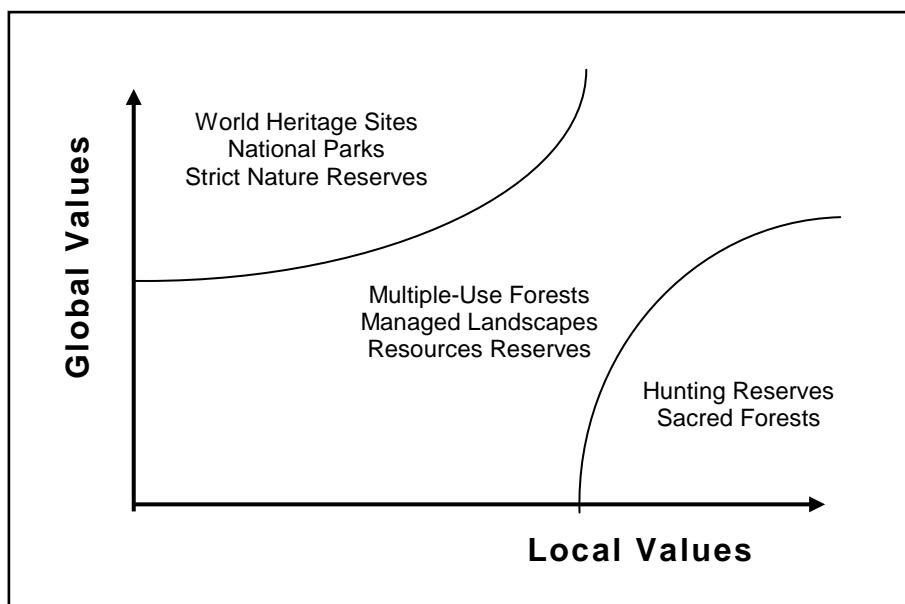


Figure 6. A conceptual framework for determining governance models for protected areas

WHAT WILL A SYSTEM OF PROTECTED AREAS LOOK LIKE?

Keeping in mind that any choice entails opportunity costs, we have to ask ourselves: How many totally protected areas will a world of 10 billion people be able to afford (Waggoner, 1998). And what should they look like?

Natural areas may be managed to maintain their biodiversity, to provide physical environmental protection or because they constitute scenic landscape features that have high amenity value. In many countries, protected areas serve all three of these functions, and management measures do not tend to favour one function over the others.

In many cultures, however, amenity values are not particularly associated with natural, undisturbed habitats; indeed, many of the world's most treasured landscapes have been drastically modified by human activities. Similarly, functions of environmental protection (associated with soil cover, hydrological properties and so on) can be provided by a wide variety of modified natural and non-natural vegetation types.

Furthermore, it is beyond dispute that much biodiversity can be conserved in habitats that have been modified. Almost all habitats have been subject to significant human use over long periods of time, and in fact, it could be argued that the very quantity and quality of biodiversity in a specific area has been influenced by long-time patterns of use (Sayer *et al.*, 1995).

While it is very difficult to reach consensus about the nature and intensity of disturbance to which an area can be subjected and still be described as "natural," there can nonetheless be agreement on management systems that either seek to minimise human interference or that seek to maintain the genes, species and communities that are present in an area at a given point in time. However, it is essential, given the lack of knowledge of the response of biodiversity to modification and the fact that many important components of biodiversity are best conserved in habitats subject to minimal human interference, that extensive networks of

minimally disturbed areas should remain the basis for biodiversity conservation efforts (Zuidema *et al.*, 1997).

Ideally, the future world wide system of protected areas will encompass a large network of sites that have *local* value and local constituents, along with a smaller set of sites that are protected for their *global* values. Both of these types of areas are important for the protection of biodiversity and other environmental values. But an important fact to keep in mind is that historically, the benefits of these public goods, and the costs of maintaining them, have not accrued equally to local and global stakeholders.

Many, but by no means all, protected areas may have to be withdrawn from other uses, or subject to reduced intensity of them. In these cases, it is inevitable that conservation programmes will incur opportunity costs for those people who would otherwise have made some productive use of the land. This may not always be the case, as some areas are of such amenity value that low-impact recreational use (such as eco-tourism) may be the optimal economic activity. But for most protected areas, this is not the case. Usually the designation of protected-area status incurs opportunity costs for society at large, or at least for a subset of potential users of the economic products of the land.

Some advocacy groups have called for very large areas of land to be allocated for biodiversity conservation while showing considerable indifference to the opportunity costs that this implies. The fact that in many cases such costs would have to be borne by poor countries, or by very poor people in these countries, has been a major factor in the past polarisation of the debate on conservation. Groups advocating the most extreme conservation measures often have not been representative of the people who would have to support the cost of these measures.

Governments have a pivotal role to play in rectifying this injustice. But the costs and benefits of conservation affect countries unevenly. Pressing economic and social development needs may tip the scale against safeguarding the interests of local people and the long-term viability of national resources, in favour of the global interests of multinational companies or of small, privileged groups of powerful stakeholders.

IUCN should take the lead in helping nations build consensus and procedures to achieve equitable allocation of their land, and offer guidance to countries on how they can co-operate, such as acting together to create regional biodiversity zones or "systems", to yield global biodiversity benefits that transcend national borders.

CONCLUSIONS: WHAT CAN IUCN DO?

IUCN is uniquely positioned to evaluate existing systems of protected areas and to offer lessons from different approaches to addressing their management problems.

For example, the principle of paying compensation for foregoing personal benefits for the sake of broader public interest is widely accepted in richer countries. It will have to become a more important element of conservation programmes in poorer countries. It is unrealistic - and unethical - to base conservation programmes on social and cultural values that are not

shared by all stakeholders. Conservation programmes will rarely work if their costs are borne by poor forest-dependent communities, or by industries operating in a highly competitive economic environment, while their benefits accrue primarily to a small community of distant environmentalists.

One possible approach to minimising the economic costs of biodiversity conservation, particularly the opportunity costs, may be to minimise the areas that are alienated from all other economic use. Conflicts between people and protected areas should be further reduced if biodiversity objectives can be met in areas that are also used for other purposes. We need to move further in the direction of biodiversity conservation programmes based on fewer and more targeted total reserves in a matrix of multiple-use reserves (Zuidema et al., 1997). The systems of protected areas in the United Kingdom and France are good examples. There is an urgent need to apply the lessons of these integrated British and French models in poorer tropical countries.

A key scientific question is to determine how we can optimise biodiversity conservation in areas modified for extractive human uses. This requires knowledge of the tolerance of different components of biodiversity to different types of habitat modification; development of "adaptive management" techniques so that biodiversity conservation objectives in multiple-use areas can be met; and development of defensible methods of making decisions on the desirable balance between biodiversity objectives and other economic objectives in areas allocated for multiple use.

This strategy implies basing conservation programmes on a minimum number and extent of totally protected areas, and using other approaches to maximise biodiversity conservation in the rest of the landscape. In summary, we must:

- o *Optimise the location of protected areas* to capture maximum biodiversity value.
- o *Maximise the opportunities for conserving biodiversity* in areas that are subject to other economic uses (such as multiple-use forests).
- o *Allocate habitat types at the landscape level* to achieve an optimal compromise between biodiversity conservation and other economic interests.

To determine optimal systems for conserving biodiversity, we also need better scientific knowledge and tools. This requires:

- o *Efficient techniques for assessing the significance of different areas for biodiversity and for detecting changes in biodiversity under different management treatments and over time.* That is to say, we have to be able to determine the most important areas for biodiversity and to have scientific criteria and indicators for monitoring changes in their biodiversity (Boyle and Sayer, 1995).
- o *Better understanding of methods that can be applied to maintain viable populations of species over long periods of time.* This will be especially important in fragmented habitats where animals and plants have small population sizes.

- o *Knowledge of the optimal disposition of protected areas in relation to other landscape elements, including modified habitats and totally transformed artificial land uses, so as to optimise biodiversity and other economic benefits at a large scale.* This requires knowledge of the impacts on biodiversity of connectivity between habitats and of the nature of the matrix environments in which protected areas are located. A key issue is to define the role of different types of modified (multiple-use or production) systems.

At the same time, we need to determine what kinds of national and international interventions (projects) are most likely to succeed in achieving biodiversity conservation goals and what changes would be desirable in the biodiversity programmes supported by conservation organizations such as IUCN. This requires a review of past attempts to influence biodiversity outcomes, particularly those that have attempted to reconcile conflicting interests in the use of land. Some issues for consideration in this area are:

- o *Cost-benefit analysis.* How do we measure the impact of investments in biodiversity conservation? Which approaches to conservation have been the most cost-effective, in which circumstances, and from whose perspective (i.e., Chambers, 1997)?
- o *Development vs. regulation.* Integrated Conservation and Development Programmes (ICDPs) have attracted very large international funding in recent years. Yet the results of this approach have often been disappointing compared with those from efforts that provide direct support for the enforcement of regulations, even though the latter approach has become unfashionable among development assistance agencies. It might be argued that while direct policing action will have a greater impact in the short term, ICDPs may show a greater impact over a longer term, say, 20 to 30 years, although this remains to be seen.
- o *Time and scale.* A similar set of arguments relates to landscape protection as embraced in the national park systems of the United Kingdom and France, which have been criticised as being ineffective in securing biodiversity conservation. Again, this is based on assessment of their impacts over relatively short time periods. Landscape-scale approaches must be assessed against the long-term viability of very small reserves, which appear to be the only other option in densely populated and intensively used landscapes. Great scientific uncertainty remains over the relative merits of integrated or segregated approaches to biodiversity conservation.
- o *Nature of management.* The fact that much biodiversity conservation will be based on a fine balance between conflicting land uses means that difficult issues of institutional arrangements for management of conservation programmes remain at the local, national and international levels. Careful analysis of institutional or governance arrangements for conservation is urgently needed.
- o *Changing values.* A society's commitment to, or tolerance of, biodiversity conservation programmes differs according to numerous attributes of that society, and especially according to its level of economic and social development. The nature and strength of "civil society" has to be taken into account in any measures to conserve biodiversity, and

it must be recognised that just as civil society varies over time and space, so conservation measures will have to be adapted to respond to that variation. Different peoples have widely divergent visions of the value of biodiversity. There is not a single "reality," and we have to be sure that we have adequately considered whose biodiversity reality counts (Chambers, 1997).

My overall conclusion is that we should not assume that we already know how to achieve conservation in the globalised societies of the 21st century. It is not simply a question of throwing more money at the problem. We need more objective, value-neutral research, and this will have to address conservation issues in a holistic way with much more attention given to serious economic, social, political and institutional components of the problems.

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RESPONSES TO KEYNOTE SPEECH

BY: Jean Larivière, Scientific Counsellor of the Nicholas Hulot Foundation for Nature and Humankind (France) and Seydina Issa Sylla, Wetlands International, Co-ordinator for Western Africa

Since their creation, and particularly since the end of the 19th century, national parks and other kinds of protected areas have always operated on the basis of prohibitions and obligations, and have especially been predicated on extreme distrust of the original inhabitants, based on total disregard for their legitimate interests. Generally speaking, conservation measures have been foisted upon local communities by external organizations, often without their being consulted or even asked to voice an opinion.

Today, the destruction wrought upon the world's natural heritage has gone too far for us to consider continuing such practices, let alone intensifying them. On the contrary, we need a thorough rethink of the whole system of protected areas whose effectiveness and status remain all too precarious in many parts of the world, both North and South.

People have for a long time now been talking about "integrated management". It is an ambiguous term - almost pejorative - and betrays the reluctance felt by many people responsible for conservation to give up some of their prerogatives. But they will have to get used to the idea. Communities should not just be associated with actions, they should be actively involved in making their own, free choices, because communities are the cement of sustainable conservation.

Local initiatives for the environment have been taken in all countries of the world. Some come to fruition, but never hit the headlines, while others, the great majority, fail for want of support or simply of acknowledgement. In the future, institutions active in the environment, conservation and development will have to put a lot more time and effort into identifying endogenous projects in order to help them take shape.

Here is one success story: in 1987 in Senegal, some hundred women formed an association to restore the vegetation in a nature reserve near their village. Ten years later they had signed an agreement with the Ministry of the Environment to manage it themselves, and their action had spread to all the villages around the reserve. It started as a volunteer effort, and is now an exemplary sustainable development programme run by a collective of over 1500 women affecting 35,000 people. The Kér Cupaam Community Nature Project is an innovative means of organizing people which harmoniously combines agricultural development and the fight against deforestation.

However, the most interesting and certainly the most promising experience is that of Yoff, a coastal village on the outskirts of Dakar near the international airport. About 300 metres out to sea from the village lies Teunguène Island, long respected as the home of the Lébou community's spirits. The island is still free of buildings and used to be reserved for rituals and ceremonies. For some years now, though, it has been frequented by fishermen and children who go there to catch shellfish. Although this is a fairly recent and as yet limited

phenomenon, it has already caused soil erosion, especially since some families occasionally ship their sheep out to the island to graze, again with a notable effect on the vegetation.

To protect this natural and cultural sanctuary, the customary, religious and civil authorities, local businesses and the residents of Yoff agreed by consensus to give the island the status of a Community Heritage Area, a protected area concept with a difference, whose creation, management and supervision are under the sole authority of the local community. This first "people's reserve" was proclaimed in June 1998. The basic principle of the Community Heritage Areas is that nothing is prohibited and that there are no conditions, and that any initiative whatsoever is encouraged if it benefits a natural site, even a degraded one.

Similar systems already exist elsewhere. In Guinea, the law allows local communities which so request to manage forest plots. In Côte d'Ivoire the same directives are applied to sacred forests. However, only in Senegal is this type of procedure applicable to any type of site, whatever its level of degradation, provided only that there exists a collective will to act.

Acting on a suggestion by UNESCO, the Community Heritage Area concept has been disseminated throughout Western Africa. In just two months, seven Western African countries (Gabon, Guinea, Côte d'Ivoire, Mali, Chad, Niger and Togo) have declared their readiness to join Senegal and to participate in an inter-country conference to draft statutes compatible with national jurisdictions for nature management.

The spread of Community Heritage Areas would help to meet a need, namely managing the global environment outside conventional protected areas with less financial outlays. They require neither staff nor logistics nor operational machinery, since all of these services are provided by the managing community. This commitment, incidentally, is the best guarantee for development aid, and development is essential for sustainability.

Finally, collective taking of responsibility gives rise to other initiatives for the solution of local environment or natural resource management problems. The Kér Cupaam and Tenguène Community Heritage Areas have already provided much proof of that.

In Yoff, the Khalif General of the Layènes has intervened twice in order to exhort worshippers to take active part in the protection of Tenguène. He has also asked to be kept informed of all initiatives in favour of its conservation. His stance is a guarantee, since for the Lébou, the influence of such a high dignitary is considerable at all levels of society. The Yoff *arrondissement* administration immediately introduced the basic data into its geographical information system, and created a page dedicated to the Tenguène Community Heritage Area at a website which is currently being set up. Tenguène was also proposed as a model during a recent meeting of Senegalese mayors held in Yoff.

Following the official declaration of the Community Heritage Area, the signatories' assembly adopted conservation measures which were published in the form of a manifesto. Thus, no sheep have been landed on the island, which now has regulated access; fishing is now strictly regulated and shellfish gathering has been suspended inside the conservation perimeter. Young members of the local Nicolas Hulot Foundation Clubs (Yoff, Ngor and Ouakam) have

started work to combat erosion, and are also running a public awareness campaign in schools and among the population.

By: Eduardo Guerrero, Fondo para la Protección del Medio Ambiente "José Celestino Mutis" (Colombia)

In the information age in which we live, people who use science and technology appropriately affect their life quality positively. What makes a society competitive is its capacity to benefit from knowledge. Consequently, one of the challenges to be faced in the 21st century is to construct societies of knowledge.

Unfortunately in developing countries, the scientific and technological activities are not tuned in adequately with social and economic needs. Efforts to socialise knowledge should be strengthened. The key question asked in this workshop - Should local communities have a more equitable right over nature and more responsibility in managing natural resources vis-à-vis the powerful 'external' economic interests? - can be answered to some extent if the possibilities of access to environmental information by such communities are analysed.

Disputes among social actors representing different interests can be solved by consensus more easily if in their meetings they use reasonable arguments and not coercion, nor allow the exercise of power by legal devices to predominate. In the processes of conflict mediation involving the environment, even in developed countries, the discourse used is so loaded with technical terminology that it often excludes the community's spokesperson. Usually authorities and large companies have more resources and information sources at their disposal. In fact in most South American countries access to scientific knowledge about the functioning of ecosystems and the environmental services they offer, as well as the biological diversity and air, soil, and water pollution, is unevenly distributed.

In Colombia, for example, since the 1991 Constitution was promulgated many spaces for citizen participation have been opened including the presence of the communities' representatives in organisations at the local, regional, and national level. However, the very fact of having spaces to participate in has not been enough to guarantee a really equitable participation in decisions related to environmental management in the country, even if some advancement in this direction is acknowledged. We have learned that it does not suffice to open spaces for meetings of different interests in a society; educational and background conditions of participants must also be equitable.

Beyond environmentalist rhetoric, local communities require information and knowledge based on objective and unbiased investigations to participate actively and properly in the democratic spaces that are being opened by decentralisation processes. But scientific knowledge about the environment is not the only valid information source. Campesino and indigenous communities possess valuable knowledge, which is usually underestimated by the government participants. Therefore besides the 'official knowledge', that is the environmental information gathered by State agencies, it is important to disseminate information about successful experiences of environmental management fostered by NGOs and local communities.

An essential ingredient of equitable participation is fair distribution of knowledge and respect for diversity in knowledge. As Gustavo Wilches, an outstanding Colombian environmentalist, put it: "...we need to develop our ability to establish dialogues of knowledge and dialogues of ignorance among human beings of different groups and sectors (ethnic, social, regional, etc.) and among workers of diverse disciplines, and fields of knowledge and practice, but also dialogues between human beings and nature".

I'd like to call IUCN's attention to the fact that knowledge production is carried out not only in the large American and European universities and research centres, but there also exists an outstanding regional and local production that is not disseminated necessarily by orthodox channels, as well as traditional knowledge of many and diverse aboriginal and local cultures around the world. This diversity in wisdom should be gathered and integrated into main currents of information, and incorporated into the theories and paradigms of conservation for the next millennium.

As the decentralisation of spaces for citizen participation progresses, it is very important to foster simultaneously the decentralisation of the production, gathering, and management of knowledge. In Colombia, for example, the Universidad Nacional (the main state university) has recently opened several colleges in borderline areas of the country, where academic institutions are lacking. These new colleges are producing innovative teaching and research programmes according to the needs of those peripheral regions and are now an open forum for discussing local problems. These university classrooms are a place for the different actors in conflict to meet. This is, among other things, very advisable within the framework of the peace process that is taking place now in Colombia.

Based on the Commission on Education and Communication and on the support of its members, IUCN might use its experience to develop a major programme dedicated to intensify the access local communities have to environmental information. Of course, the goal to be achieved would be to present the civil society with a tool for them to participate more substantively and efficiently in spaces for public debate and to have an influence on decisions made by authorities in relation to environmental management and conservation of biodiversity.

Since its creation 50 years ago, IUCN has set out as its goal to supply the intellectual basis for the conservation of nature. And, in fact, IUCN has headed the building of knowledge and the design of international, regional, and national strategies to manage nature. However, as Yolanda Kakabadse put it aptly: "Our advice and our benchmarks should be useful for communities that interact in the real world with the environment". We should go beyond large environmental forums and State policies to share the huge experience, knowledge, and ability of our membership network, commissions, and secretariat, with society at large.

Environmentalism in the coming century should not be a sector-bound phenomenon driven only by specialised organisations and isolated citizen groups. Ideally a wide dissemination of world conservation values, respecting local values and cultural diversity at all levels, should be carried out. An ample spreading of science and traditional knowledge about nature enriches and consolidates the building up of those values. Even if this does not seem an easy goal to be achieved, in fact we could have both a globalised but also a diverse world.

Finally as a consequence of the issues I have presented here, I recommend IUCN to promote more decentralisation of its scientific networks and to encourage the process of socialising knowledge intensively, thereby respecting natural and cultural diversity. In order to achieve this goal it is necessary to use the valuable experience of the Commission on Education and Communication, and to look for partners like UNESCO, the mass media and the government agencies dedicated to information and education and to profit more from the Union membership.

COMMENTS FROM PARTICIPANTS

The process of fair sharing of the values of protected areas has begun in many countries, including Tanzania. Local communities are being given rights of access to resources. Tanzania is now legalising a system that will enable two types of protected areas; 27% of protected areas will be managed by local communities, the rest will be managed for global biodiversity values. IUCN should influence and facilitate the establishment of protected areas that are managed in collaboration with local communities.

I support the need for the promotion of protected areas that are supported by local communities, but the local communities need to be educated so that they have the appropriate behaviour.

The equitable distribution of information is important, and IUCN has been democratising its information. The concept of IUCN depository libraries should be further promoted.

IUCN should focus more on law enforcement of protected areas without losing the benefits of protected areas.

KEY CONCLUSIONS

IUCN needs to take advantage of the cultural diversity of the world and to build on this for conservation to succeed, but it also needs to recognise that there are strong economic forces that may work against this.

While local management of natural resources is very attractive, the forces of globalisation may result in failure of integrated or collaborative management of protected areas. IUCN therefore needs to proceed cautiously as there is a high probability of failure because of economic forces.

2. COMMUNITIES

2.d ENVIRONMENTAL INSECURITY

Resource scarcity, environmental degradation, ecological catastrophes, and human conflict are linked in highly complex ways, with profound implications for conservation in the future. As both human population and resource consumption increase in the coming years, more conflict can be expected, with profound implications for both human welfare and conservation. How can this set of problems be addressed by the global community, and by IUCN?

Organizer: IUCN's Regional Office for Southern Africa (Yemi Katerere)

Chair: Munyaradzi Chenje, India Musokotwane Environment Resource Centre (South Africa)

Keynote speaker: Hartmut Krugmann (South Africa)

Patron Commentary: H.M. Queen Noor (Jordan)

Respondents:

- o Lidia Castillo, Centro de Protección para Desastres (CEPRODE) (El Salvador)
- o Malcolm Powell, Wildlife and Environment Society of South Africa

CHAIR'S OPENING REMARKS

CHAIR: MUNYARADZI CHENGE

RAPPORTEUR: YEMI KATERERE

What are the prerequisites for environmental security? Is this a regional or global phenomena, and can IUCN do anything constructive on this issue?

The relationship between security and the environment is highly relevant to the work of IUCN. The environment and security concept is an important analytical tool and offers a new way of understanding the complex relationship between people and the environment. The concept extends and enriches current participatory approaches and applications of indigenous knowledge systems; explicitly accepts the reality that people and the environment are part of "security"; and recognizes that changes in the environment affect the quantity and quality of resources, with resulting impacts that can contribute to insecurity.

A major challenge is applying the concept to real practice. Some of the concepts that we need to consider in this workshop involve managing risk from environmental change to achieve economic, political, environmental, food and state security; managing the interactions between biophysical and social elements to create sustainability; providing a framework in which choices for livelihoods are secured without compromising other choices or the natural resource base and dealing with the external political and economic influences that affect humans and their interaction with the environment.

As a way of getting started, let us accept that "environment" is the totality of biophysical elements and their relationships with a special focus on human processes and their ability to cause change. "Security" is managing and coping with risks associated with environmental change by minimizing threats and optimizing human and environmental wellbeing. Environmental security, the topic of our workshop, is how to bring these two ideas together.

Environmental Insecurity: From a Contested Concept towards a Policy Agenda

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ABSTRACT

The main problems and threats facing humanity have changed fundamentally in nature, moving away from military issues toward a wider range of often inter-related problems including environmental degradation. "Environmental security" is emerging as a new approach for addressing issues of poverty, environmental degradation, resource depletion, and inequitable distribution of benefits arising from the use of resources. Conceptualising these environmental issues as security threats certainly underscores their weight and may help to mobilise political support and additional resources (including resources held by military forces), but risks the concept being co-opted for different agendas or used as mere rhetoric, or environmental approaches becoming unduly influenced by conventional security logic. While many different individual and institutional interpretations of the concept of environmental security have emerged, a fundamental dilemma is that society needs to move away from resource consumption models of "development" in order to increase human security, whereas dominant elites see it in their security interest to oppose such transformation, highlighting the hard choices that need to be made. The concept of "human security" aims at empowering disadvantaged groups, addressing social and gender inequities, strengthening basic human rights, enhancing the control of local people over their local resource base, and facilitating their participation in high-level decision-making processes. Policy reform is needed in many countries to ensure both appropriate forms of resource tenure and decentralisation and devolution of authority over natural resource management. Conflicts over water are particularly challenging, and indeed competition for scarce water in transboundary river basins is often considered the only environmental scarcity situation capable of triggering interstate conflicts. This highlights the need for neighbouring riparian states to find common ground around frameworks and strategies for joint management of shared water resources. But sooner or later it will become indispensable to develop and implement policies, technologies and institutional mechanisms. IUCN should convene a policy dialogue or series of regional workshops to bring together representatives from different groups to address the new linked problems of environment and security, and set up communications channels among and across interested groups - environmentalists, security/intelligence specialists, development practitioners, political elites, and disadvantaged groups - to share experiences on environmental security on an on-going basis. IUCN should also facilitate further research on what concepts like "environmental security" or "human security" may mean in practice and how they could be used to improve ways to enhance the environment and livelihoods of poor men, women and children.

INTRODUCTION

In recent years, particularly since the end of the Cold War, 'environmental security' has emerged as a new concept (some would say a new 'paradigm') linking environmental issues with security concerns. Reasons for this emergence are two-fold. On the one hand, with clearly identifiable stratospheric ozone depletion (ozone hole), large-scale clearing of rainforests, widespread deforestation on vast areas of natural savannah woodland, visible degradation of huge expanses of (semi-) arid land, etc., environmental degradation and resource depletion have received increasing attention as serious threats to human well-being, economic development, societal cohesion and political stability. On the other hand, as the Cold War waned, obsession with national security as a largely military issue gave way to broader notions of 'security' extending to political, economic, social and environmental spheres.

The emergence of 'environmental security' as a now relatively widely invoked concept is a remarkable development, since traditionally the respective intellectual and institutional domains of security and environmental thinking and problem solving approaches are situated quite far apart. Conventional security objectives, tools and responses are described in terms of ensuring national (state) security against external threats of an essentially military nature and using force to respond to such threats. The seriousness of external threats is analysed both in terms of the vulnerability to such threats and in terms of the power and (military) capacity to respond. Conventional security analysis and prescription use terms like power (balance), dominance and control, and tend to calculate political and military opportunities and risks in terms of zero sum games. These kinds of concerns and terminology were, of course, developed and refined during the decades of the Cold War.

Environmentalists, on the other hand, have opposed reductionist thinking and articulate what they see as the main issues facing humankind in terms of the interconnectedness of components within complex integrated systems inter-linking essential ecological processes and processes of human production, distribution and consumption. Their emphasis on co-operative (non-confrontational) behaviour and approaches to problem solving, on interdependence among system components and actors, on harmony, balance and sustainability contrasts starkly with conventional (national) security practice and discourse.

How then was it possible for a concept like 'environmental security' to emerge and find its way into environmental and security discourse alike? And what is gained (or lost) by bringing 'environment' and 'security' together? What new insights can be gained at the analytical level? What are the implications for policies to address urgent environmental problems, and for advocacy and political strategy? This paper is concerned with these questions.

RETHINKING SECURITY AND CONFLICT: THE ROLE OF ENVIRONMENTAL ISSUES

In order to examine causes, conditions and consequences of what many people today describe as environmental insecurity, it is necessary to understand the concept of 'environmental security' better. For this purpose, it is useful to enquire, first of all, what 'security' more generally may mean in today's context. Dictionary definitions of 'security' give a flavour of

the difficulties and complexities involved: protection or freedom from danger (objective security), feeling safe (subjective security), and being free from doubt (confidence in one's knowledge) are all part of the concept. As security concerns have broadened in recent years, it has become increasingly clear how subjective, contradictory, time-dependent, distributionally sensitive, multi-faceted, multi-level, multi-sector and hence complex 'security' is:

- o Security needs, priorities and perceptions are not confined to the state; they also exist at lower and higher levels (individuals, local communities, civil society interest groups, regional groupings of countries, and the global community).
- o Different aspects of individual (and small-group) security are frequently contradictory (e.g., protection from crime versus erosion of civil liberties) and plagued by the difficulty of distinguishing between objective and subjective evaluations (are threats real or imagined?).
- o Security objectives and perceptions at different levels clearly are interdependent, such that there may be contradictions and trade-offs (as well as complementarities) across levels in security perceived or achieved: e.g., a state may become repressive vis-à-vis its own citizens, as it prepares to defend the country against real or perceived internal or external threats in the name of national security.
- o Inter-temporal trade-offs in security - short-term security gains (real or perceived) for longer-term losses in security, or vice versa - are quite common phenomena, as with poor people overusing their local resource base for survival.
- o Analogous observations can be made for distributional losses or gains in security at different levels, as with elites enriching themselves at the expense of the poor and marginalised.
- o Sectoral (political, economic, social and environmental) security concerns are also inter-linked in many ways, with contradictions and trade-offs as well as win-win situations occurring.

An important economic-environmental security linkage concerns patterns of resource-intensive lifestyles, production and trade, as they are typically observed throughout the richer countries in the North, which cause resource depletion and environmental degradation. In attempting to preserve the current economic (and political) system and maintain their resource-intensive patterns in order to ensure what they perceive to be their economic security, rich countries at the same time may compromise environmental security (in the sense of diminished natural resource capital and jeopardised livelihoods) from the perspective of poorer countries and poorer segments in their own countries, as well as for humanity as a whole (due to global environmental degradation).

To return specifically to 'environmental security', it must be noted that this term is now being used by a variety of researchers, policy makers, politicians, practitioners and activists, coming from different disciplines, backgrounds and ideological perspectives. It is not surprising,

therefore, that the notion of 'environmental security' is understood or interpreted in a variety of ways, reflecting differing vantage points, experiences and policy objectives. This makes 'environmental security' (as 'security' more generally) a highly contested concept and explains the considerable confusion that seems to exist about its possible meaning and use. The range of different individual and institutional interpretations of 'environmental security' has recently been summarised as follows (IUCN, 1998):

- i) security of the environment - that is, security of services provided by the natural environment, usually implying non-diminishing natural capital; ensuring such security may entail programs aimed at enhancing environmental sustainability, efforts to monitor and enforce environmental agreements and treaties, development and deployment of clean technologies, protection of nature reserves, etc.;
- ii) addressing environmental degradation or resource depletion (both renewable resource inputs and pollution/waste) arising from military operations in preparation for or during conflict; in other words, the 'greening' of military activities during times of both peace and armed conflict;
- iii) environmental degradation and resource depletion as potential causes, contributors or catalysts of violent conflict;
- iv) compromising the sovereignty of countries to mitigate environmental degradation;
- v) responding to environmental degradation and resource depletion as threats to 'national security'; and
- vi) working toward an environment (in a broad sense; not just physical environment) in which all the different dimensions of individual and group security are attained.

An examination of these interpretations reveals different dimensions and perspectives on the notion of 'environmental security'. Interpretation (i) is broadly equivalent to ensuring ecological sustainability in natural resource use through programmes, policies, technologies and practices. Interpretation (ii) focuses attention on making the military 'sector' environmentally more responsible by reducing its adverse environmental impacts and using its resources for environmental rehabilitation and conservation.

Interpretations (iii) through (v) are all inspired by more traditional security thinking. Emphasis on (perceived) threats to national security arising from environmental problems (as in v) or environmentally motivated intervention (as in iv) reflect security concerns defined in terms of (relative) power, control, domination, confrontational situations, and the use of force to respond to threats. Emphasis on violent conflict both as a yardstick for insecurity and as a threat to security (as in iii) likewise reflects traditional security concerns preoccupied with conflict. Quite clearly, these interpretations (especially iv and v) reflect a narrow definition of 'environmental security' which is anchored in Cold War ideology and conceptualises environmental problems as threats to (national) security.

An additional dimension of North-South relations in (iv) reflects real (and perceived) inequalities between North and South and presents itself as an environmental security dilemma. The North may be (and has been) seen by the South as using international environmental security arguments (e.g., protecting the rainforests in Brazil and elsewhere to preserve them as a critical global store of biodiversity and carbon) to try to dictate natural resource use, development and population policies. Such perceived environmental 'imperialism' may be seen by elites in the South as a greater political threat to state security than the environmental destruction itself. The end result may be the opposite of what Northern pressure set out to achieve, namely less environmental security globally and in the concerned Southern countries.

In contrast to (iii) through (v), (vi) suggests a broad definition of the term. It is consistent with broad security concepts like 'common security', 'global security' and in particular 'human security'. The 'common security' concept was first articulated in the early 1980s by the UN Commission on Disarmament and Security chaired by Olaf Palme. It was later endorsed and adopted by others, including the Conference on Security, Stability, Development and Cooperation in Kampala in 1991. Common security is understood to extend to global security concerns shared universally by all countries and people as well as local security issues of personal concern.

The concept of 'human security', like 'common security' includes global as well as local security concerns and integrates the whole range of 'insecurities' associated with non-conventional threats. 'Human security' incorporates equity and poverty as key agents in processes of environmental degradation, resource depletion, instability and conflict. It integrates critical aspects of social justice and recognises the inter-linkages between environment and social variables. Initially, 'human security' was defined to relate to threats to the physical security of the person only, as enshrined in the Universal Declaration of Human Rights adopted by the United Nations in 1948. Later on, UNDP (1994) enlarged the definition to include the following dimensions of threat:

- o economic security (assured basic income);
- o food security (physical and economic access to food);
- o health security;
- o environmental security (access to sanitary water supply, clean air and a non-degraded land system);
- o personal security (security from physical violence and threats);
- o community security (security from ethnic cleansing); and
- o political security (protection of basic human rights and freedoms).

UNDP distinguished between 'human security' and 'human development', suggesting that while the latter was about 'widening the range of people's choices', the former concept meant that 'people can exercise these choices safely and freely'. While terms like human wellbeing, human security, development and sustainability are all closely inter-related, the following delineations are suggested. If human welfare implies that a basic level of needs is being met, then human security implies the safety and freedom to make choices once the basic needs are

met. Development strives to increase the range of choices available to individuals and communities, and sustainability suggests how we should behave given a range of choices.

In combining principles of participatory development and human rights, 'human security' is obviously closely related to some of the goals and concerns of the international development assistance community, so the concept could be operationalised for use in development programmes.

There has been considerable discussion about the opportunities and dangers of introducing 'environmental security' as a broadly defined concept, such as with 'human security'. Those who favour the concept have pointed to its relevance in capturing diffuse environmental threats and suggesting new meanings and realities of security in the post Cold War era, in the necessary holistic fashion. The popular appeal that a term denoting such a positive, desirable situation, rather than the conventional negative security connotations (absence of insecurity) carries, has been emphasised. This appeal may be used to mobilise political support for the necessary political and economic reforms and the appropriate policies and programs to be put in place to pursue goals of greater human security. For this purpose, it is helpful to speak the language of those (the dominant political and security groups) who must be convinced of the seriousness of environmental problems and the underlying patterns of inequality and marginalisation.

On the critical side, it has been argued that the contested concept of 'environmental security' (such as human security) will serve different political agendas at the same time. There is also the risk that as with sustainable development, the notion of 'human security' is taken on as rhetoric by those who look for public relations gimmicks but carry on with business as usual. Perhaps a greater risk is that a concept like 'environmental security' or 'human security' is co-opted by the dominant groups and countries to maintain the status quo and perpetuate a self-serving system of global disparities and inequitable and excessive resource exploitation in the name of their own 'security'. The kinds of political and economic transformations required to move away from these conditions in order to achieve true human security are precisely those resisted by the conventional Western uses of 'security' (Dalby, 1992).

It is evident that the opportunities and risks associated with bringing together two concepts as far apart as 'environment' and 'security' are hard to reconcile. Because security is a contested term, its meaning may be stretched to encompass competing political agendas. Instead of searching for the impossibility of a simple solution, Dalby (1992) suggests seeking ways forward by formulating the environment and security problematic in terms of an environmental security dilemma: it is necessary to move away from resource consumption models of 'development' in order to increase human security, whereas dominant elites see it in their security interest to oppose any such transformation. Framing the future in terms of such a dilemma has the advantage of highlighting the hard choices, difficulties and uncertainties ahead.

ENVIRONMENTAL THREATS, CONFLICT AND SECURITY: HOW ARE THEY LINKED?

Given the ambiguity, complexity and contested nature of 'security', recent empirical research into the relationships between environment and security has focused on the nature and role of environmentally induced conflict. Unlike 'security', 'conflict' is a more objective and observable phenomenon. But while conflict, especially violent conflict, normally is a direct threat to security, the two terms are not the same; insecurity may be caused or result from other factors as well. At the same time, by choosing 'conflict' as a surrogate variable for 'security', the research responds implicitly or explicitly to more narrow traditional concerns of security.

Relationships between Environmental Change and Violent Conflict

Among the recent empirical research efforts on environment and conflict, two major projects have recently published findings from a variety of case studies undertaken: (i) the Environmental Change and Acute Conflict Project (EACP) directed by Drs Homer-Dixon and Boutwell of the Peace and Conflicts Studies Program at the University of Toronto and the American Association for the Advancement of Science, and (ii) Environment and Conflicts Project (ENCOP) co-ordinated by Drs Baechler and Spillmann of the Swiss Peace Foundation and the Centre for Security Studies and Conflict Research. Both projects have focused on developing countries, given their generally greater vulnerability to environmental threats and hence greater likelihood of conflict there.

EACP's overall conclusion is that "environmental scarcities are already contributing to violent conflicts in many parts of the developing world". These conflicts, it is argued, are probably the early signs of an upsurge of violence in the coming decades that will be induced or aggravated by increasing scarcity of renewable resources, as human populations, economic activity and resource consumption continue to rise. The violence will usually be sub-national, persistent and diffuse. Poor societies will be particularly affected since they are less able to cope with the environmental scarcities and the social crises they cause. Scarcities may sharply increase demands on key institutions, such as the state, to implement social and economic reforms, while they simultaneously reduce the capacity of states to meet those demands. These pressures increase the chance that the state will either fragment or become more authoritarian. The mostly domestic conflicts may have spill-over effects for neighbouring countries. State instability, especially states becoming more authoritarian, presents a potential national security problem for the developed world (Homer-Dixon, 1991, 1994).

EACP defines "environmental scarcity" as a combination of environmental change (human-induced net decline in the quantity and quality of renewable resources), population growth and unequal social distribution of (renewable) resources. Environmental decline reduces the resource pie, population growth divides it into smaller slices for each individual, and unequal resource distribution allows some individuals or groups to get larger slices than others. Two recurring patterns of interaction between the three sources of scarcity are identified: 'resource capture' (powerful groups enlarging their share of the resource pie at the expense of weaker groups); and 'ecological marginalisation' (unequal resource access combining with population growth to cause migrations of poor people into ecologically fragile regions).

Three pathways linking environmental change to conflict are hypothesised: 'simple-scarcity' conflicts (resource wars) between states; 'group-identity' conflicts (e.g., ethnic clashes) arising from scarcity-induced population movements; and 'deprivation' conflicts resulting from scarcity-induced economic hardships and socio-institutional disruption. Little evidence is found for simple-scarcity conflicts, except in cases of transboundary river water. Ample evidence was encountered for group-identity conflicts that are always strongly conditioned by particular contextual factors. The hypothesis of economic deprivation-type conflicts was supported by evidence, while no definitive conclusions were reached about the role of social institutions.

Analysts and policymakers in the developed countries tend to unduly emphasise the social impacts of global environmental change such as climate change and stratospheric ozone depletion. Vast populations in the developing world are already suffering from depletion of agricultural, forest, water and fish resources, while the effects of climate change and ozone depletion will likely become visible only in the longer run, most likely interacting with and adding to long-felt demographic and economic resource pressures.

ENCOP utilises a broad definition of environmentally-induced conflict: "Environmental conflicts manifest themselves as political, social, economic, ethnic, religious or territorial conflicts, or conflicts over resources or national interests, or any other type of conflict. They are traditional conflicts induced by environmental degradation. Environmental conflicts are characterised by the principal importance of degradation in one or more of the following fields: overuse of renewable resources; overstrain of the environment's sink capacity (pollution); or impoverishment of the space of living". On the basis of case study material, seven 'ideal' types of conflict are categorised: ethno-political conflicts; centre-periphery conflicts; internal migration conflicts; cross-border migration conflicts; demographically caused migration conflicts; international water conflict; and global environmental conflict.

By and large, ENCP confirms EACP's hypotheses on the links between environmental scarcity and internal violent conflict. ENCP's conclusions emphasise the different roles that environmental discrimination and transformation can play - as background reason, trigger, target, channel and/or catalyst. ENCP pays particular attention to different institutional structures (state, civil society, etc.) which often make the difference between the existence or absence of conflict, in situations of environmental transformation or discrimination.

A number of comments and criticisms of EACP's and ENCP's empirical environment-conflict work have been made, including:

- o a charge of environmental determinism (too much weight given to environmental variables);
- o the limits to generalisation of the result, since all case studies focus on poorer developing countries where conflict is more likely;
- o environmentally-induced conflict is of little concern (to the developed world), since only poor (developing) countries are affected;

- o on the other hand, the case studies shift attention from the North to the South and thus let the North off the hook regarding the world's poverty and structural inequities; and
- o little evidence for inter-state resource-based conflict is presented, with the exception of river water.

Some broader questions deserve more attention here and point to areas for further work: a) the conditions under which co-operation (and adaptation) rather than violent conflict is the outcome of a conflictual situation; b) the links between environmental change and (relapse into) conflict in post-conflict situations; c) broader linkages between environmental change and (human) security, going beyond the narrow environment-conflict focus; and d) responses to environmental threats to human security.

Conditions for Co-operation and Adaptation rather than Conflict

Given ubiquitous poverty and widespread inequality in access to resources among societal groups in developing countries, why is environmentally induced violent conflict not an even more regular occurrence in the poorer countries? This leads to the question concerning the local/national conditions under which responses to tensions between people and groups are adaptive and/or co-operative rather than violent. As the ENCOP researchers suggest, institutional stability and capacity in both government (local and national) and civil society and at the local group level are likely to be important variables here. The capacity to negotiate and co-operate of any group facing tensions with other groups around questions of access to key resources will depend on variables such as its social cohesion, sense of empowerment and purpose, organizational ability, nature and degree of common ground with the rival groups, the stability of the local and national policy environment, and other variables. An important additional variable is adaptive capacity to adjust to change. Adaptive strategies entail adjustments in economic activities, social structure, institutional mechanisms and organisational rules to reduce vulnerabilities to changes in the environment. It is important to pinpoint commonalities and differences in these variables across situations.

Post-conflict Transitions: Environmental Change and (relapse into) Conflict

Since the end of the Cold War, a number of developing countries (often the poorer developing countries) have experienced continued or new civil war. Reasons may include regime instability following the retraction of one of the superpower's previous 'helping hands', continuing civil strife dating back to Cold War years, or other reasons. The extent of armed conflict in these civil wars is usually much larger than in the kinds of more localised environmentally-induced conflicts referred to by EACP and ENCOP. Witness the level of recent civil strife in countries like Somalia, Rwanda, Burundi, Democratic Republic of Congo, Sierra Leone, Liberia, Cambodia and Bosnia.

In 1990, then-UN Secretary Boutros Boutros Ghali announced *An Agenda for Peace and An Agenda for Development*, as a new approach designed to deal with intertwined peace and development issues, such as are posed by the civil wars in the countries mentioned above. This new approach to peace and development formally recognised conflict prevention, conflict resolution, peacemaking, peacekeeping, peacebuilding, post-conflict reconstruction

and development as integral parts of a larger package of international instruments to address the complex inter-linkages between peace and development.

This ushered in the establishment of a new domain of research, analysis and policy development directed specifically at problems faced by countries in 'post-conflict' transitions where peace building and reconstruction are critical needs. Countries in 'post-conflict' transitions share similar characteristics, despite their differences. Unlike other developing countries, they have to contend with a particularly difficult context which may include:

- o delegitimised or fragmented political power and institutional authority, and extremely weakened or non-existent governance institutions;
- o loss of control and often ongoing conflict over state territory and natural resources;
- o massive human displacement and dispossession;
- o comprehensive infrastructural damage and highly distorted economies;
- o breakdown of elementary programs and services, including health and education;
- o social anomie brought about by the militarisation of daily life, with consequences such as high degrees of psycho-social trauma and domestic violence; and
- o fragile research and policy making capacity.

In such exceedingly difficult contexts, the challenges of preventing relapse into violent conflict are great, and environmental factors are likely to play a critical role. Indeed, competition over scarce or valuable resources may be a constant source of renewed violent conflict, more likely than in 'normal' developing country situations. In war-torn societies, the environmentally catalysed conflict potential may be exacerbated as a result of large-scale population displacement, refugee accumulations and movements, demobilisation and reintegration of large numbers of ex-combatants, general destabilisation of community-level institutions, delegitimisation of the government, the extreme lack of state capacity to control national and international economic interests, and general criminal activity fuelled by large numbers of small weapons left by the war. Large numbers of landmines laid by the previously warring factions may compromise livelihoods by preventing access to cropland, fresh water and other resources by the rural poor.

The environmental factors in post-conflict transitions need to be examined and compared with 'normal' country situations to gain insights into the extent of and reasons for differential vulnerabilities and understand the role of environmental degradation and problems of access to resources in processes of and prospects for peace building, reconciliation, and social reconstruction versus relapse into conflict.

Broader Linkages between Environmental Change and Human Security

Human security may be affected by a variety of different environmental threats, including or stemming from human-induced environmental degradation and resource depletion, natural disasters, global environmental change (ozone depletion and climate change), large development projects, conflict, etc. These threats vary in a variety of ways such as spatial scale, time frame and consequences - and hence require different responses.

Generally, environmental factors relevant to violent conflict will also be relevant to broader human insecurity, since violent conflict is a clear threat to human security. Poverty, inequality and marginalisation are central sources of human insecurity, even more than they contribute to conflict. Relationships between environmental degradation and resource depletion and human insecurity will generally be stronger than in the case of conflict, since significant levels of human insecurity may be experienced in individual, household or group deteriorating situations long before any tangible conflict arises.

The concept of human security needs to be tested to gain an in-depth understanding of what it means in practice and how it might help to inform and assess appropriate policies and interventions. For this purpose, different subjective security perspectives of individuals and groups affected, as well as more objective measures of insecurity, should be distinguished and integrated. Indicators of human insecurity may serve as monitoring and evaluation tools to trace and compare changes in human security at local, national and global levels and to measure the performance and impact of environment and development programs and policies. Humanitarian early warning systems may be developed to avert humanitarian crises. In-depth assessments of the human insecurity impacts of particular programs and policies might use a variety of methods including participatory appraisals, surveys and interviews.

Responses to Environmental Threats to Human Insecurity

Generally, responses to threats to human security may take different forms and will depend on the perceived nature of the threats. Natural disasters such as floods and droughts constitute relatively sudden local threats which require immediate local and national responses, possibly backed up by international assistance. By contrast, the threat of global climate change is diffuse, uncertain in its possible manifestations and time frame, but of potentially enormous global consequences. Perspectives on the seriousness of the threat and what needs to be done now or later vary widely. Suggested responses range from immediate aggressive mitigative strategies (mainly energy conservation efforts to reduce CO² emissions) primarily in the industrial economies, to checking population growth in the developing countries, to a wait-and-see attitude. The current lack of global consensus on what actions to take, by whom and when, reflects at least in part a wide range of security perspectives and priorities. This, in turn, illustrates the point made earlier that 'security' is a concept which is contested by different political and economic interests and agendas.

Environmental degradation and resource depletion already threaten vast numbers of people in developing countries. Beyond adaptation and self-help, vulnerable groups may benefit from development programmes that can play an important role in addressing issues of human insecurity. The concept of human security is broadly consistent with participatory types of development approaches that aim at empowering disadvantaged groups, addressing social and

gender inequalities, strengthening basic human rights, enhancing local people's control over their local resource base, and facilitating their participation in higher-level decision-making processes.

The history of international development assistance is replete with examples of inappropriate large development projects (like dams and large agricultural and industrial schemes) which often enhance local-level human insecurity by displacing local people and undermining their livelihoods. But in recent years, development thinking has shifted away from large-scale top-down technocratic schemes to smaller, more flexible and participatory people-centred programmes. These programmes attempt to focus on the rural poor themselves, rather than seeing them as indirect beneficiaries.

A particularly interesting and relevant family of innovative rural development programmes is the so-called community-based natural resource management (CBNRM) programmes, which have been initiated in Africa, Asia and Latin America. CBNRM programmes generally emphasise community-level participatory processes of institution-building, enhancement of local technical capacity, experimentation and research, organisational innovation, and adaptive management, all aimed at productive, equitable and sustainable resource use, for local benefit. CBNRM builds on assets held by local men, women and children: intimate knowledge about the local resource base; motivation to improve productivity if benefits are forthcoming; and local decision-making processes and social enforcement mechanisms for resolving resource conflicts.

In CBNRM processes, local communities often enter into partnerships with the state, local government, NGOs and/or the private sector. CBNRM programmes may be organized around particular natural resources such as water (for irrigation purposes), wildlife, plant biodiversity (e.g., medicinal plants) or forest resources, depending on the specific local conditions.

Local-level development interventions to address poverty and inequality, like CBNRM programs, must be complemented by appropriate national policy reform, to establish the right enabling environment. Policy reform is crucial in land resource tenure (to ensure the necessary land rights and security of tenure for local groups) and political and administrative decentralisation and devolution of authority over natural resource management (to allow communities to benefit more directly from the use of local resources).

TRANSBOUNDARY WATER AND REGIONAL SECURITY: FROM CONFLICT TO COOPERATION AND SUSTAINABLE MANAGEMENT

The EACP and ENCOP projects conclude that competition for scarce water in transboundary river basins was the only environmental scarcity situation capable of triggering *inter-state* conflicts. Indeed, tensions and conflicts between countries over access and use of disputed international rivers and water-resource systems have regularly been both the target and the tools of war in political conflicts that may escalate to military aggression (Gleick, 1993).

Fresh water is a fundamental resource, essential to all life support systems and human life itself, and integral to all economic activities. Water is a renewable resource, but in practice

the resource is finite. During most of human history, water was available in abundance nearly everywhere on earth and did not constrain human activities. But in recent years, with growing populations and expanding agricultural and industrial activity, human water consumption (withdrawals from surface and groundwater bodies) has been increasing at unprecedented rates. Indeed, at a global level water use has tripled since 1950 and this has led to the building of more and bigger water supply projects.

Water resources are very unevenly distributed, and countries in some of the drier regions are already experiencing acute water stress - as defined in terms of the ratio of water demand (total withdrawals) to total renewable supply (annual water resources). With water use continuing to rise as a result of population and economic growth, water scarcity is projected to increase in a growing number of countries in arid and semi-arid regions.

Most of the surface water on earth is discharged through rivers that border or cross two or more countries. World wide, some 300 major transboundary river basins cover about 50% of the total land area of the globe (Natural Resource Forum, 1997). Growing water scarcity is leading to increasing numbers of rivalries or intensifying existing tensions between neighbouring countries, over international river water, a feature of geopolitics today (Postel, 1997).

Potential for Water Conflict

In several international river basins, mainly in developing countries, tensions over contested scarce water have existed for some time:

- o the Nile Basin including the Lake Victoria Sub-Basin (the main contending countries include Egypt, Sudan, Ethiopia and Uganda);
- o the Jordan River Basin (Israel, Palestine, Jordan, Lebanon and Syria);
- o the Euphrates Basin (Turkey, Syria and Iraq); and
- o the Ganges Basin (India and Bangladesh).

Where a downstream country desperately depends on water originating in upstream countries and is stronger economically, politically and militarily than the upstream countries - as with Egypt in the Nile Basin - the likelihood of open conflict to ensure downstream water security is higher. Indeed, Egypt, extremely vulnerable to upstream flow diversions and reductions (97% of Egypt's water use comes from the Nile), indicated its willingness to use force if necessary to prevent any disruption of water flow (Gleick, 1993). Where the stronger countries are situated upstream, as with Turkey for the Euphrates River, war is less likely to erupt (Gleick, 1993). Discussion of factors concerning use, access and control of river water across basin countries and reasons behind tensions in these river basins (Lowi, 1993; Gleick, 1993; Brooks, 1997; Natural Resources Forum, 1997). The point that ensuring continued access to scarce transboundary river water seems to be sufficient reason to contemplate armed conflict. On the other hand, the huge cost of warfare (relative to the value of the water in dispute) acts as a deterrent for "rational" countries to opt for military action; it has been estimated that it is far cheaper to share water than to fight for it (e.g., total annual water in dispute between Israelis and Palestinians has been estimated to have a value of perhaps \$200 million - well under the *daily* cost of modern warfare).

Scope for Co-operation

Clearly, there are better ways of resolving water-related disputes than flexing political or even military muscle and exhibiting confrontational behaviour. Sufficient mutual trust and a reasonably co-operative general climate offer more scope for a co-operative approach to resolving water disputes. Such an approach usually entails negotiations to achieve agreements on equitable sharing of water, co-ordinated action on water quality issues, and perhaps also harmonisation of efforts in using water more efficiently.

Legal Issues

There is as yet no enforceable law governing the allocation and use of international waters, but a code of conduct and legal framework for shared watercourses has been gradually evolving, mainly due to efforts of the UN International Law Commission and the private International Law Association (ILA). Equity and reasonableness are the overriding principles of this framework, and a set of more specific guidelines have been developed. These include:

- o equitable utilisation;
- o prevention of significant harm to other states;
- o obligation to notify and inform other nations of any activities on shared watercourses that will affect them;
- o obligation to share data on water resources, river flows, etc;
- o co-operative management of international rivers using participatory approaches such as through joint water basin commissions; and
- o obligation to resolve disputes peacefully.

'Equitable utilisation' is not the same as equal utilisation. It means that water allocations must be negotiated to fit the physical, economic and social conditions of the parties to the agreement. The above principles and guidelines are often interpreted in different ways and therefore are not always directly useful to improved practice. So far, it has been up to individual states and affected parties to come to agreements with neighbours on sharing water and preventing conflict. A number of such treaties exist in current hotspots. Regrettably, none of them includes all parties within the river basin (e.g., the 1959 Nile Treaty is between just Egypt and Sudan and allocates as much as 90% of the river's average flow between the two countries, even though more than 80% of the flow originates in Ethiopia).

Nevertheless, some lessons are emerging from water-sharing agreements and related water management objectives:

- o Determining rights of parties to specific quantities (and qualities) of water is always a contentious process, but progress is sometimes made when negotiations shift attention

from rights to water supply (a rather subjective matter) to water needs and water demand rights (which has a more objective basis).

- o Agreements on water allocations should be flexible enough to accommodate even extreme eco-climatic events and conditions such as major droughts or global climatic change. For instance, rather than specifying fixed (absolute) water allocations to different parties, it is preferable to specify relative water shares. In this case, the absolute quantities of water received would depend on the overall water availability in any given year as well as on the minimum flow of water reserved for maintaining the ecological functions of the river (such as protection of the river delta, maintaining the fish diversity and other biodiversity in the stream, etc.).
- o Maintaining water quality is almost as important as water quantity, specifically for purposes of supplying potable water. Water pollution from agricultural run-off, industrial effluents and untreated domestic wastewater is a problem almost universally on the rise, given expanding populations and economic growth. Water quality issues should be given due attention in water treaties.

Water Conservation and Demand Management

Hammering out equitable water sharing agreements is both necessary and important to meet the challenge of transboundary water management and to move away from conflict toward co-operation. But it is not enough, if inter-state tensions over water are to be prevented in the longer-term. Discounting for the moment the technically feasible but economically unattractive option of large-scale water desalination to expand water supply, much greater emphasis must be placed, especially in water-scarce regions, on using water more efficiently in all different domestic, agricultural and industrial end uses and on conserving water through inter-sectoral shifts in economic activity in favour of less water-intensive production and even by importing some of the more water-intensive commodities (e.g., rice). The technologies allowing more efficient water use are available, the scope for water conservation is vast in developed and developing countries alike, and providing the same water services by saving water rather than supplying additional water is almost always more economic.

Active water demand management strategies need to be initiated, moving away from the business-as-usual practice of expanding water supply to meet simplistic projections of future water demand. Demand-side strategies must work out suitable combinations of options and tools for demand management, including legal and institutional frameworks, market-based measures such as water pricing and tariffs, non-market measures such as regulations and social pressures, and direct intervention in providing public services and infrastructure. Demand-side management and water conservation strategies (or 'soft water paths', to borrow a term used successfully in energy analysis and policy) would, if successful, go a long way in alleviating water scarcities and hence conflict potential, now or in the future, around access to transboundary water resources. Water conservation and demand-side policies should be aggressively pursued and harmonised by countries linked by common water security concerns. To the extent possible, such national policies should be made an integral part of any international water-sharing agreement.

Unfortunately, significant institutional and political barriers to the adoption of such approaches and strategies exist, much as they did and still do in the field of energy. For one, water management institutions continue to be oriented to supply management (building dams and other large-scale water supply engineering works). For another, in many agrarian-based developing countries (even in more developed countries like Israel), water security is seen as closely tied to food security, by both government and local communities. In such countries, line ministerial functions for water and for agriculture are typically closely linked, and by far the largest share of available water is consumed in irrigated food production. Irrigation water is usually free or hugely underpriced and accordingly used very inefficiently. The scope for saving water in irrigation (improved irrigation techniques, shifts to less water-intensive crops, importing water-intensive food commodities, etc.) is thus potentially wide, but political will to change the situation cannot be taken for granted and there are significant government-level and community-level institutional constraints to contend with.

So in situations of water scarcity involving two or more countries depending on access to shared river water, a combination of water conservation and demand-side management strategies on the one hand and negotiation of equitable, efficient and sustainable international water sharing agreements on the other, are necessary to face difficult water trade-offs and avoid inter-country conflict. In this way, international rivers could become bridges to peace and prosperity, rather than flashpoints of tension and conflict.

GREENING THE MILITARY OR MILITARISING THE ENVIRONMENT?

Military establishments throughout the world have been major sources of environmental degradation. At the same time, military forces possess important skills and resources (technologies, equipment, data banks, trained personnel, etc.) which could be mobilised to 'fight' environmental problems. As the nature of security concerns and human conflict has changed - away from armed hostilities between states toward civil wars and local conflict on the one hand and toward global environmental economic instability and environmental threats on the other - the need for conventional military forces has come under scrutiny. There have been calls for demilitarisation, in developed and developing countries alike, to free up or redirect military resources for tackling the new local and global security challenges, including environmental issues.

But what should 'demilitarisation' entail and how far should it go? And how specifically could it help addressing environmental problems? Views on the scope for demilitarisation range from a narrow understanding in terms of simply cutting down on the size of military forces or shifting the defence industry to civilian production to much broader approaches to military conversion. Military establishments have often been receptive to the idea of helping address non-military (e.g., environmental) problems, as such purposes may give them a new *raison d'être*, at a time when the necessity to keep military forces is being increasingly questioned and further defence budget cuts loom.

Critics of the idea of involving the military in non-military tasks and objectives have argued that this may not only affect military strength and readiness, as and when needed, but more importantly it may extend military approaches and logic (use of force, coercion rather than co-operative action, secrecy, lack of transparency, etc.) to the resolution of problems best

tackled otherwise. Given the relative organisational strength and resources of the military in many countries, these critics feel there is a real danger of unnecessarily militarising civilian domains of policy and practice such as the environment, when the real need is for a stronger civil society.

In a project entitled 'Redefining Security: Militarisation and the Ecology of Southern Africa' initiated in 1993, the Group for Environmental Monitoring (GEM) assessed the scope of and implications for broader understandings of demilitarisation. While recognising that demilitarisation and conversion are contested concepts, the GEM project identified seven ways in which military resources could be redirected to environmental protection and sustainable development (Cock, 1998):

- o ideological conversion to a new understanding of security which emphasises its link to development and meeting human needs;
- o conversion of land previously used as military bases;
- o conversion of defence force personnel and equipment for development;
- o demobilisation, retraining and integration of ex-combatants into development institutions and programmes;
- o conversion of informal military structures, such as self-defence units, into development-related projects;
- o conversion of the defence industry to civilian production; and
- o the reallocation of defence expenditure.

While the project focuses on Southern Africa, and South Africa in particular, the discussion and conclusions under these seven areas of concern have more general validity. The main problems and threats that humanity is faced with, have changed fundamentally in nature - away from military issues toward a wider range of often inter-related problems including environmental degradation; these problems and threats manifest themselves not (any more) primarily at the level of the state, but often at local and global levels, especially in the case of environmental problems; and the changed nature and spatial levels of these problems and threats require responses that are fundamentally different from the military responses of the past (i.e., a much broader array of actions emphasising co-operation, consensus building and collective action). This, in turn, calls for a much broader concept of security (which might both reflect and inform appropriate policy and practice), such as 'environmental security' or perhaps even more appropriate 'human security'.

The conversion of military facilities to alternative land use is an important issue in South Africa and other developing countries, since much valuable (and ecologically special) land has been used for military bases, weapons testing grounds, ammunition depots, training schools and other military purposes, notably in state-controlled nature reserves and national

parks. In developed countries - especially in the US and the former USSR - the military has been a major polluter of the environment, but significant progress in clean-up operations and environmentally more responsible behaviour has been made (IUCN, 1998).

The redeployment of troops and equipment for disaster relief, environmental monitoring and protection is already being done in a number of countries. Beyond that, South Africa (and likely other countries) allow (or even encourage) assistance of the military in development projects of more general kind (meeting basic needs, building the economy and developing human resources). However, this is felt by critics to be counterproductive in giving the military a much broader role and thus undermining the objective of demilitarisation.

Demobilisation, retraining and integration of ex-combatants forms a crucial part of demilitarisation specifically in those (mostly poor developing) countries going through post-conflict transitions, such as Mozambique since 1992 or Uganda after 1985. Ex-combatants are a source of instability, unless disarmed and economically as well as socially reintegrated. Ex-soldiers often joined fighting forces at a very young age and hence do not have many, if any, marketable skills. Training them in environmental rehabilitation work may be a possibility, but this option does not yet have much positive experience in post-conflict situations.

Conversion of informal military structures to civilian purposes applies to countries such as South Africa where there is a legacy of such structures. Conversion of the defence industry is a major issue in a number of countries, because it is a source of moral contamination and the defence sector's contribution to overall economic performance is far less significant than often claimed. On the other hand, parts of the defence industry may be transformed to develop industrial capability in clean (environmental) technology. Finally, defence budget reallocations could be a major source of funds for environmental programmes, since in many countries defence budgets are often still a major proportion of government expenditures.

In conclusion, defence establishments in developed and developing countries alike tend to be interested in and are often able to bring major resources to greening their own operations and engaging in civilian programmes directed at environmental improvement. They are capable of making significant positive contributions to environmental and human security, but inherent risks of 'militarising the environment' raise human security concerns of their own. The extent to (and ways in) which the military should be converted to civilian aims remains a matter of debate and controversy.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Environmental security is a complex and essentially contested concept. Institutional interpretations will differ according to tradition and vantage point. As with the concept of *sustainable* development, *environmental* security carries a crucially important message for those who are concerned with enduring patterns of inequality, poverty, environmental degradation and resource depletion and who see these phenomena as well as the underlying

structures and processes as major threats to individual and global human justice and well-being.

These environmental threats are very serious and urgent, and drastic steps must be taken to reduce inequality, fight poverty, reverse and prevent further environmental degradation and resource depletion, by encouraging more efficient use of resources across end uses and discouraging production and consumption patterns that are wasteful of natural resources. The global political and economic ramifications of this message are far-reaching and amount to major change and transformation in structures, processes and rules of transaction among and within countries and throughout the globalised world system.

At the same time, and again as with '*sustainable* development', different political and economic agendas (and related security concerns) exist which may seize on '*environmental* security' either as a political slogan supporting their own interests often attached to the status quo or as rhetoric to dress up their true intentions of going on with business as usual.

The broad and intertwined nature of current security concerns, very different from the narrow military threats during the Cold War years, have provided inspiration in the search for new notions of security. 'Human security' has emerged as a holistic concept well suited to capture and reflect the range of inter-related environmental, economic and social threats to personal, national and global wellbeing. While this concept seems intellectually appealing, it needs to be tested in different applications and operationalised as an analytical tool for environment and development programmes and policies. Unlike conventional security discourse, the 'human security' perspective addresses the vulnerabilities and security needs of marginalised groups and of women and children who are most often the victims of inequality, poverty and environmental decline.

Conceptual and empirical work to date has unravelled some of the complexity of the inter-linkages between environmental change, conflict and security. Human conflict now typically takes place at a sub-national level and potential conflict can take a variety of environmentally induced pathways. Inequality of access to resources, poverty and population growth are central variables. Progress in these variables, more than anything else, will tend to increase human security and reduce conflict potential.

While conflicts and wars these days tend to take place within countries, areas of transboundary river courses are an exception to this rule. While the potential for tensions, and possible conflict, among riparian states in water-scarce regions is real, co-operative approaches to shared water management are as necessary as they are difficult. Water conservation and demand-side management can go a long way in reducing (or at least postponing) pressure on available water resources.

Military forces in many countries possess technologies, organisational and human resources that can be, and are being, brought to bear in various ways to respond to environmental challenges. However, there are concerns that greening the military may not be possible without unnecessarily militarising the environment. Demilitarisation, like environmental security, is a contested concept whose operationalisation is subject to intense debate.

Recommendations for Further Research, Information Exchange and Policy Dialogue

What might the global community do to address the new link between problems of environment and security? First, in view of the contested nature of the links between environment and security, policy dialogue is needed among different constituencies, including environmentalists, security/intelligence specialists, development practitioners, political elites, and disadvantaged groups from developing and developed countries, to gain a better mutual understanding of the different perspectives and to define common ground on which to move forward.

To facilitate such policy dialogue, a series of regional workshops might be held to bring representatives from these groups together. These fora would have to be carefully organised and facilitated to be productive. As a well-linked global membership, IUCN would have an important role to play to mobilise interest and participation in such policy dialogue exercises.

Second, communication channels should be set up among and across these groups to share experiences on environmental security on an ongoing basis. This could be done by linking these groups within electronic networks, using modalities such as moderated exchanges, virtual conferences, and informal interactions.

Finally, several areas for further research have been identified:

- o test and operationalise the concept of 'human security' for use in environment, security and development policy and practice, using a variety of (field) research methods;
- o explore the correlations between conflict and security, vis-à-vis environmental change, in different country situations;
- o investigate the factors that are responsible for co-operation rather than conflict to result under similar environmental and socio-economic conditions, and to understand the role of institutions and the capacity for adaptive management in this connection;
- o examine and compare the dynamics of and pathways to conflict or co-operation in countries emerging from violent conflict vis-à-vis 'normal' countries;
- o continue pilot work on innovative community-based natural resource management (CBNRM) involving policy makers and NGOs, and share lessons learned; and
- o assess and develop shared water use and management options and choices, with emphasis on water conservation and demand-side management options and what kinds of regional institutional mechanisms work for co-ordinated or joint basin management.

In some of these areas (e.g., CBNRM and water demand management) IUCN is already active. In others, IUCN could be instrumental in organising the research work and disseminating the results in country, regional and global workshops.

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RESPONSES TO KEYNOTE SPEECH

By: Lidia Castillo, Centro de Protección para Desastres (CEPRODE)
(El Salvador)

We need to consider giving people knowledge rather than arms. IUCN could encourage governments that export arms to desist from this practice. We know that resources are not distributed equitably but we can encourage harmony between people and protected areas so that local people contribute to conservation while helping them to solve their problems. I would like to highlight the difference between visible impacts and impacts that are less obvious. The press focuses on visible impacts such as a building falling down but often good news on the environment is ignored as being not newsworthy even if it affects more people.

By: Malcolm Powell, Wildlife and Environment Society of South Africa

There is no doubt that human insecurity has been caused by environmental issues. The environment is the basis on which all society is built and our survival depends on natural resources. It is a shame that politicians do not realise the importance of the environment. Conflicts over limited resources are often created by false promises for political expediency by politicians. In some cases indigenous communities have had a major impact on the environment because of introduction of modern technology that enables overuse, resulting in increased conflict. Population expansion and its affect on resources is the source of many conflicts. Finally, often development assistance is inappropriate and it escalates conflict.

COMMENTS FROM PARTICIPANTS

The threat of nuclear weapons poses the gravest threats to humanity. We need to place environmental security in the light of this threat. IUCN needs to support more open dialogue to break up the nuclear club. This is nuclear apartheid. IUCN needs to encourage a Security Council that is not hostage to political ideology.

Burkina Faso is facing a problem with desertification and thus can appreciate the threat of environmental insecurity. People are moving from limited production areas to more productive areas and this is creating conflicts with the population in the more productive areas. We have also seen regional threats develop due to water shortages. IUCN can assist by more energetically pursuing awareness-raising among politicians in the Third World. Often poor political decisions result from the politicians having poor quality information. IUCN has had considerable influence on African states and IUCN should continue to do this, including mobilising resources to fund micro-projects.

Political issues dictate the rules of the game. Environment is a political issue and we need to bring political issues into the debate.

IUCN can work with regional organisations and international agencies in Central America to look at the serious impact of the hurricane that has devastated three Central American countries. The economies of the Central American countries are largely based on providing products for developing countries, so we should look there for help. We need to look at how the military can contribute to environmental security.

We need to be cautious in involving the military in environmental security as they have not been trained for this and they may indeed end up creating a greater security problem than they are meant to help with.

Involving the military in environmental security is likely to create problems in many countries as they often show disdain for the laws of their own country. Perhaps we should look at whether an armed force is even needed.

KEY CONCLUSIONS

IUCN will have a tough role to play as a peacekeeper. Many issues may best be addressed at a national level but there is also a need to address some of the issues at a global level. Environmental security is a very real issue and has many aspects. The root causes of environmental insecurity relate mostly to poverty. The role of information and knowledge is critical to this issue.

In addressing environmental security, IUCN may be able to:

- o convene policy dialogues;
- o set up communication channels among interested groups; and
- o sponsor and facilitate applied research that defines what environmental security and human security mean in practice.

3. CONSUMPTION

3.a LIVING WITHIN OUR LIMITS

The 1987 Brundtland Report implied that a 16-fold increase in resource consumption is required to secure equitable development, but is such a level sustainable? Population is expected to continue growing at a rate of 80-90 million per year in the coming decades, requiring greater consumption of energy (and attendant threats to climate), forests, fisheries and other resource systems. As the human consumption of resources continues to grow, what is left for other species? What will happen to ecosystems? What practical measures are available to limit consumption, and how should IUCN promote these?

Organizer: IUCN Commission on Environmental Economic and Social Policy (Tariq Banuri)

Chair: Tariq Banuri

Keynote speaker: Anil Agarwal (India)

Respondents:

- o Michael LaGraff, British Petroleum (UK)
- o Claude Martin, Director General, WWF-International (Switzerland)
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CHAIR'S OPENING REMARKS

CHAIR: TARIQ BANURI

RAPPORTEUR: TARIQ BANURI

As you are aware, the 50th Anniversary symposium has been structured along three streams: conservation, community and consumption. While this is not the only way in which it could have been structured, the beauty of this arrangement is that on the one hand it overlaps with and evokes some of the other possible structures, and on the other hand goes beyond them. Take a few obvious possibilities:

Time: past, present and future.

Level: global, national and local.

Type of action: research, advice and advocacy.

Disciplinary base: natural sciences, social sciences and humanities.

Medium of communication: academic, policy/popular journals, electronic

It could be argued that IUCN (and the conservation community more generally) started initially with conservation proper, moved on to practices that involved communities more directly into their work, and might increasingly have to focus on behavioural issues that cause degradation. In other words, the past was conservation; the present is communities; and the future, consumption.

Similarly, it could be argued that conservation efforts were oriented towards national policy makers; their analytical framework was provided by the natural sciences; they were led by scientists; and they relied mainly on academic journals for communication. Community participation, on the other hand, is oriented towards the local level; its analytical framework comes increasingly from the social sciences; and it places NGOs and policy-oriented forums and popular print media for communication. Finally, concerns about consumption are global in nature; these concerns need the intellectual structures provided by ethicists and philosophers; they will rely increasingly on advocacy and publicity; and they are tailored to the electronic age.

This is a fairly simple, even simplistic, description of a process of change in the manner in which the heartland of conservation has been defined. But the point is deeper than this. The point is that all of the categories I have mentioned have also been transformed over time. Conservation has become oriented towards community participation, and community-building efforts have increasingly begun to use conservation as an entry point as well as a goal of collective action. In other words, the papers presented in the streams on conservation and communities are as much about the future as this one. They too combine natural and social sciences and ethics in innovative ways to help us understand the human predicament today. And all of them are oriented towards practical people engaged in finding concrete and practical solutions to our collective problems.

Having said this, I now wish to turn to the subject of the present stream, consumption, and make a brief comment on the salience of this issue to tomorrow's world.

The former President of IUCN, Sir Shridath Ramphal, in his valedictory address to the IUCN General Assembly in Buenos Aires in 1994, called consumption one of the forgotten issues of UNCED. Indeed it is a forgotten issue of the environmental movement. The greatest danger to the environment comes not from its consequences in selected areas but the enormous and relentless pressure that the insatiable desire for consumption places upon it. Today we need an approach to conservation that focuses as much on the causes as on the consequences of degradation.

Why is consumption a forgotten issue in the environmental debate? One reason is that the environmental movement traditionally focused on a different agenda - "building a new Ark", as one of the founders of IUCN put it - which sought protection rather than prevention. There are other problems as well. I have argued elsewhere (Banuri, 1994) that the implicit associations of the metaphor of the Ark - technological optimism, screening and exclusion, and the creation of "controlled" environments through isolation and segregation - led many in the South to view UNCED (and by implication the environmental movement) quite differently from its architects. It is more appropriate to say that they saw the architects "building a new Cross", on which the South would be asked to sacrifice itself for the sins of "humanity". The point here is not to evaluate the validity of different metaphors, but to emphasise the distance between them. Despite a decade of intense engagement, we have been unable to bridge or reduce this divide, and the battle lines at Kyoto (1997) or Buenos Aires (1998) are virtually the same as those in Rio de Janeiro in 1992.

A second reason has to do with the nature of the dominant cultural values today. With a little help from the media, the advertising industry, and the corporate world, accelerated and intensified by the process of globalisation, we have become a society of consumers. This means not simply that people consume, but rather that they have to consume ever-increasing amounts of an endless array of newer and newer goods. (It does not matter very much whether this is because of the need for markets to function or for consumers to find meaning in their lives.)

The problem was underlined almost 70 years ago by John Maynard Keynes in a relatively little known essay, "The Economic Possibilities of Our Grandchildren". This was published in the fall of 1930 in **The Nation and Athenaeum** weekly (republished in Keynes, 1933). Keynes argued that "[T]he economic problem [italics in original] may be solved, or be at least within sight of solution, within a hundred years". In other words, the human race would, for the first time in recorded history, have the ability to produce enough to meet everyone's needs. Keynes's goal in this essay was two-fold. On the one hand he wanted to counter the spirit of doom and gloom that then prevailed. On the other hand, he wished to point to a different danger, namely that our value system, oriented as it is towards accumulation, is totally unequipped to deal with an age where scarcity is no longer the driving force.

It is not yet 100 years since he wrote that essay, but the generation that would have been his grandchildren's is here and his predictions have been more than vindicated. Given the dominant value system, geared towards acquisition, accumulation and avarice, Keynes's economic problem has been transformed from the problem of production (presumably for everyone's needs) to the more virulent form of consumption - for everyone's greed. In other

words, a problem that did (or could) have a solution has been transformed into one that does not have a solution and cannot have a solution.

Stephen Marglin (1995) points out in a review of the half-century following the publication of Keynes's essay that, while the statistical trend is precisely as Keynes had predicted, "It hardly seems that we are solving the economic problem, even if we confine ourselves to the United States". The real problem, Marglin suggests, is that Keynes grossly underestimated the power of what he called "relative needs", namely those that make us feel superior to our fellows. By focusing on the lesser needs, which he termed "absolute needs" (and later economists called "basic needs"), Keynes seemed to discount the insatiability of human desire for consumption. As Marglin notes, "If the market is dedicated to fulfilling (insatiable) relative needs, ... then far from being a solution to the problem, growth is its cause. The possibility of growth lets the genie of scarcity out of the bottle, but no amount of growth can ever give everybody more than its neighbour".

The centrality of consumption is now so ingrained that no viable political or environmental movement in the north or the south dares to place its reduction at the centre of its agenda. There is no point in blaming the corporate world for this. Unlike production, for which corporations must take central responsibility, it is the global elite that must take primary responsibility for sustaining the ideology of endless consumption.

One cannot escape the impression that the neglect of consumption in the environmental debate is in part due to values shared by those who influence decisions and lead opinions. In recognising this point, one has to move beyond the simple North-South divide that has dominated the issue in the past. Contrary to what many of us had believed and even argued a few years ago, the fundamental divide today is no longer between the North and the South (although these terms continue to provide shorthand handles to discuss such issues). It is rather between what Zygmunt Bauman (1998) calls the tourists, a globalised, almost infinitely mobile, culturally hybridised elite, and the vagabonds, a localised, involuntarily mobile, and culturally disempowered non-elite. The conflict is between the omnivores and the ecological refugees (Gadgil and Guha, 1995), between the *affluent society* and the *castaways* (Latouche, 1993).

Now the global consumer ethic and the global threat to the environment is sustained and driven by the tourists. It is important to recall like most international events, IUCN's 50th anniversary symposium is also a meeting of tourists, of the omnivores, regardless of whether they are from the north or the south, the east or the west. It is also useful to remember that the tourists are not the solution; they are part of the problem.

These are the same persons who, irrespective of their national or hemispherical origin, shape the global agenda including the agenda for the environment. With their high mobility, their laptops, and their membership in a global community, they provide the most compelling and yet the most inappropriate role models for the 21st century. They shape an ideology whose purpose is largely to protect their own lifestyles. Even the defensiveness of the "development set" is missing here, not least evidenced in the march that UNDP has stolen on the issue by publishing its **Human Development Report** 1998 on consumption. I am reminded of a keynote speaker at a world conference on hunger. Referring to the cornucopian feast that

preceded her after-dinner address, she said, "If this is any indication of how these things work, I must cancel my next speaking engagement - at the global conference on population!"

Neither consumption nor the environment is a technical relationship between ends and means. These are at their heart political problems involving conflicts over resources as well as conflicts over meanings. The process of degradation is driven by the very systems of thought and meaning that sustain the global economy. The conflicts over meanings, over the definition of nature, of environment, of conservation, and of degradation, are just as important in protecting nature as are the conflicts over rights. We may be on the right side on one issue but that is no ground for comfort if that places us on the wrong side of the more lethal divide.

By not addressing the central problem of our times, by refusing to acknowledge our own complicity in it, by acting in an unreflective, uncritical and complacent manner, we are rapidly becoming marginalised and socially irrelevant. If the best we can do is to organize self-congratulatory meetings such as this one, our work will at best become a form of therapy for the collective guilt of tourists addicted to consumption.

There is a way out though. It has to start with the injection of a note of self-criticism into the debate, the re-opening of the discussion of consumption and its impacts, and the explicit recognition of our own role in the problem. And it has to lead towards the identification of alternative utopias. Bauman, reflecting perhaps a sympathetic Northern perspective, laments that vagabonds have no other images of the good life, no alternative utopias, no political agenda of their own. Others (see, e.g., Nandy, 1987; Agarwal and Narain, 1991; Guha, 1993) have argued differently by articulating the alternative agendas that shape the resistance to modernity. The environmental movement needs to engage with such perspectives in a more meaningful manner.

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Living within our Limits

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ABSTRACT

The western economic model is based on intensive use of energy and various raw materials, and has been accompanied by tremendous problems of pollution and resource over-exploitation. The globalised economy is forcing government ministers to focus on macro-economic issues, when micro-economic issues are of far greater concern to the rural poor in developing countries; they meet their consumption needs from their immediate environment and depend far more on the micro-economics of their habitat than on the macro-economics of a nation. While the social, economic, and environmental challenges facing humanity are immense, numerous trends and opportunities present hope that the next century will see very positive changes in the way humans behave. Already, a significant trend is the move from representative democracy to participatory democracy, leading to systems that encourage people to do things for themselves. Simply stated, reducing the role of the state will bring numerous positive changes in such areas as rural energy, watershed development, and waste management. One important illustration of this trend is that rural people in the Indian province of Madhya Pradesh are today consuming more high-quality biomass in the form of logs than they were 20 years ago, primarily from growing trees on their own farms. Rather than the rapid deforestation that was predicted just 20 years ago, many rural villagers are beginning to protect forests to meet their own biomass needs without any intervention from the government. And where governments are able to provide appropriate incentives, watersheds can be very much better managed, leading to a wide range of benefits to the local people. An important generalisation is that improved environmental management requires the involvement of the people, with the government playing a limited and strategic role. Technologies such as composting toilets and solar power can greatly increase their beneficial impacts on both human welfare and the environment with an appropriate supportive role being played by government. The effective leaders of the 21st century will be promoting a system of governance that decentralises management of natural resources, ensures equity through appropriate entitlements, and pushes for a new technological paradigm that gives greater control and responsibility to the household and the community.

INTRODUCTION

Years ago, Mahatma Gandhi pointed out that Indians would strip the world like locusts if they tried to imitate the consumption habits of the West. But Indians refused to listen to him and began to strip India itself like locusts. By the early 1980s, nearly one-third to one-half of India, a country with enormous poverty and population density, was officially declared a wasteland.

Gandhi had failed to tell the Indian people that the Western development model is also a highly toxic model. This the Indians are slowly learning in the 1990s with even the 'Hindu rate of growth' leading to the massive poisoning of the country's urban air, rivers and

groundwater systems. The unprecedented energy and material-intensity of the Western economic model began to poison the West itself in the post-war economic boom. Cities as far apart as London, Los Angeles and Tokyo were choking for air during the 1950s and 1960s. With massive investments and a bit of discipline, the West was able to reduce its urban pollution.

But few lessons were learned. The economic boom of Asia in the 1980s has turned several countries of the region into the most polluted ones in the world. Even environmentalists of the region failed to understand the speed with which the pollution would hit them. In 1986, I personally had the opportunity to address the Indian Cabinet and Members of Parliament. I had an unequivocal message to deliver to them: rural environmental problems are far more urgent and important for India to tackle than its urban environmental problems. But in just about ten years, Delhi has turned into a toxic paradise and every other town and city of India is going the same way. Now studies by the World Bank tell us that when the economy doubled in some Southeast Asian countries during the 1980s, their pollution loads went up by ten times. How wrong I was, therefore, in the message that I delivered to the nation's leaders in a unique opportunity that environmentalists rarely get.

And since we are a people who cannot make the same investment in pollution control as has been made in the West and also as we are a lot more 'undisciplined' with far more ingrained disrespect for the state, while we may have followed the Western model in pollution generation and environmental destruction, I am not sure if we have all the cultural and economic wherewithal to follow the Western model for pollution control adequately. And not that the West itself has found a complete answer to the toxic hell it is creating. It may have been able to contain the sulphur, lead and benzene emissions which were poisoning its urban air but it still has to contain its extremely serious impact on the global carbon cycle and it has not even truly started talking about its impact on the global nitrogen cycle.

GLOBALISATION

Meanwhile, globalisation poses a new challenge to the population-consumption-environment equation. Economic globalisation is being accompanied by 'technological globalisation' and 'cultural globalisation' and as a result the globalised economy is pushing Western-style consumption all over the world and faster and faster. The rich want more and more. And, of course, the poor, imitating the rich, also want more and more. And once you get locked into an integrated global economy, it will be impossible to get out of it without creating an enormous crisis that may take generations to tackle. Soon after Rio, former German Environment Minister, Klaus Töpfer, visited India and we asked him about 'consumption patterns' in the North. He had quite bluntly answered, "But if German tourists don't go to the Maldives, then that would adversely affect that nation's economy."

Indeed, the finest example in world history of how integrated economies can suffer from the collapse of one comes from the Indus Valley civilisation, one of the world's first urban civilisations with the most advanced urban management systems in the third millennium before Christ. Historians are still finding it hard to explain how such an advanced civilisation, which lasted for more than a millennium, suddenly collapsed within a span of less than a century. There are many theories but one that has been gaining ground links the collapse of

the Indus Valley civilisation to the collapse of its contemporary Mesopotamian civilisation, which over irrigated its lands and found itself short of food. The cities of the Indus Valley and Mesopotamia were great trading partners and the importance of trade in their economy turned the Indus Valley settlements into booming urban settlements. After the collapse of Mesopotamia, the Indus Valley urban culture disappeared and people began to live in essentially rural settlements.

Indeed, we can ask: Can this happen again? Is the 'East Asian flu' not a good reminder? Economic disengagement is extremely difficult and very destabilising. The Dominican Republic, for example, was badly hit when its sugar imports to the US were greatly reduced.

Yet despite all the criticism of economic globalisation and its attendant consumption patterns, it looks like a growing fact of life. There will no doubt be many negative sides of the globalisation process. For example, the globalisation of economic relations is today setting dramatically new challenges and standards for the modern nation-state. Today even the highly straitjacketed socialist economies are opening up and becoming a part of the globalisation process, from Europe to Asia. As a result, finance ministers of developing countries are slowly becoming glorified bookkeepers trying to balance their foreign exchange accounts. And they are, therefore, becoming even greater victims of the dictates of macroeconomics rather than the compulsions of microeconomics, which affects the poor and the environment in developing countries in far greater measure than the changes in the macroeconomics. The poor meet their consumption needs more from their immediate environment and, therefore, depend far more on the microeconomics of their habitat as compared to the macroeconomics of a nation.

But whatever be the negative sides of the globalisation process, they will not be dealt with by carping about them but by addressing them head-on. And I think it can happen. There is no reason for doom and gloom. Numerous trends and opportunities present hope that the 21st century planet Earth can become a much better place to live in - with a lot more wealth and comfort and yet in harmony and peace with ourselves and our environment. Of course, it will depend a lot on the leadership that is provided to the human race.

GLOBAL CIVIL SOCIETY

In fact, the most beautiful thing about the 21st century globalised world is that there will be many more leaders. The growth of the civil society in the last half-century has been quite phenomenal and its role in bringing sanity, especially ecological sanity, to the world has been extremely impressive. The first half of the 20th century was marked by an unprecedented growth in science and technology, whose application and introduction into our daily lives was managed by a few political and business leaders. But its adverse ecological impact brought forth a response that showed that even in the so-called democratic societies of the West, their democracy was not deep enough. People no longer wanted to allow their elected representatives to decide where they could install a nuclear power station. People wanted to participate in that decision by saying "not in my backyard, dear decision-maker. You may have been elected to take decisions but you do not have an unqualified right to decide on our behalf."

Not surprisingly, the 1970s saw the flowering of highly interventionist civil society in the West itself and slowly it began to spread across the world, including the more socialist and state-dominated Third World. Environment became a government and business concern during the 1970s, 80s and 90s only because of the massive environmental movement across the world led by hundreds and thousands of relatively small-time, non-political, non-business leaders. In fact, the contribution of the most well-known environmental leader of the latter half of this century, Al Gore, looks puny in comparison to many of these small-time leaders even though Gore may have received miles of column-inches in newspapers.

The world has, thus, slowly moved in the latter half of this century from representative democracy to participatory democracy. And this is a very heartening sign. The growing diversity of human leadership cannot but be a good thing. The 21st century now offers the world a great opportunity to create a global civil society which could go a step further even in reducing the dominance of the Northern civil society. Everyone in power today has to recognise that technological globalisation and the communications revolution is very subtly changing the power equations. Not necessarily in the military sense, but definitely in many other senses. And the greatest thing about all this is that politicians can only retard this process, they cannot stop it. Good political leadership in the 21st century will be one which does not feel threatened by this process and actually promotes it. Still, let us recognise the fact that there is no dearth of leaders, especially in the Third World, who do feel threatened by this process.

PARTICIPATORY GOVERNANCE

Another major change is slowly taking place across the world, as monolithic governance systems are disappearing and being replaced by far more pluralistic governance systems. And because this process leads to growing involvement of larger numbers of people in the governance of their life and their environment, it can only lead to a 'greater balance' in the relationship between people and between people and their environment. A look into recent Indian history has again a lot to teach us. About 250 years ago, when the British began to spread their tentacles in India, India had a school in every village, every single person knew the three Rs, there was a greater percentage of people living in towns and cities than anywhere else except possibly for China, and it was the wealthiest country in the world, except again for the possibility of China. People had made hundreds and thousands of water structures to manage their lands. And there were equally hundreds and thousands of sacred groves.

The British looting of India helped to finance its Industrial Revolution. But the worst legacy of the British was the manner in which it subverted the country's governance system. The Indian Rajas and the Muslim Nawabs never did anything for the public. They created systems that encouraged the people to do things themselves. As a result, there were a million institutions - village-level, city-level - to take care of all the tanks, thousands of which still survive today, even though they are in a highly dilapidated state. The British replaced all these institutions with one mega-bureaucracy that proved totally incapable of dealing with the diversity and multitude of environment-friendly water structures that existed then. All over the world, the paradigm of water management began to change. From water being everybody's business, it slowly became the business of the government. And now with a

century's hindsight, it is hard to believe that this new paradigm is better than the past one. The 21st century is being forecast as the century of water scarcity and water wars. But all this is scare-mongering. A lot of change will take place if we simply reduce the role of the state.

In the developing world, the modern state has proved to be extremely incompetent and corrupt. When one looks at India's environmental history, one finds that hardly any rules were set by the erstwhile rulers at the top; most rules were set at the bottom. A lot of this was customary law which was enforced by communities and social and religious sanctions. Nomadic groups, for instance, rarely crossed each other's routes. But in the modern state, we have parliaments passing innumerable laws at the top but there is nothing at the bottom to implement these laws. And with the traditional disrespect for the ruler, the modern governance system is creating an extraordinary havoc. Corruption is just one response of that disrespect. The governance system went from a 'pyramid-like structure' in the past to an 'inverted pyramid', teetering, doddering structure, in the present. But realisation is seeping in that it has to look like at least a barrel to meet the challenges of the modern day. Monolithic governments are already withdrawing from the industrial sector and sooner or later they will be forced to withdraw from the social and environmental sectors as well. All this is a very slow process undoubtedly but a very heartening one again. And I believe it will come to dominate the 21st century.

RURAL ENERGY

Let me illustrate with a few outstanding environmental examples why I am so upbeat about the future and so negative about the role of the modern state in the management of our affairs.

My first example comes from the field of rural energy. For years energy experts and foresters have believed that the poor will eat away the forests of the developing world like locusts in order to meet their ever-growing firewood demand. This opinion was also shared by Indian foresters. Soon after the oil crisis hit the world in 1973, the government of India set up a Fuel Policy Committee to assess the country's energy scenario. The committee noted in its report submitted in 1974, "nearly one-half of the total energy consumed in the country comes from non-commercial sources such as firewood (including charcoal), cow dung and vegetable waste. The dependence on these fuels is at its maximum in the domestic sector. This has led to large-scale denudation and destruction of forests." A study published in 1977 pointed out that 30 out of 45 districts in Madhya Pradesh, after taking into account the gross forest area and human population, were already suffering from a firewood famine. At that rate of demand, the study argued, forests in all but 16 districts of the state would disappear in another 20 years.

Dependence on firewood in India's villages has not lessened over the decades. For the first time the Census of India collected data in 1991 on the type of fuel used by different households. The results confirmed that of the 151 million households in India in 1991, 92% in rural areas and 39% in urban areas were dependent on bio-fuels.

Given this background, the results of the latest survey on firewood consumption in India's rural areas published by the National Council of Applied Economic Research are quite stunning. This survey generated data for the year 1992-93 whereas the last survey had

presented data for 1978-79. The new survey revealed that the share of bio-fuels like crop residues and cow dung have not kept pace with the growing rural household energy demand. Yet, and this was the most surprising finding, the share of fuelwood went up in rural household energy consumption and people were using more superior biomass fuel in 1992-93 as compared to 1978-79. When firewood availability becomes difficult, studies from various parts of the world show that rural people tend to switch from using logs to little twigs and branches and when even twigs and branches are not available they will move towards crop residues, cow dung and even dry leaves. In 1992-93, as compared to 1978-79, the NCAER survey found that not only the share of cow dung and crop residues had gone down, the share of firewood in the form of twigs had also gone down - from 35.62% to 29.11% - whereas the share of firewood in the form of logs had gone up dramatically from 18.95% to 32.49%. The percentage of households using firewood logs also went up dramatically from 35% to 55.8%. In other words, what was often described as a 'rural energy crisis' in the 1970s and 1980s had begun to ease by the early 1990s.

Equally interesting was the finding that the percentage of households collecting firewood from forests had halved between 1978-79 and 1992-93 whereas the percentage of households collecting firewood from their own farms had gone up from about one-third to one-half. In other words, the fear that people will encroach upon forests and public lands to meet their growing firewood hunger and destroy the country's tree cover has not proved to be true even as a larger percentage is using more superior quality biomass fuels.

Just why and how this dramatic shift has taken place, however, is still not very clear. But one major factor in this transition from cow dung and crop residues to firewood and from inferior firewood to more superior firewood appears to be the success of the farm forestry programmes initiated in the 1980s. In fact, very few social scientists have studied the extent to which the farmers of India have reacted to the firewood crisis by growing and protecting trees on their farmlands and private fallow lands. One study from Nepal, which shares similar characteristics with many Himalayan states of India, shows that farmers have been growing more trees both on their private and adjoining common lands. Studies undertaken in India by reporters of the Centre for Science and Environment have also shown that many village communities in India, especially in Orissa, the Chottanagpur region of Bihar and the Panchmahal district of Gujarat, have in recent years begun to undertake forest protection to meet their biomass needs on their own initiative without the intervention of any governmental or non-governmental agency.

In addition to these social changes, however slow and patchy, another unexpected factor has also helped to increase firewood supply. An exotic species called *Prosopis juliflora* has invaded large tracts of the country all the way from Gujarat to Tamil Nadu. And this plant has an extraordinary capacity to coppice. The more you cut, the more you get.

This example shows that even a half-hearted government programme like farm forestry, changes in people's own behaviour however patchy it might be, and some unexpected help can produce some quite surprising results. Despite growing population pressure, people seem to be meeting their energy needs in a much more sustainable way than before. And what is most important about this entire development is that it had precious little to do with government programmes.

WATERSHED DEVELOPMENT

My second example also shows that dramatic changes can take place in environmental management even with growing population pressure. This is an outstanding example in which the government has intervened in a way that promotes public participation in environmental management. To see trees coming up in a place which in the mid-1980s had looked to me like a moonscape, and to see dug wells literally overflowing with water onto the land in a place that was described as chronically drought-prone in the 1980s is truly the most exciting thing I have seen in the country. Some 149,283 ha covering 374 villages have been brought under the Rajiv Gandhi Watershed Development Mission (RGWDM). The foundation of any watershed programme is water and soil conservation. In the case of Jhabua it means capturing the water that falls on the hill slopes and instead of allowing it to run away carrying away with it precious topsoil, the water is so trained that it percolates into the land and recharges the groundwater wells. With increased water availability, the irrigated area increased to 1115 ha in 18 micro-watersheds, which is nearly double the irrigated area of 1994-95. The flow intensity and duration of natural streams has also increased. With increased irrigation, agricultural productivity is increasing. There is also a slow shift towards cash crops with the area under soybean and cotton having increased by 340 ha. Food availability has increased by a minimum of one month to about four months. Some 313 village-level grain banks have been established to ensure timely availability of foodgrains on easy credit. The protection of the land in the watershed and planting of various species of benefit to the local people (like bamboo, *anwla*, *Acacia catechu* and *neem*) has shown a 66% reduction in wasteland area in 11 micro-watersheds studied. District officials' estimates show that over 2 million trees have regenerated. The regeneration rate has been far more rapid as compared to lands where only forest protection programmes have been implemented because the water conservation efforts increase soil moisture and, therefore, plant growth. In turn, there is a more rapid increase in economic returns to the poor people involved in watershed management. Possibly the biggest benefit to the local people has come from the rapid regeneration of grass and, therefore, increased fodder availability. Some estimates suggest a 5-6 times increase in grass from the regenerated lands.

This change can be seen quite dramatically with the following data from the Hathipahwa watershed, where work started in 1995-96. The watershed covers a total land area of 323.66 ha. Before the work started, the land was without vegetation and heavily eroded. There was a severe shortage of fodder and villagers had to buy it from markets in neighbouring Gujarat. And there was a regular stream of distress, seasonal migration. But now, with watershed management and stall-feeding of cattle, the people of the watershed sell grass every year and seasonal migration has almost disappeared. The change has come in just three years simply from the economic benefits coming from increased grass production. Apart from earning money from selling grass, villagers have started keeping better breeds. Increased water availability has increased vegetable production, which are sold in the local market. The watershed development programme is already having a substantial social impact. Dependence on local moneylenders has gone down.

The transformation of Jhabua is a fine example of the results we can expect when a government seriously starts working with the people. Jhabua has happened because three tiers of institutions have been created: first, at the state level, for policy co-ordination; second, at

the district level, for implementation co-ordination; and third at the village level to ensure that all villagers acquire an interest in the effort. And the vision for the entire effort has come right from the top, the state's chief minister, Digvijay Singh, because nobody else has the power to ensure that different departments work together in unison, forgetting their territorial egos and rivalries.

But a vision is not enough. As every industrial management guru will tell you, 'God is in the details', so too is it in Jhabua. At the village-level, the start-up itself consists of an elaborate process to involve all sections of the village society - from the collective village to specific interest groups in the village. Each group begins its work with a participatory rural appraisal exercise in which problems and solutions, which include the structures to be built, are identified by the village community. For each structure proposed in the watershed development plan, a user group is created to manage it and derive benefits from it. As these structures will mainly benefit villagers with land, user groups basically represent the landed in the village community. In order to involve the landless, self-help groups are created who benefit from the employment generated through the watershed development programme but who may also like to take up a non-farm activity like setting up a nursery to produce saplings for the afforestation work. And, finally, to involve women, women's groups are created.

Thus, in this complex way, literally everybody who matters - from the top echelons of the state to the lowest echelons of the village - is involved in the watershed programme. Not only does each of these watersheds have a village Watershed Development Committee to undertake collective decisions, but they also have district-wide:

- o 1,256 self-help groups involving 9,699 participants,
- o 1,668 user's groups with 13,947 participants, and
- o 1,748 women's groups with 25,506 participants.

The funds for the programme have come from the various central government sponsored rural development and employment generation programmes. The villagers play an active role in managing the funds meant for the watershed programme. Nearly 80 per cent of the funds for the programme are put in a bank account managed by the Watershed Development Committees made up of village people.

The programme encourages villagers to save a part of the wages they earn from the programme for:

1. A watershed development fund (WDF), for future use for the management of the watershed, which is a mandatory fund developed through contributions from both landed and landless people;
2. A Gram Kosh (village fund) for use by the village for collective activities as per the wishes of the community;
3. Baira ni kului (women's thrift and credit groups) which women can use to help each other with soft loans.

But the most beautiful thing is that the state bureaucracy is now in a unique mode to work with the people. Now that the groundwater is being recharged, many people fear that the more powerful will begin to exploit it through private tubewells whereas the recharge is the result of a united community effort. Nowhere in India has bureaucratic regulation of groundwater regulation worked and water tables are falling rapidly almost everywhere. In Madhya Pradesh, too, the officials now know that their success in Jhabua has brought them to a stage where they have to confront issues of inequity in the water management. In an unprecedented move in favour of community-regulated water management, the officials working with the programme propose to argue that communities who have come together as watershed committees be given powers to regulate the withdrawal of water from those watersheds.

The example of Jhabua shows that increasing population pressure does not necessarily create an irreversible trend towards environmental degradation. It simply means improved environmental management that is usually not possible without the involvement of the people and the government playing a limited but strategic role.

HUMAN WASTES

Let me now take two other examples - from the Western world and from a scenario in which high-tech solutions are the norm. My first example is from the area of human waste disposal. This, too, is an area in which the state has made massive investments in the development of sewer systems and after having destroyed innumerable rivers with the resulting sewage flows, massive investments are being made in sewage treatment plants to clean up the rivers. In developing countries, this technology acquires not just ecological dimensions but also equity dimensions. Because many urban people do not even have a legal house, and in any case do not have the money to get themselves connected to a sewer, a large section of the urban population does not benefit from the sewers. It is, in fact, the richest urban sector that benefits from sewerage and yet most states in the developing world have to subsidise its construction as well as subsidise the construction of sewage treatment plants. As a result, most governments are running out of money for water supply and sanitation systems. Subsidising the rich to excrete in convenience is possibly against all canons of public finance and yet it is happening all the time and will become worse with the rapidly growing urbanisation in the developing world. The answer may not lie in increased World Bank assistance but a different paradigm which gets the state out of the picture.

A paradigm of this sort would require a different technology, which can be managed at the household level and thus leaves responsibility for waste disposal with the producer of the waste. Interestingly, some of the most recent developments in waste disposal are trying to do precisely that and, thus, avoid mixing the food and land cycle with the water cycle. Today, in Stockholm, it is possible to buy on the market at least ten different types of composting toilets. There have been more research papers published on composting of human excreta in the last five years than in the previous 50. I have seen such toilets being used in Sweden without any problems. And one US professor, who would like to provide a toilet that needs no intervention by human beings, is also planning to put a microchip in the compost pile to control the humidity, air flow and other parameters that would lead to smooth deodorisation, depathogenisation and composting of the human excreta. There is no reason to believe that composting toilets will not become the order of the day in the years to come, getting rid of

flush toilets and greatly reducing the urban water demand and river pollution. There are equally interesting developments in the treatment of domestic 'greywater' which allow a community to collect and treat its own waste. Thus, community and household-based treatment systems may well replace the state in the next century. The speed with which such technology grows will depend greatly on the amount of awareness that the civil society can create about such possibilities and thus undermine the influence of the 'construction lobby' which can be quite powerful in many parts of the world.

GLOBAL WARMING

My final example comes from the vexing area of global warming, which is becoming a bed of hot and devious politics. In very simple terms, the problem of global warming comes from the fact that we continue to use fossil fuels, which produce carbon emissions. The answer, therefore, lies in an energy transition - from a carbon-based energy economy to a carbon-free energy economy. Let us look at a study, which tells us what benefits will accrue to the world in combating climate change with the rapid phasing in of solar energy technologies. Instead of global carbon emissions continuing to grow constantly for nearly 180 years and reach a peak of 49 billion tonnes of carbon in 2175 with average global temperatures rising a maximum of 6°C (relative to the base year of 1860), emissions will peak in 2035 in just 40 years at about 37 billion tonnes of carbon and start declining thereafter if research and mass production can keep cutting the cost of solar energy technologies by 50 per cent every decade. By 2065 solar energy would have become competitive with fossil fuels to the extent that it will replace fossil fuels in every economic sector. Even a relatively pessimistic scenario in which solar energy costs decline by 30 per cent per decade make a salutary difference. If this latter scenario is accompanied with a carbon tax on fossil fuels of about US\$100 per tonne, then the latter scenario will become as effective as the more optimistic scenario in which solar energy prices fall by 50 per cent every decade.

Thus, the rapid penetration of solar energy technologies in the energy sector has the potential to turn the threat of climate change into a problem that would last only for a few decades in the early part of the 21st century instead of a problem that will continue to threaten human beings for centuries to come.

It is often argued that if industrialised countries were to reduce their emissions while developing countries are increasing their emissions, then the entire effort of the industrialised countries will be nullified. Therefore, the US, in particular, has taken a strong position that all nations, including developing nations, must become a part of the effort to reduce carbon dioxide and other gases that cause the heating of the Earth. The Western companies have also been fuelling this argument because they believe that if they alone have to bear the cost of reducing emissions, then they will become uncompetitive in the world market and either they will go out of business or firms which generate high quantities of greenhouse gases will move to countries which do not have restrictions on their emissions.

Unfortunately, greenhouse gas emissions are strongly correlated with economic growth and since a large part of the world consists of countries that are very poor, they will inevitably increase their emissions as they grow economically. It would be fanciful to imagine that

leaders of developing countries will want to bear an extra economic burden at a time when they are aspiring for rapid economic growth. Neither can they accept global economic inequality of the kind that prevails today.

All these intractable problems can, however, be surmounted if the world makes a serious effort to move towards an energy economy that is built on sources that are carbon-free like solar and biomass energy, wind power or hydroelectricity instead of the existing reliance on fossil fuels like coal, natural gas and petroleum-based fuels. Then the threat of climate change will get arrested and each nation would be free thereafter to use as much energy as it wants.

The most heartening thing is that despite all the neglect of solar energy by governments and enormous subsidies to fossil fuels, solar energy systems are already making their way into the market. Annual US sales of solar energy technologies are already about US\$1 billion. Photovoltaic technology has already seen considerable advances in the last 20 years and though its costs remain high, they are likely to come down to less than \$0.10 cents per kilowatt-hour early in the next century. Enron and Amoco are already building a 100 MW plant in Nevada, USA and have been looking for funds to build a 50 MW photovoltaic power plant in India.

PRE-CONDITIONS FOR THE NON-CARBON ENERGY TRANSITION

In order to promote rapid expansion in the use of solar energy, two important things need to be done:

One, more research money needs to be provided. A carbon tax of \$5 per tonne of carbon will increase the price of oil by just \$0.65 per barrel but it will generate US\$10-15 billion in the US alone which could be used to fund solar energy. According to the Worldwatch Institute in Washington, DC, less than 9% of energy R&D budgets of industrialised countries is spent on solar and other renewable sources of energy. *Two, a growing market for solar technologies needs to be provided so that mass production can further bring the cost of solar technologies down.*

This is where a system of emissions trading built on entitlements can play an important role. Developing countries like China and India are growing at a rapid rate. Any entitlement they obtain would get used up rapidly. But as it is unlikely that they can use up their entire entitlement in the immediate future, they would have the potential to trade their unused entitlements. This provision would immediately give them the incentive to move towards a low emissions developmental path so that the benefits from trading emissions can stay with them for a long time.

For example, if India were to find the current high cost of a solar power plant set off by the economic advantages obtained by saving emissions and earning money from trading the saved emissions, as compared to the lower cost of building a coal power plant, then it is quite likely to think in terms of investing in a solar power project and thus help to create a global market for solar energy technologies world wide by helping to bring the costs of solar energy technologies down. This emissions trading system would, thus, also provide sufficient

financial resources and an "enabling economic environment for technology transfer" to take place, as indicated in Article 10 of the Kyoto Protocol.

It is equally important to note that such an economic environment would help to create a **global market** for Western solar energy technologies - first in developing countries, and then later in industrialised countries - and help to kick-start the global transition towards zero emission technologies. This makes sense because developing countries have more solar energy than Western countries and if global warming is to be averted in the long run, the more solar energy is used by them instead of oil and coal, the better. Also, developing countries have millions of settlements even today which do not have grid-supplied electricity. More than two billion people today have no access to electricity; solar energy systems should serve these people in the future rather than carbon-producing electric grid systems.

Technological advances are also taking place in using hydrogen as a source of energy that will have major impacts on the transport sector. By 2010, vehicles operated on fuel cells and electric batteries are expected to be on the road and this will considerably reduce carbon emissions from the transport sector. But many of these technologies will not reach the developing world unless its special needs are taken into account. If India, for example, were to have as many cars on a per capita basis as USA, it would have 500 million cars as compared to about 4 million that exist today. But in the decades to come India will definitely have a 100 million or so scooters. These vehicles are today 70% of the total number of vehicles in India. Like India, other Asian cities like Bangkok and Taipei, too, are full of scooters. But hardly any Western company is thinking of working on electric or fuel cell scooters. This situation needs to be rectified.

An emissions trading regime would thus help developing countries to enter into the most meaningful form of participation - to borrow the phrase that the US government uses so often. But then one of the rules of emissions trading would have to be that no trade can take place that does not involve a transition to the use of non-carbon or biomass energy sources instead of trading being the cheapest alternative to the cost of reducing greenhouse gas emissions in industrialised countries as is being proposed by the US. In the latter case, the world will definitely get emissions trading and industrialised countries will be able to do 'creative carbon accounting to meet their emissions reduction targets but climate change would not have been averted.

There cannot be a better solution than fixing 'emissions entitlements' and 'pegging emissions trading to non-carbon energy sources alone' because it will be both socially just and ecologically effective.

CONCLUSIONS

I clearly see major changes in the 21st century not just in the nature of things we produce but also in the nature of the way we do things. I do not believe any of the problems we face are insurmountable. Every one of them is solvable but the speed with which they will get solved will depend on good leadership, a leadership which promotes a system of governance that decentralises management of natural resources, ensures equity through appropriate

entitlements, and pushes for a new technological paradigm that gives greater control and responsibility to the household and the community, which is slowly unfolding in any case. The leadership for this transition need not necessarily come from the political and business leadership. It can also come from the global civil society.

Mahatma Gandhi is often looked upon as an apostle with a message for the poor. But his message of caring and sharing will become even more relevant in a wealthy world. Gandhians in wealth will be needed even more than Gandhians in poverty.

RESPONSES TO KEYNOTE SPEECH

By: Michael LaGraff, British Petroleum (UK)

The papers that have been presented assume that limits are inherent to the system, but are they correct? Perhaps we have no real limits, but just opportunities to utilise resources in a sustainable manner in various settings around the world. We need governments that are competent and dedicated to the solutions generated by their people.

IUCN needs to bring industry much more into its discussions. Unfortunately, industry tends to see the "vagabonds" of the world as their most promising consumers. But on the other hand, industry needs to preserve the world for its own future.

Conservationists tend to use the term "industry" as if it were a single block, but in fact different industries behave in very different ways and offer different opportunities for partnerships. IUCN therefore needs to use different approaches to different parts of the private sector.

By: Claude Martin, Director General, WWF-International (Switzerland)

The perspectives from Anil Agarwal are very useful in reminding us all about the evils of consumption. But is the Indian system really applicable in other parts of the world? Examples from any single country do not necessarily provide global models, whether that country is north or south, east or west. And the case of India is in many respects rather unique.

A critical issue is the externalisation of national costs, as the major cities tend to draw on the surrounding countryside, and indeed the rest of the world, for its basic needs. The ecological footprint of London covers an area as large as all of the UK.

Conservationists often tend to confuse trends, projections, and scenarios. But what really is required is more analysis, for example seriously examining the conservation impact of a future world where two-thirds of the population lives in urban areas. People need various types of incentives to encourage appropriate behaviour, replacing the current set of incentives that often seem to stimulate ever-greater consumption. Many of us are becoming increasingly fed-up with the "preaching mode", and instead are looking to the conservation movement to provide practical ways for moving ahead.

By: Augusta Henriques, Association Tiniguena (Guinea-Bissau)

The 1987 Brundtland Report estimated that resource production would have to be multiplied by 16 if all peoples in the world were to have the same level of consumption as in northern countries. That, though, would mean destroying living conditions on the planet, since there are already clear signs that resources are becoming scarce (e.g., declining fish stocks, or soil depletion). UNDP's 1998 Human Development Report says that "the 20% who live in the richest countries share 86% of total consumption as opposed to 1.3% for the 20% living in the poorest countries". And as if that were not enough, the northern countries swear by growth, and even impose that model on the rest of the world.

If we want to save the environment, and not do it at the expense of the poor, we absolutely must reduce consumption levels for the citizens of the north, especially the wealthiest. But who is prepared to suffer a drop in income and living standards (consumption, of course)!? Hardly anyone. The citizens of the north are not even prepared to share with their fellow citizens who lose their jobs, or to keep their parents at home with them when they grow old! Further, claiming that they have their own problems at home and that there is too much corruption in the south, they allow development aid to dwindle. The age of macro-egotism is upon us.

But when you look at the effects of development aid in the south, especially in Africa, you start thinking that it may be just as well. I come from Guinea-Bissau, a small country on the West African coast. We have received development aid since gaining independence 25 years ago. Even after fighting a 12-year war for independence we inherited a fine country brimming with nature's gifts which, if managed wisely, could have ensured our people's wellbeing. Today we are one of the world's poorest countries. Despite the good intentions of a few people who really tried to help us, development aid for us has meant:

- a) ill-considered development of cash crops which destroys forests and reduces farmers to poverty, while despoiling them of their resources (since liberalisation 15 years ago, forests have been destroyed at an average of 50,000 ha per year);
- b) fish resources have been looted by foreign operators, mainly from Europe (we do not have the means to guard our coasts, and with such low public sector wages it is all too easy to pay coast guards to turn a blind eye);
- c) corruption has developed in parallel with World Bank loans;
- d) a weaker state structure, which, following the budget cuts imposed by structural adjustment measures, increasingly washes its hands of such social spending areas as health, education and the environment, leading to a gradual degradation of the civil service which in turn fuels corruption;
- e) growing debt and a destructured national economy (our country has one of the highest levels of per capita debt);
- f) increasing economic and social inequalities leading to greater political and social instability;
- g) large-scale destruction of cultural and moral values which respect the environment;
- h) and finally, since June, war, the greatest misfortune to befall a people, has beset us. This war broke out when economic indicators were showing that we were heading in the 'right' direction towards growth and democracy, although economic and social discrepancies had never been so great and our so-called democracy was going nowhere.

In the name of growth they corrupted our leaders, in the name of growth they looted our resources, in the name of growth they dragged our country into debt, in the name of growth they reduced our people to poverty and in the name of growth our country was pitched into a fratricidal war which threatened our very sovereignty and whose outcome is still uncertain despite the dramatic consequences already suffered.

We must rethink the way in which the global economic and political system works if we want to live within our means and care for the planet. The system is unfair, based on over-consumption and selfishness, and has already run out of steam. It can no longer be repaired. We all know that the cyclical crises on the stock markets are one sign of what's happening, but we still refuse to face the reality of the danger and change things.

We must dare to conceive a new ideal. We have to create a new lifestyle, which rehabilitates mankind's great values, such as equality and fraternity, and which places people back at the centre of development in harmony with nature, a lifestyle that restores civilisation's lost humanity.

We must nurture the idea of a new citizenship based not on democracy inside a given country but on democracy for the entire world. And not the ballot-box democracy which they tried to sell us (and that we fell for), but real democracy. It is so easy to teach lessons in democracy when, like the USA, you gobble up over 25% of the world's energy. It's so easy to preach democracy when you sell arms to the countries in the south so that you can then come in with humanitarian aid, mere scraps from the rich man's table. It is good for the conscience. What you should be doing is seeking structural solutions to the causes of conflicts, first and foremost to injustice. I speak to you as a refugee from a country at war; it is my misfortune to be familiar with the ins and outs of conflict.

Each day brings us closer to the heart of the crisis. Let us hope that our children will show us the way out, since we have neither the courage nor the innocence to do it ourselves. Let us hope that the children of the north, of the rich and the very rich countries, sickened by so much consumption, and the children of the south, of the poor disinherited countries, revolted by injustice, will one day join hands to repair what our generation has taken just 50 years to destroy.

Fifty years. These may be harsh words when we are celebrating an anniversary, but IUCN, although highly dependent on bilateral aid, must raise these issues at the political and not just the technical level. Environmental degradation is not so much due to the lack of technical data as it is the result of economic and political options imposed by the north. May we have the courage to look reality in the eye, because the world is suffering, people and nature are suffering, and our children will harvest tomorrow what we sow today.

COMMENTS FROM PARTICIPANTS

It is important to draw a distinction between consumption and conspicuous over-consumption. Unfortunately, many conservationists are examples of the latter.

Modern institutions need both accountability and transparency if they are going to contribute in a positive way to modern democratic forms of development.

In view of expanding globalisation of markets, poorer countries may require different development models, focusing especially on education and local community involvement that enables local control.

If local solutions are to be made to work, the communities must be supplied the knowledge tools with which to work.

Consumption is not the most important factor, but rather waste. Waste is what leads to pollution and must be avoided in all industrial processes.

The critical issues of technology, knowledge, and education are issues of empowerment.

KEY CONCLUSIONS

Despite all of the very useful points made in this workshop, the state is still required and should not be weakened; rather, the state needs to be re-defined, in the context of greater empowerment of the local communities who are interacting with natural resources on the ground. IUCN needs to work with all levels of government to address problems of excess consumption of biological resources.

Growth is still seen as the solution to our current crisis, irrespective of the political party; this is a critically important problem, as politicians simply do not believe that the public wants to consume less. Therefore, IUCN must recognise that the general public - the consumers - must be a key target in any effort to limit over-consumption.

The combination of growing consumption by a growing population is leading to inevitable pressures on natural resources, requiring a vigorous, but nuanced, response by IUCN. Approaches appropriate for the high-waste polluting societies of industrialised countries may be very different from approaches in rural societies that traditionally have been based on efficient resource use.

3. CONSUMPTION

3.b PRODUCING MORE WITH LESS

This session addresses innovative ways of enhancing productivity, involving technical efficiencies, the role of incentives and disincentives, and the impact of subsidies. Building on work IUCN is doing with OECD, UNEP and other partners, conclusions will be sought on how efficiency criteria can be built into more of IUCN's activities.

Organizer: IUCN Economics Service Unit (Frank Vorhies)

Chair: Jay Hair, Former IUCN President (USA)

Keynote speaker: Ronald Steenblik, OECD (France)

Respondents:

- o Hajime Ohta, Executive Counsellor, Keidanren (Japan)
- o William Eichbaum, WWF-US (USA)

CHAIR'S OPENING REMARKS

CHAIR: JAY HAIR

RAPPORTEUR: FRANK VORHIES

It is apparent that the private sector is a critically important factor in any effort to ensure a sustainable future. Fortunately, many corporations have adopted sustainability as a guiding philosophy and therefore can be important partners for IUCN in the future. The private sector capital flows from North to South now exceed the development assistance flows by a factor of 5 or more, so IUCN can no longer afford to deal only with governments.

Perhaps the most appropriate approach is for IUCN to seek partnerships with the private sector in areas of mutual interest and concern. "Private sector" is a rather broad term, when in fact it contains within it very great diversity. Natural resources-related industries may appear to be the most appropriate partners for IUCN, involving forestry, agriculture, and fisheries. But other industries are also utterly dependent on environmental resources; tourism, for example, depends very much on various kinds of protected areas, wildlife resources, scenic areas, sandy beaches, and so forth. The banking and insurance sector may be looking for green investments, convinced that environmental factors are critically important to ensure the long-term viability of their investments. And the energy sector is certainly vitally interested in ensuring that their activities do not harm the atmosphere or the climatic system. Many other examples could be quoted.

This session is focusing especially on the role of subsidies, which is one important part of the overall picture.

Subsidy Reform: Doing More to Help the Environment by Spending Less on Activities that Harm It

By: Ronald Steenblik, Principal Administrator, Fishery Policies Division, Directorate for Food, Agriculture and Fisheries, OECD, 2 rue André-Pascale, 75775 Paris Cedex 16, France

ABSTRACT

The issue of environmentally damaging subsidies (sometimes called "perverse subsidies") has been receiving greater attention in recent years. This paper underlines the importance of continuing the reform of government policies and programmes that generate subsidies that work against the interests of biodiversity. A subsidy occurs when public funds are used for private purpose, and most subsidies tend to flow to relatively few beneficiaries who often are those best placed to take advantage of government policies. Subsidies affect biological resources in many ways, including those that encourage the use of fertilisers and pesticides, favour a small number of easily standardised commodities, and stimulate greater consumption of energy. Tracing the causal relationships between subsidies given to particular sectors and their effects on biodiversity can provide insights useful in promoting the reform of policies. But the understanding of local conditions is vital because the interaction of subsidies and their effects at the ecoregional scale is what generally determines actual environmental outcomes. Most attempts to reduce or remove subsidies are motivated by their trade effects, rather than concern over their effects on the environment. But the focus in multi-lateral discussions is now beginning to take account of environmental considerations because of greater interest in the impacts that subsidies may be having on the management of natural resources; NGOs, most of whom were not previously engaged in discussions about subsidies, can take some of the credit for this. While some NGOs are calling for simply redirecting subsidies to what they regard as more appropriate technologies or activities, others are reflecting a deeper scepticism of subsidies and their overall damaging effects. NGOs can play a critical role in subsidy reform, especially in identifying areas where subsidies to different industries interact in ways that are particularly harmful to biodiversity. IUCN's current approach to analysing the effects of subsidies on biodiversity from an ecosystem perspective is an example of how their work can effectively complement to the work of multi-lateral institutions that are addressing these issues.

INTRODUCTION

"The Convention on Biological Diversity calls for financial incentives in support of its objectives: to conserve biodiversity, use biological resources sustainably, and share the benefits of this use equitably. Governments, however, spend billions of dollars annually in subsidies to sectors such as agriculture, energy, forestry, fisheries, mining, and transport; many of which threaten or destroy biodiversity. Reforming these perverse subsidies is an obvious cost-effective way to improve the status of biodiversity."

Nowadays, it is widely accepted within the environmental community that subsidies to energy production and consumption, transport, agriculture, fisheries, and other natural resource-based industries, tend to undermine conservation objectives. This is not a recent discovery, of course. Economists have been commenting for many years on the consequences of supporting industries with significant environmental externalities. The difference today is that the issue has been picked up by virtually every major national and international environmental NGO and made an integral element of their programmes of work. Subsidy reform, once the lonely pursuit of finance ministries and trade economists, has become a *cause célèbre* of the green movement.

Indeed, over the last three years, virtually every major international environmental NGO has sponsored a major study attacking what have come to be labelled as "perverse" subsidies. Headline-making studies include those published by or for the Earth Council (de Moore, 1997 and de Moore and Calamai, 1997), Greenpeace International (Ruijgrok and Oosterhuis, 1997), the International Institute for Sustainable Development (Myers, 1998), the Worldwatch Institute (Roodman, 1996 and 1998), and the World Wide Fund For Nature (Burns, 1997 and WWF International, 1998). Some of the initial forays relied heavily on work produced by the major inter-governmental organisations. Influential in this respect have been the OECD's annual estimates of PSEs and total transfers to agriculture - \$280 billion in 1997 (OECD, 1998a and earlier years), the World Bank's \$230 billion estimate of world-wide subsidies to fossil fuel consumption (Larson and Shaw, 1992), and the FAO's \$54 billion estimate of global fishing subsidies (FAO, 1992). Increasingly, however, the NGOs are publishing data and analyses with a high value-added content. And more studies are in the works. The Earth Council's study, for example, is being followed up by a second phase, which will focus more narrowly on the effects of subsidies on biodiversity, this time under the auspices of IUCN.

The decision by the green movement to shift its powerful weight behind the cause of subsidy reform can only be seen as a good thing. Yet even environmental NGOs' resources are limited, which raises the question of how they can most effectively involve themselves in the debate. Their main vehicles of advocacy to date - studies and press conferences - have helped to keep attention focused on the issue. But, to be effectual, NGOs must be ready to commit themselves for the long term. Multilateral subsidy reform is not as simple as getting governments to place a cuddly marine mammal on an endangered species list. It requires the marshalling of economic arguments, an understanding of political processes and constraints (especially social constraints), persistence and, above all, patience. And if, as is heard more and more - most recently in David Roodman's book *The Natural Wealth of Nations* - that subsidy reform should be seen as part of a more comprehensive effort to redesign the fiscal policies of governments, then clearly this is a campaign that is not going to be won in the short term.

This paper has one overarching objective: to underline the importance of continuing the reform of government policies and programmes that generate "biodiversity-perverse" subsidies, and to encourage the conservation community to further develop their capacity to speak authoritatively on the issue. As a prelude, the paper reviews the inefficiencies created by subsidies, and the effects they have on the environment in general and biodiversity in particular. It then turns to the current multilateral mechanisms being applied to discipline

subsidies to resource-based sectors, with a view to identifying areas in need of further strengthening. Most of the mechanisms used to date reflect attempts to deal with the trade and budgetary effects of subsidies. The application of these disciplines can be expected, in general, to reduce or even eliminate many of the policy-driven incentives to farm intensively, overfish and burn dirty fuels. But governments usually have considerable discretion in how they interpret such disciplines; large variations in the incidence of subsidies within nations can have important implications for their effects on particular ecosystems. It is in identifying such links that civil society, particularly environmental NGOs, can make the greatest contribution to the process of subsidy reform.

SUBSIDIES AND THEIR EFFECTS

Few terms from public finance and economics are as familiar in daily life, or as evocative, as "taxes" and "subsidies". The man on the street has no trouble in defining them: what he renders unto Caesar are taxes; what he gets back is his due; everybody else receives subsidies. When the 18th and 19th century economists spoke of subsidies (or "bounties") they generally had in mind government grants, especially to encourage exports. In recent years, however, the term "subsidy" has been pressed into service as a catch-all for any benefit granted to an individual, firm or sector, including those resulting from government inaction. The proliferation of legal definitions for "subsidy" invests the word with even more connotations. For the purpose of this first section, however, a simple definition for a subsidy suffices: a subsidy occurs when public funds are used for private purpose - where the public funds are financed, not just transfers from taxpayers but also ones paid by consumers and producers, such as those created by trade barriers.

STATIC EFFECTS

While economists may not agree among themselves on the precise definition of subsidy (see Steenblik, 1995), they do generally agree on their static, first-order effects. Theory shows that these depend on a number of factors, among which the elasticities of the subsidised activities, the form of the subsidy, the conditions attached to the subsidies, and how they interact with other policies, are the most important (see, for example, Wolfson, 1990 and OECD, 1998c). At their most benign, subsidies can serve redistributive goals, or help to correct market failures. However, subsidies to promote specific industries - the focus of this paper - can also divert resources from more productive to less productive uses, interfere with price signals, and in so doing reduce allocative efficiency.

The effects of subsidies on allocative efficiency are sufficiently well understood and appreciated that it is not necessary to elaborate on them here. Less appreciated, however, are their effects on the distribution of wealth and income. These effects both help explain the persistence of subsidies and, ironically, provide a powerful argument for their reform. Although governments are often motivated to provide subsidies in order to benefit specific groups of people - or, more specifically, voters - they rarely like to be seen doing it through such transparent devices as direct income-support payments. Hence activities or things tend to get subsidised rather than people (Ross, 1996).

Perversely, the distributive consequences of subsidies are often precisely the opposite of what the framers of the policies intended. Most countries that subsidise farmers or fishers profess to be protecting the small operator. Yet, by design, subsidies that are tied to outputs or inputs tend to favour larger producing units. Even the distribution of more direct payments can often be highly skewed. Recently, for example, the Environmental Working Group counted up all the cheques written by the US Government to farmers between 1985 and 1994 (i.e., before the 1995 "Freedom to Farm" Act was passed) and found that just 2% of recipients accounted for over 25% of the transfers (Cook, *et al.*, 1995). Studies done of agricultural support programmes in other countries appear to lend credence to the proverbial 80:20 rule - that 80% of support goes to 20% of beneficiaries (OECD, 1995).

Direct, budget-funded, income payments at least have the virtue of high transfer efficiency: most of what a government allocates to such programmes end up in the pockets of the intended recipients - at least initially. Subsidies to products or inputs, by contrast, leak away to other activities, often in unexpected or unintended ways. Studies of policies used to support market prices for agricultural commodities, for example, have shown that typically only 20% of the gross transfers reach the target group. The remainder gets dispersed among the suppliers of inputs, programme administrators, and even fraudulent operators (Ross, 1996).

DYNAMIC EFFECTS

Over time, however, even that which does trickle down to the target group tends to be dissipated through the capitalisation of rent into the least elastic factor of production, a point made by David Ricardo over 170 years ago. Accordingly, the gains from subsidies tend to be transitional, benefiting mainly those who can immediately take advantage of a new scheme. Their successors end up paying higher prices for land, fishing licences, mineral rights. In short, as the economist David Friedman once quipped: "the government can't even give anything away" (see Tullock, 1976).

Government policies and programmes that give rise to subsidies are almost always created to serve a (ostensibly public) purpose - to redistribute wealth, to support income, to favour a particular region or industry, to keep voters happy. But if so many support policies are so inefficient at accomplishing these goals, why do they persist for so long?

The "transitional gains trap" offers an important, but not the only reason why subsidy programmes prove so difficult to remove after they are put into place. Sometimes people themselves are entrapped, particularly when subsidies are used to support employment in rural industries, such as agriculture, fisheries and mining, which require specialised skills but not necessarily much formal education. The resulting low mobility of the affected labour force itself becomes a barrier to reform, making structural adjustment all the more painful when it comes.

Resistive forces to the reform of subsidy programmes also have their roots in entrenched views regarding the role of government in particular sectors. The public financing of irrigation and drainage, for example, has a history as old as civilisation itself. The Roman Emperor Hadrian was not the only leader from antiquity to finance road building from general taxation. By the nineteenth century it had become common for farmers in Europe to seek and

obtain protection from lower-priced imports and to receive subsidies for their exports. And subsidies to distant water fishing fleets have been around since the post-Napoleonic era (see, for example, Kurlansky, 1997). Old habits die hard.

Another factor working against reform is that subsidies themselves create a pool of money out of which recipients can influence the very political process that channels money to them in the first place. In many instances subsidies redistribute wealth from a large number of unknowing contributors to a smaller number of beneficiaries. The latter lobby vigorously to defend their handouts; the former seldom bother, or are empowered, to prevent them (Ryan, 1995). In any case, short-term bursts of public outrage against particular subsidies are usually ineffectual; the offending programmes simply get renamed or cloaked in the latest policy fashion.

Finally, the bureaucracy itself can constitute an obstacle. That a government ministry can develop a vested interest in the continuation of the industrial support programmes it administers is universally recognised, though there are of course exceptions. More subtly, the bureaucratisation process often feeds a pernicious notion that the subsidised activity forms part of the natural order of things, converting subsidies into entitlements and making any attempt to curb them politically hazardous. This subversion of rational policy-making feeds the spread of subsidies, especially in the following forms:

- o *Sympathetic support*: This is support that influences the direction of technological developments in a manner that happens to benefit a domestic industry. Many examples can be found in the energy sector, such as when governments support the construction of coal-fired "demonstration" power plants that are dependent on coal from high-cost domestic mines rather than on imported coal (see the example in Steenblik and Coroyannakis, 1995).
- o *Compensatory support*: When support leads to *higher* input prices for downstream consumers, especially those that derive a significant proportion of their sales from exports, compensation is often provided in order to keep them buying domestically-produced raw materials. A typical example is a subsidy to a food processing industry (e.g., tomato canneries, producers of potato starch) to compensate it for paying above world prices for its feedstock. Support is also often provided to individual firms in an industry, such as trucking, when deregulation renders the capitalised value of restricted operating rights - e.g., licences - worthless.
- o *Subsidy clusters*: When support - or the failure of governments to consider opportunity costs - leads to *lower* prices for downstream consumers, new investment to take advantage of the cheap input is often encouraged. Hence aluminium plants are attracted to major hydroelectric projects by concessional power charges, thereby increasing regional dependency on the continuation of subsidies (Koplow, 1996).

Taken together, these derivative subsidy forms lend support to the notion that bad subsidies tend to chase out good ones - what Runge (1996) has called "Gresham's law of subsidies". (*This is a word play based on the theory, attributed to the 16th century English financier Sir*

(Thomas Gresham (1519-79), that when two or more kinds of money of equal denomination but unequal intrinsic value are in circulation, the one with greater value will tend to be hoarded or exported, i.e., that "bad" money drives "good" money out of circulation.)

SUBSIDIES AND ECOSYSTEMS

Subsidies affect the environment, including biological resources, through many pathways. The most obvious, perhaps, is when they directly stimulate economic activities that interact with the environment. Despite reforms in recent years, there are plenty of these types of subsidies still around: subsidies to the use of fertiliser and pesticides, to automobile ownership and parking, to the consumption of electricity, just to name a few.

Biodiversity is often the loser. Administered pricing systems for agricultural products, by favouring a small number of easily standardised commodities, create disincentives to diversify varieties and species grown. Subsidies that encourage overfishing push harvest levels beyond sustainable yield, in extreme cases precipitating not only the economic collapse of fisheries but also permanent changes in marine ecosystems. Subsidies to roads and railway lines lead to the expansion of transport corridors that, unless very carefully designed, divide habitats into pieces too small to support wide-ranging animals, such as large cats.

It is not just the effect of subsidies on marginal prices and costs that determine environmental effects, but the conditions that are attached to their provision as well. Numerous examples are provided by agricultural and fisheries policies. Price stabilisation policies for crops reduce the need for farmers to raise livestock as a hedge against fluctuating grain prices; payments requiring continued cultivation of a supported crop or crops create a disincentive to rotate (Runge, 1994).

Tracing the causal relationships between subsidies given to particular sectors and their effects on biodiversity can provide insights useful in the development and reform of policies. But, ultimately, the interactions of subsidies, and their effects, at the scale of ecosystems, or ecoregions, determine environmental outcomes. In this domain, understanding local conditions becomes vital.

Looking at such interactions at the geographic perspective - i.e., at a scale sufficiently large to observe externalities among different industries and sectors - suggests that the clustering of related industries, especially if they are subsidised, can generate patterns of negative externalities that are analogous to the positive externalities associated with clustering that have been so much vaunted by economists since Alfred Marshall. The Columbia River basin, in the north-west corner of the United States, provides a striking, but hardly unique, example of both phenomena (Box 1) (Reisner, 1993; Ryan, 1995; and Harden, 1996).

In theory, these negative impacts can be mitigated by measures to internalise such negative externalities, or to deal with fundamental structural problems. In practice, however, policy makers have often found it easier simply to spend more money on the problem. Hence - to provide a typical example - when water shortages loom in arid regions, rather than raise prices to irrigators, governments often prefer to finance the installation of water-conserving technologies on farms.

REFORMING SUBSIDIES

Considering the factors working against the reform of entrenched subsidies, the economist Gordon Tullock, writing in 1975, felt compelled to remark:

[It] is conceivable that simultaneously abolishing all of them [i.e., subsidies] would lead to a net gain for almost everyone. The individual would lose his particular privilege, but would gain from the loss of privileges of other people. As to its political practicality, I take it I do not have to explain why I think it is low.

Tullock was perhaps too pessimistic. Within a decade New Zealand had embarked on a bold, and ultimately successful, experiment to eliminate support to virtually all of its primary industries, and to substantially reduce tariffs on many manufactured products. Australia was already moving down that path, though at a more measured pace. Several South American economies carried out similar reforms. Broad-based unilateral reform of subsidies was shown to be conceivable, and not just in theory.

But such comprehensive, economy-wide reforms are much more difficult to carry out by large democracies with diverse constituencies. That does not mean they are not worthwhile pursuing - indeed, over the long term they may be the most enduring. But change may be easier to sell to sceptical voters if the required sacrifices are seen to be shared among other countries, particularly if there are gains (such as gains from trade) that can help offset adjustment costs. Multilateral arrangements, which can offer countries an opportunity to seek out and obtain such trade-offs, have therefore served an indispensable role in subsidy reform.

MULTILATERAL SUBSIDY DISCIPLINES

There are several reasons why countries might wish to enter into agreements to limit their ability to support or protect domestic industries. The most straightforward motive is to obtain the economic gains that can be reaped through expanded trade. Countries seeking to reduce expenditures may also find it politically safer to have their hands tied by an external authority than to directly resist internal pressures on budgetary resources. Given the current interest in reducing environmentally harmful subsidies, it is instructive to review where things stand currently with regard to multilateral disciplines on subsidies. By way of providing a few examples, the following section looks at those applied to two sectors: agriculture and fishery products.

BOX 1. SUBSIDIES AND SALMON

The Columbia River is one of the world's natural wonders. Its salmon fishery, once the most productive in North America, sustained a large indigenous human population for centuries. But it was the river's enormous hydroelectric potential that drove the rapid development of the basin.

Each day the Columbia expends as much energy as is released by 25 moderate-size atomic bombs. Taming and harvesting this energy has been one of the great engineering feats of modern times. The first hydroelectric dams were built on a relatively modest scale, in keeping with local economic growth. In the 1930s, however, as the Bureau of Reclamation expanded its activities into the area, dam building activities shifted into a higher gear. The biggest dam of all, the Grand Coulee, was initially built with far more capacity than needed - in part owing to pressures from local farmers to have a reservoir high enough (i.e., close enough to the elevation of their fields) that they could draw water from it for irrigation. The surplus electricity generating capacity found a ready market, however, as aluminium companies, aeroplane manufacturers and the Manhattan Project moved into the area.

The regulation of the river's mighty flow by hydroelectric dams also facilitated barge navigation. Locks were built along the Snake River, one of the basin's main tributaries, turning the town of Lewiston, Idaho - some 750 kilometres from the Pacific Ocean - into a major port, particularly for feed grain and wheat destined for markets overseas. In another part of the basin, between Grand Coulee and the Hanford Atomic Works (home to what Blaine Harden describes as "the Western world's largest and leakiest nuclear dump"), massive electric pumps lift water from behind the Grand Coulee reservoir onto a high plain where farmers in the Columbia Basin Project produce mostly alpha and horticultural crops.

According to Hardin (1996), every one of these activities has benefited from generous levels of government financial support. Barge operators are charged user fees that cover only one-quarter of the operating costs for locks on the Columbia and Snake rivers. The production and export of the grain they transport has benefited (until recently) from various agricultural support programmes. Farmers in the Columbia Basin Project enjoy both cheap water and cheap electricity. And so on.

While subsidies have clearly favoured the economic development of the region, the activities they have stimulated have not helped the river's pre-eminent biological resource: the salmon. The migration of salmon to the upper reaches of the Columbia was blocked totally by the Grand Coulee Dam when it was completed - without fish ladders - in the late 1930s. On its lower reaches, and along the Snake River, where adult salmon are still able to make their way upriver to spawn, the survival rate of their offspring, who have to swim in the other direction, is substantially reduced by spinning turbine blades and water that is too slow and too warm. These obstacles, combined with habitat destruction and overfishing, have diminished the catch of chinook and coho salmon by over 80 per cent in the last two decades, and by over 95 per cent since the first hydroelectric dams were built.

In an effort to ensure that there are still enough salmon to satisfy sport, native and a small commercial fishery, the government's answer for years was to augment the supply of juveniles and to help them around the rough spots. Each year, some 80 million salmon smolts are released into the river system from state and federal fish hatcheries, at a cost of around \$60 million a year. Several more million dollars are spent each year to transport around fifteen million juvenile salmon around a 240 kilometre stretch of the lower Columbia River by barge and by lorry. Whether these actions will in the end preserve wild salmon stocks is hotly debated.

In 1994 the Northwest Power Planning Council adopted an ambitious salmon recovery scheme which called for, among other measures, drawing down reservoirs on the lower Snake River in order to speed the passage of fish to the sea. The plan was and remains controversial, however, not least because it would raise electricity bills, halt barge traffic for two months in every year, and force expensive modifications to irrigation systems. At this point a final decision on whether to go ahead with it has not been taken.

It is noteworthy that, in both sectors, subsidies (including tariffs and non-tariff trade barriers) have been subjected to multilateral disciplines in an effort to curb their trade effects, not because of any concern over their effects on the environment (though such concerns may have motivated the negotiating parties as well). Even the latest multilateral initiative, the Asia-Pacific Economic Co-operation (APEC) forum's proposal for early voluntary sectoral liberalisation - which would cover energy, fishery products and agriculture along with 12 other sectors - is focused primarily on trade. (For an analysis of the trade effects of the EVSL initiative, see Dee, Hardin and Schuele, 1998.)

AGRICULTURE

The main multilateral mechanism for disciplining subsidies to agriculture is the "Agreement on Agriculture", adopted as part of the *Final Act* embodying the results of the (1986-93) Uruguay Round of multinational trade negotiations. Prior to that agreement, agricultural trade was subject to several general or country-specific derogations or exemptions that, in combination, virtually exempted agriculture from the disciplines that were applied to trade in manufactured products (see OECD, 1995 and Bello, 1998).

The definitive text of the Agreement on Agriculture (URAA) included detailed schedules of reduction commitments, from each country, in three areas: market access (i.e., concessions that relate to bindings and reductions of tariffs, and to other market access commitments), export subsidies, and domestic support. With regard to market access and export subsidies, WTO members agreed to reduce tariffs, volumes of subsidised exports, and budgetary expenditures on export subsidies over the course of the six-year (10 years for developing countries, or DCs) implementation period - by an average of 36% (DCs: 24 per cent). Least developed countries (LDCs) were exempted from reduction commitments altogether.

The domestic support reduction commitments of each Member, contained in Part IV of its Schedule, apply to all of its domestic support measures in favour of agricultural producers, with the exception of domestic measures that are not subject to reduction. Domestic support deemed to be non- or minimally trade distorting and direct payments provided through certain production-limiting programmes, are not included in the aggregate measure of support (AMS). Domestic policies identified in the country schedules as trade distorting - basically, market price support, production-linked direct payments, and input subsidies, expressed in terms of Total Aggregate Measurement of Support - are subject to reduction commitments of 20% (compared with the 1986-88 base period), with credit granted for any reductions that had already occurred since the base period. Developing countries must reduce their Total AMS by 13% over nine years, and LDCs cannot exceed their Total AMS established for 1986-88.

It is generally acknowledged that, as a package, the URAA signalled an important move in the direction of freer trade in agriculture by improving market access and reducing other trade restrictions. However, many distortions remain, with much of the trade in agro-food products still governed by a complex set of tariff quota arrangements and many prohibitive over-quota tariffs (OECD, 1998b). Domestic support measures for which exemption from the reduction commitments can be claimed (detailed in Annex 2 of the URAA) include a wide range of general government-supplied services, such as research, food inspection, marketing and promotion, and "infrastructural services". These infrastructural services cover big items in

some governments' budgets - notably, roads and other means of transport, market and port facilities, water supply facilities, (irrigation) dams and drainage schemes, and infrastructural works associated with environmental programmes. While no firm numbers are available on government subsidies to irrigation, the available data suggest they are in the tens of billions of US dollars a year world-wide (World Bank, 1997). Interestingly, the exemption for infrastructural services does "not include subsidies to inputs or operating costs, or preferential user charges." Yet very few such subsidies have been included in country schedules or subsequent notifications.

Despite these shortfalls, has the URAA made much of a difference? Yes, especially by making countries tariff their non-tariff trade barriers. Also, it appears that countries are abiding by their commitments to phase out subsidised exports. As for domestic support, it is perhaps too early to discern the net effect of the Agreement. However, a recent study prepared for a meeting of the OECD's Agricultural Ministers in March 1998 suggests some positive trends among its own Member countries.

The level of support has fallen for the OECD as a whole but is still high (estimated total transfers of US\$280 billion in 1997), with wide variations among Member countries and across commodities. Expressed as a percentage of the value of agricultural production, the Producer Subsidy Equivalent (PSE) fell from 45% for the 1986-88 period to 35% in 1997. A shift to direct payments has improved market orientation, yet many direct payments are still linked to production or factors of production and supply controls persist.

In addition, some countries have undertaken, or are contemplating undertaking, unilateral domestic policy reforms that go beyond what they have committed to under the URAA. And most recent bilateral and regional trade agreements have included agriculture to varying degrees. The entry of Austria, Finland and Sweden into the EU in 1995, for example, required domestic and trade policy reforms in the first two countries. The North American Free Trade Agreement (NAFTA) led to a further regional integration of the respective agro-food sectors with significant impacts on policy reform and structural adjustment, particularly in Canada and Mexico (OECD, 1998b).

The URAA was by no means the last word on multilateral efforts to discipline agricultural support. The OECD still monitors its Member countries' agricultural policies (including estimates of PSEs and Total Transfers), and is still engaged in a substantial work programme in the areas of agricultural trade, structural reform and the environment. In March of this year, OECD Ministers of Agriculture reaffirmed their commitment to the long-term goal of domestic and international policy reform. They also reaffirmed their commitment to undertake further negotiations on agriculture, as foreseen in Article 20 of the URAA. Those "negotiations for continuing the process" of reform are scheduled to commence within the WTO's Committee on Agriculture before the end of 1999.

FISHERIES

The fisheries sector differs in important ways from agriculture. Nevertheless, from 1947, when the first GATT was signed, until the conclusion of the Uruguay Round in December 1993, fishery products were, like farm products, exempted under Article XI from disciplines

on import restrictions. One major difference between the two sectors, however, has been that, unlike agriculture, most of the tariffs on fish and fish products applied by developed countries were bound under GATT before the Uruguay Round negotiations got under way. This tariff binding thus had the effect of denying these countries any possibility of increasing the tariff and non-tariff protection already negotiated.

In the Final Act, fishery products were expressly excluded from the list of products covered by the Agreement on Agriculture, and were presumed to be covered, along with industrial products, by the Agreement on Subsidies and Countervailing Measures (the SCM Agreement). The SCM includes within its scope several types of subsidies found in the fisheries sector, including border measures, output-related subsidies, subsidies to intermediate inputs and capital, and explicit tax breaks. However, as various observers have pointed out (Stone, 1997; see also Milazzo, 1998 and Porter, 1998), it does not seem to include what some have called "implicit subsidies"- uncollected or undercollected resource rents, or the cost advantage conferred by lax enforcement of environmental standards. It is also not clear whether, for instance, exemptions from fuel excise taxes that are also available to other primary producers (e.g., farmers and foresters) would be covered by the code (Porter, 1998).

The Uruguay Round did, at least, lead to some decrease in border protection. It has been estimated that more than 90% of world fisheries exports have benefited from trade concessions negotiated during the Round (New Zealand, Ministry of Foreign Affairs and Trade, 1994). Japan, for example, reduced its tariffs on fish and seafood products by a third. Tariffs on imports - particularly of processed fish products - remain high in some countries, however. Trade-weighted tariff reduction targets, under which fisheries were classified, averaged around one-third, but within that general category some countries chose to reduce tariffs by a smaller proportion for fisheries products and to make up the difference on other products.

Interest in subsidies to the fishing industry has not waned since the conclusion of the Uruguay Round. If anything it has grown. But, increasingly - the APEC initiative notwithstanding - the focus of multilateral discussions is shifting away from purely trade-related issues towards, or at least expanding to include environmental considerations.

MONITORING SUBSIDIES AT THE ECOSYSTEM LEVEL: A POSSIBLE NICHE FOR ENVIRONMENTAL NGOS?

The two experiences described above lead to several observations. First, the process of disciplining subsidies at the multilateral level can take many years, if not decades to bear fruit. Second, such processes have been mainly driven by concerns over trade, government budgets and competition. Third, until recently, governments and multilateral institutions have largely dominated the policy agenda.

That situation has changed in two important ways. First, people both inside and outside of governments have begun to take a keen interest in the effects that subsidies may be having on the environment and the management of natural resources. Second, the driving force behind

this newly focused attention has often been provided by non-governmental organizations (NGOs), and other bodies not previously engaged in the subsidies dialogue.

As mentioned at the beginning of this paper, within the last five years there has been a virtual explosion of NGO-sponsored studies emphasising the environmentally perverse effects of subsidies to primary industries, and generally calling for their reform. But reform of what kind? Here, the environmental NGOs, or at least the authors of their reports, differ in important ways. For some, reform means the "greening" of subsidies. Subsidies are not suspect *per se*, according to this view; it is just that governments have been giving them to the wrong people. Authors in this camp call for redirecting subsidies from 'bad' to 'good' activities, such as biofuel production, organic agriculture, and artisanal fishing.

Such bald appeals to simply shift subsidies from one set of activities to another are not likely to be taken seriously by trade economists and public finance specialists - the green movement's natural allies in the cause of subsidy reform - although they do strike a chord with the public. As environmental NGOs develop expertise in the subject, however, their critical analyses are revealing an increasingly deeper scepticism of subsidies, and a more sophisticated understanding of the mechanisms that could be used to discipline them.

That knowledge, if used judiciously, can serve as a check and balance to future efforts to discipline "perverse" subsidies. Generally, any multilateral regulatory regime requires three components: a norm building process; a formal set of legal obligations (or a set of common principals and criteria, in the case of non-binding arrangements); and an apparatus for monitoring and enforcement (Schorr, 1998). At this stage in the development of international relations, law making and enforcement are still privileges of sovereign governments. But in democracies, at least, civil society and the press can and often do influence the norm-building process and contribute to monitoring in an informal way.

Environmental NGOs have recently had, and will continue to have, an influence on regional, national and international dialogues over subsidies. And through their investigative work they will no doubt shed light on subsidy policies that may have escaped the attention of the multilateral institutions formally encharged with monitoring and enforcing. But it is unlikely that national governments will cede these functions to NGOs any time soon. That raises the issue of how many resources NGOs should be devoting to, in a sense, duplicating what will continue to be done by others in any case.

There is, however, a useful niche that NGOs can fill. If recent history is any guide, most multilateral arrangements to discipline subsidies will continue to be framed around specific sectors. While appropriate for addressing trade concerns, such arrangements may not always reveal subsidy "hot spots" - i.e., areas where subsidies to different industries interact in particularly environmentally harmful ways. The IUCN's current approach to analysing the effects of subsidies on biodiversity from an ecosystem perspective seems to this writer, therefore, an eminently sensible use of NGO resources - complementing the work of multilateral institutions while at the same time providing information that is focused and practical for policy makers at all levels of government.

This activity puts into practice the dictum "think globally, act locally" in that it requires thinking about global institutions and processes, but also research at the local level. Potentially, if the project involves input from local and regional chapters of environmental NGOs, it can provide a vehicle for increasing public awareness and, hopefully, begin to change peoples' attitudes towards subsidies where it matters most: at the grass roots level. As David Roodman observes, "few public policies are as unpopular in theory and popular in practice as subsidies." Subsidies persist, in part, because they are seen as a way of transferring tax money back to local taxpayers. The problem is that there is usually a disconnect between who pays and who receives, which encourages the diversion of public money into dams, roads, ports and other large infrastructure projects even when they are not really needed. Voters have a hard time refusing such "gifts" from their parliamentarians partly out of a sense of equity: if we don't receive our fair share of the pie, somebody else will. Questions of how the government should be spending its money get pushed aside.

Working to reduce or eliminate environmentally perverse subsidies is not enough, however. Making the transition from dependence on, to independence from, subsidies can be frightening for workers employed in a supported industry. There is therefore an important job to do in educating people and policy makers, not only about the potential long-run benefits of subsidy reform, but also about ways to make the transition to a more sustainable future less painful. Answering the question of "How do we get there from here?" is perhaps as important as identifying where we want to get.

There are undoubtedly more areas in which organizations such as the IUCN and its member organizations could contribute towards the process of policy reform. What is important is that, clearly, the will to make such a contribution has already been made abundantly evident.

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RESPONSES TO KEYNOTE SPEECH

By: Hajime Ohta, Executive Councillor, Keidanren (Japan)

Keidanren, the Japanese business association that has developed significant programmes for addressing environmental problems, is a useful model for working with trade organizations to produce specific actions for addressing common problems. In today's modern world, command and control measures are needed to enforce sustainable behaviour. But while regulations have an important place in modern society, it also is clear that economic instruments can be used to promote environmentally-friendly activity. Mechanisms such as green taxes, appropriate subsidies, and various other kinds of incentives can be used in combination with regulations to bring about important changes in corporate behaviour. In short, the private sector is anxious to ensure that their activities are sustainable, and contributing to social welfare.

By: William Eichbaum, Vice President, WWF-US (USA)

Ronald Steenblik has given us a number of examples where subsidies have been destructive. But on the other hand, numerous examples exist of environmentally helpful subsidies. One particularly dramatic example is the restoration of the Florida Everglades, a World Heritage site that has been significantly disrupted by upstream impacts on the flow of freshwater into the system. The Federal and State Governments are now investing considerable amounts of public funding to restore at least part of the flow of freshwater into the Everglades, involving restoring rivers that had been "improved" by the Army Corps of Engineers to a more natural flow regime.

In short, subsidies should be seen as a tool that governments use to bring about desired conditions. These are not automatically contrary to environmental interests, so attention given to subsidies is often very appropriate.

COMMENTS FROM PARTICIPANTS

Fisheries are a particularly serious example of where subsidies have led to unsustainable rates of harvest that deplete fish stocks, ultimately to the detriment of human welfare.

New mechanisms are required for addressing the important issues of subsidies, because the World Trade Organization clearly is not sufficient for the task.

Much more work needs to be done in this field, developing better understanding of the definitions of key elements, additional data on impacts, and research leading to better understanding of the relationship between subsidies and biodiversity.

KEY CONCLUSIONS

The issue of subsidies is one that requires considerable attention from IUCN. This could, for example, focus on the following issues:

- o Expanding the scale at which conservation activities are carried out, moving up to at least the ecosystem level so that the impacts of subsidies can be specified more clearly.
- o Conducting research on the interaction of subsidies between sectors, supplementing the sector-based work that is being carried out.
- o Designing systems for enabling NGOs to monitor the impact of subsidies on various components of the environment (including biodiversity).

3. CONSUMPTION

3.c HOW DO WE KNOW WHEN WE ARE SUSTAINABLE?

Many institutions are working to find ways of bringing about a more sustainable future for the people and ecosystems of the world. Yet how do we determine what sustainability is and how do we measure our progress towards it? Based on a global effort by field teams in various parts of the world designed to define sustainability in terms of the users, this session will address the methods and tools being developed to assess our progress towards this elusive goal.

Organizer: IUCN Monitoring and Evaluation Initiative
(Nancy MacPherson)

Chair: Alec Watson, The Nature Conservancy (USA)

Keynote speaker: Robert Prescott-Allen (Canada)

Respondents:

- o Carmen Miranda, Estación Biológica del Beni (Bolivia)

CHAIR'S OPENING REMARKS

CHAIR: ALEC WATSON

RAPPORTEUR: NANCY MACPHERSON

"Sustainable development" has become a popular new phrase in the environmental community, but considerable controversy still surrounds the concept. Different interest groups have used the idea of sustainability in very different ways, and some have charged that "sustainable development" is simply a means of continuing business as usual while changing the terminology. Yet few will disagree that we need to find ways of bringing about a more sustainable future for both the people and the ecosystems of the world. Many NGO members of IUCN are dedicated to working toward these ends, often trying to convince governments to bring about appropriate changes.

This workshop is designed to address one part of sustainability, namely how to measure it. We need to reach agreement on definitions so that we are all talking about the same thing, hopefully reaching better conclusions about how to move ahead in this critical endeavour to seek sustainable relationships between people and nature.

How do we know when we are sustainable?

By: Robert Prescott-Allen, IUCN International Assessment Team/PADATA,
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ABSTRACT

Over the past several years, IUCN and IDRC have developed a user-driven, participatory and systematic approach to assessing sustainability. While "sustainability" has many definitions, most of them share the common features of a desirable human condition, a durable ecosystem condition, and a fair sharing of benefits and burdens (equity). The systemic perspective developed by IUCN and IDRC is known as Sustainability and Wellbeing Assessment (SAWA), which regards people and the ecosystem as equally important, with human societies considered a dependent part of the ecosystem. The SAWA model comprises people (human communities, economies and artefacts) within the ecosystem (ecological communities, processes, and resources), together with their interactions. The latter consist of flows from the ecosystem to people and from people to the ecosystem, with both flows including both stresses and benefits. Given that a logical goal for every society is to improve and maintain the wellbeing of people and the ecosystem, progress towards sustainability can be shown by the amount of human wellbeing achieved per unit of ecosystem stress. SAWA examines the conditions of people and the ecosystem using a combination of measurement of a set of indicators, mapping to tie the indicators to specific places and to seek information on the whole area rather than a few points, and narrative to describe the context, argue the choice of issues and indicators, and fill gaps with supplementary information. Since it is impossible to account for everything, and no instrument exists for measuring wellbeing and sustainability directly, assessments measure representative aspects, or indicators; these are combined into indices, or compound indicators that convey information about the system as a whole. The process begins with defining the system and goals, then identifies issues and objectives, chooses indicators and performance criteria, measures and maps the indicators, combines the indicators into indices, and maps the indices and reviews the results. Together the indicators and indices provide a powerful tool for assessing sustainability.

ASSESSING PROGRESS TOWARD SUSTAINABILITY - DEVELOPMENT OF AN APPROACH, METHODS AND TOOLS

IUCN (The World Conservation Union) and IDRC (The International Development Research Centre) have collaborated over the past four years in the development of a user-driven, participatory and systemic approach to assessing sustainability. Working with field teams in Africa, Asia and Latin America, an IUCN/IDRC International Assessment Team has developed an approach and a set of methods and tools for use by agency practitioners, decision-makers and field teams involved in sustainable development at any level from global to local.

The approach to assessment places equal importance on people and the ecosystem, promotes the integration of reflection and action, and links system assessment (assessment of the conditions of people and the ecosystem) with project and institutional assessment. This paper describes the system assessment method.

The system assessment method has been developed and tested by the International Assessment Team, PADATA, and teams in Asia, Africa and the Americas, working on local, provincial and international assessments. The assessments have covered villages in Nicaragua, districts in Zimbabwe, watersheds in India and the Zambezi basin, and the province of British Columbia (Canada). The method is the basis of *The Wellbeing of Nations*, an assessment of the wellbeing and sustainability of 185 countries (Prescott-Allen in prep.). It is still evolving as additional partners and collaborators apply it to new situations.

THE CHALLENGES OF SUSTAINABLE DEVELOPMENT

Sustainable development is difficult to achieve because we don't know what it is, its constituency is divided and small, daily decision-making largely overlooks it, and global and local efforts are isolated from each other.

Most definitions of sustainability and sustainable development (Box 1) have three features in common:

A desirable human condition: a society that people want to sustain because it meets their needs.

A durable ecosystem condition: an ecosystem that maintains its capacity to support human and other life.

Equity: a fair sharing of benefits and burdens - between present and future generations, and within the present generation.

The common features, however, are skeletal. When it comes to putting flesh on the skeleton, interpretations can diverge greatly. Each feature raises profound questions:

What is "a desirable human condition"? People's needs, potential and sense of potential differ among cultures and individuals. Some issues - health, basic needs, education - command a broad consensus, and are included in statements from a wide range of societies. Others are more sensitive to cultural perspectives. Are every culture's traditions sacrosanct or do universal values override them (and by what criteria is a value universal)? What is the right balance between the material and the spiritual, the individual and the community, or between market and non-market mechanisms? How to reconcile different cultural and individual ideas of human wellbeing?

What makes a resilient and supportive ecosystem? How much stress can the ecosystem withstand? We do not know how much diversity would be sufficient for ecosystem wellbeing. We lack the understanding to consciously and deliberately maintain the

ecosystem's key functions and processes (assuming we have identified them all). There is no point in trying to achieve and preserve a specific set of conditions, since an important mechanism by which the ecosystem maintains its stability is change. How much conversion and modification of habitats is too much? How much and what kinds of biodiversity should we try to conserve? What standards of land, water and air quality should we aim to achieve?

Who is "us" and who is "them"? As human populations and economies have grown, it has become impossible to improve one's own wellbeing without affecting that of other people. Through trade, money markets and environmental change, the ripple of interactions, dependencies and impacts among communities and nations has steadily widened. The scope of self-interest has expanded from the individual and his or her society to all societies. Yet as the struggle for survival and prosperity intensifies so does the temptation to ignore other people (other families, ethnic groups, religions, businesses, classes, countries) or to treat them as competitors and enemies. How are we to share?

What combination of human and ecosystem wellbeing would be equitable and sustainable? What ways of life would be both desirable and durable? How can we balance human needs and ecosystem requirements without knowing what is a desirable human condition and what makes a resilient and supportive ecosystem?

The short answer to these questions is that we don't know. System assessment provides us with a way of answering them by equipping societies to set a baseline of current human and environmental conditions, keep track of change, and learn from their actions.

BOX 1. DEFINITIONS OF SUSTAINABILITY

A sustainable society has been an explicit concept since at least 1972, and sustainable development since at least 1980:

A sustainable society is "one that to all intents and purposes can be sustained indefinitely while giving optimum satisfaction to its members" (Goldsmith *et al.*, 1972).

"Development is...the modification of the biosphere and the application of...resources to satisfy human needs and improve the quality of human life. For development to be sustainable it must take account of social and ecological factors, as well as economic ones; of the living and non-living resource base; and of the long term as well as the short term advantages of alternative actions" (IUCN/UNEP/WWF, 1980).

The Brundtland Commission's adoption of the term in 1987 led to its enshrinement in political rhetoric. The Commission's definition of sustainable development echoes the *World Conservation Strategy*'s definition of conservation and is still widely cited:

Sustainable development "meets the needs of present generations without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987).

Conservation is "the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations" (IUCN/UNEP/WWF, 1980).

Since then, definitions of sustainable development and sustainability have proliferated. A single volume (Munasinghe & Shearer, 1995) contains more than 20, including:

Economic growth that provides fairness and opportunity for all the world's people, not just the privileged few, without further destroying the world's finite natural resources and carrying capacity (Pronk & ul Haq, 1992).

A set of indicators of wellbeing (including income) that could be maintained or increase over time (Munasinghe & McNeely, 1995).

A relationship between dynamic human economic systems and larger dynamic, but normally slower-changing ecological systems, in which (a) human life can continue indefinitely, (b) human individuals can flourish, [and] (c) human cultures can develop, but in which (d) effects of human activities remain within bounds, so as not to destroy the diversity, complexity, and function of the ecological life support system (Costanza, 1991).

The number of people actively promoting ways of life that are desirable, durable and equitable is rather small. People are also deeply divided as to the relative importance of people and the ecosystem. One perspective is that sustainable development requires a balance or overlapping of environmental, economic and societal spheres (Figure 1a). The United Nations Commission on Sustainable Development (CSD) has added a fourth sphere - institutions (Figure 1b). The four spheres are now the framework for reporting on implementation of Agenda 21, the action plan of the 1992 United Nations Conference on Environment and Development (United Nations, 1996).

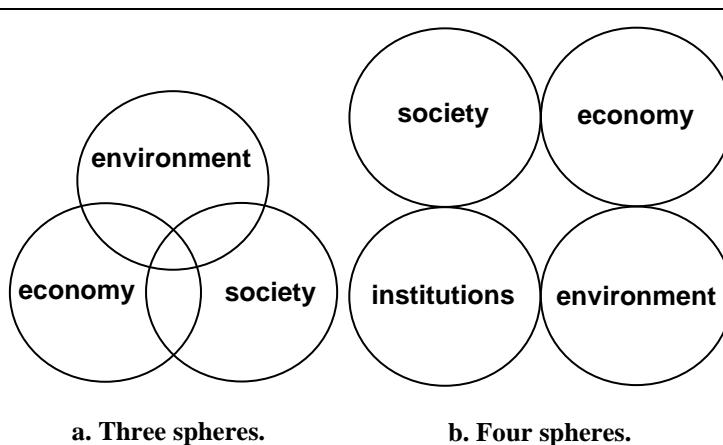
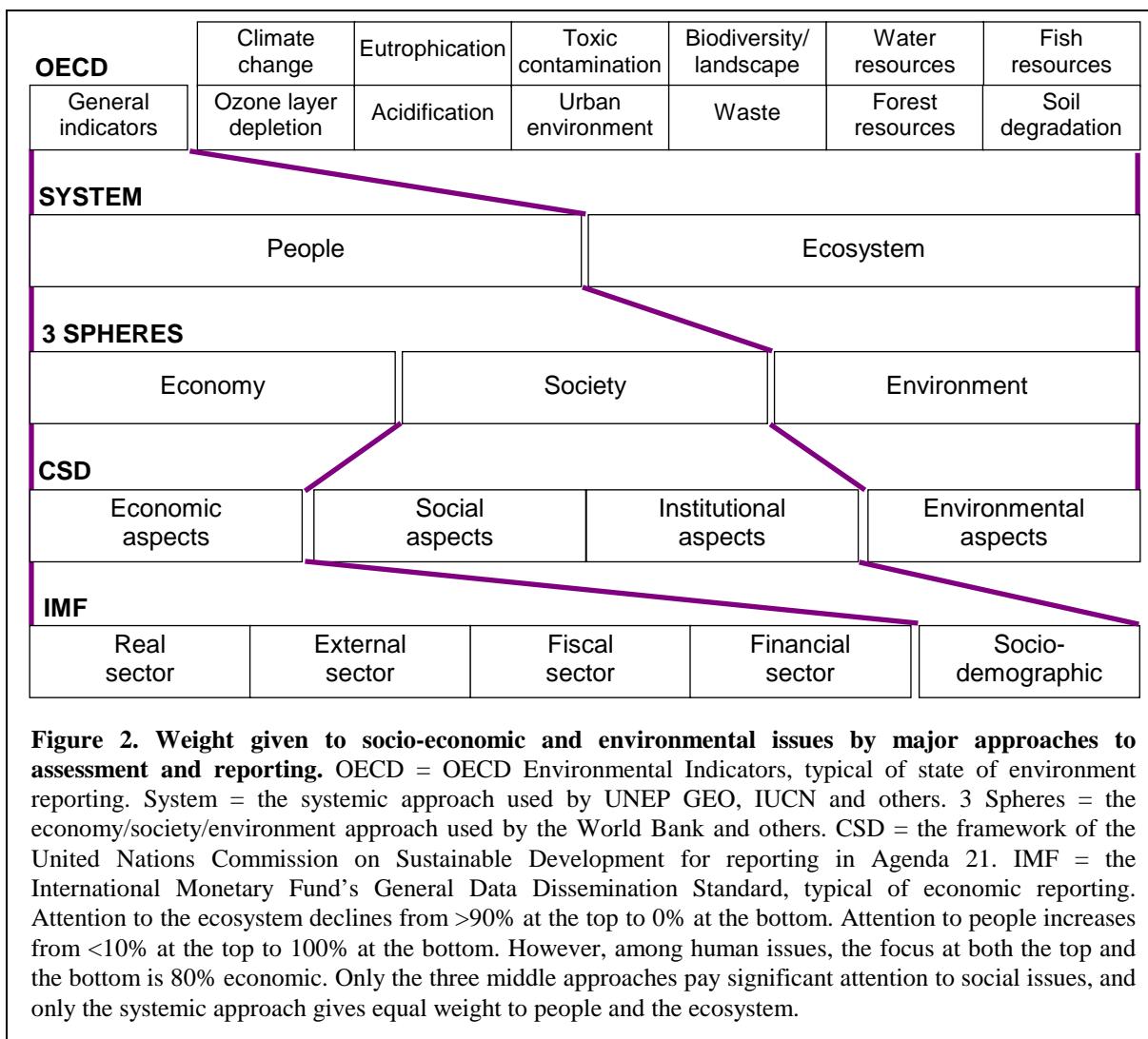


Figure 1. Thematic views of the world. The three-sphere view (a) is widely used. The four-sphere framework (b) is used by the United Nations Commission on Sustainable Development.

Systemic perspectives recognise that human societies are a subsystem - a dependent part - of the ecosystem, and regard people and the ecosystem as equally important. Systemic perspectives have been adopted by the United Nations Environment Programme's **Global Environment Outlook** (Bakkes & van Woerden, 1997; Swart & Bakkes, 1995), the World Resources Institute's approach to measuring environmental policy performance (Hammond *et al.*, 1995), the IUCN approach, and several other assessment methods (e.g., Corson, 1996).

Depending on the perspective, approaches to assessing sustainable development give dramatically different weights to people and the ecosystem (Figure 2). Only systemic frameworks give them equal weight. Thematic frameworks place people outside the ecosystem and demote the ecosystem to one of three or four components. In a three-sphere framework, this makes a change in human conditions twice as important as a change in environmental conditions, and in a four-sphere framework three times as important. At the extremes, environmental reporting pays little attention to human wellbeing, and economic reporting ignores the state of the environment.

Views of sustainability also differ over whether human and ecosystem components can be substituted for each other. The various approaches have been classified by some economists as "weak sustainability", "sensible sustainability", "strong sustainability", and "absurdly strong sustainability" (Serageldin & Steer, 1994).



"Weak sustainability" is not concerned with the parts, just with the whole. The parts can be substituted for each other, and ecosystem wellbeing could decline provided human wellbeing increased by at least as much. A sawmill (human-made capital) could replace a tract of forest (natural capital), even though a sawmill is worthless without the forest to supply it with wood.

"Sensible sustainability" is primarily concerned with maintaining the whole but pays some attention to the parts. The parts are assumed to be substitutable up to a point. Since that point is not known, they should be treated prudently. For example, oil may be depleted so long as the receipts are invested in human capital development such as education.

"Strong sustainability" requires maintaining the parts in good condition, as well as the whole. None can be substituted for another, and in some versions there is only limited substitutability even within parts. For example, loss of forest in one place should be replaced by the addition of a similar type of forest elsewhere, or receipts from depleting oil should be invested in renewable energy production.

"Absurdly strong sustainability" would maintain all parts completely intact and never deplete anything. Only the "overmature" portion of a timber stand or other stock of renewable resources could be harvested, and oil and other non-renewable resources could not be used at all.

System assessments can build consensus and expand national and local constituencies for sustainable development, by stimulating reflection, promoting debate, and providing a forum in which these divisions can be addressed.

The somewhat abstract debate about the nature of sustainability persists because of its remoteness from daily decision-making. Lofty resolutions about sustainable development are made in international meetings but decisions on the ground usually have a much narrower focus. System assessment can help here, too, by relating the immediate imperatives addressed by national and local decision-makers to the larger perspectives of human and ecosystem wellbeing, and vice versa.

If assessments are done at different levels - regional, national, provincial, local - they can also bridge the gaps that separate global, national and local initiatives. International decisions to implement Agenda 21 and the conventions on biodiversity, climate change and desertification depend heavily on local action to be implemented effectively. Conversely, imaginative local efforts can often founder due to a lack of policy support at national level. System assessments can link initiatives at different levels through dialogue and development of a common assessment framework.

KEY FEATURES OF THE *WELLBEING OF NATIONS* ASSESSMENT METHOD

The IUCN/IDRC *Wellbeing of Nations* (WON) system assessment method has several key features to help its users meet the challenges of sustainable development:

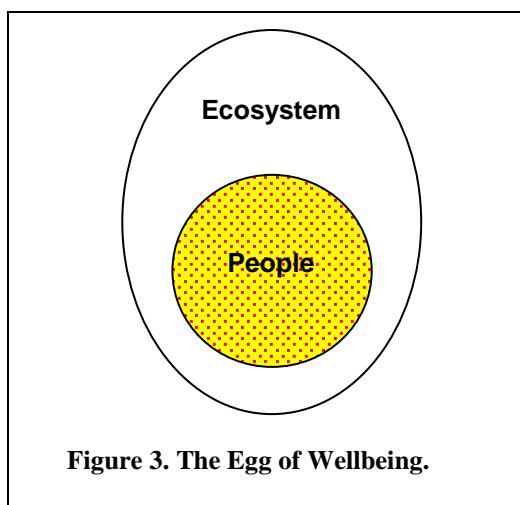
- o Equal treatment of people and the ecosystem
- o Hierarchy of issues and objectives
- o Common framework of dimensions
- o Barometer of Sustainability
- o Six-stage cycle
- o User-driven process

EQUAL TREATMENT OF PEOPLE AND THE ECOSYSTEM

The WON method's underlying hypothesis is that sustainable development is a combination of human wellbeing and ecosystem wellbeing. Human wellbeing is defined as a condition in which all members of society are able to determine and meet their needs and have a large range of choices to meet their potential. Ecosystem wellbeing is defined as a condition in which the ecosystem maintains its diversity and quality, and thus its capacity to support people and the rest of life, and its potential to adapt to change and provide a wide range of choices and opportunities for the future.

The hypothesis is expressed in the metaphor of the Egg of Wellbeing (Figure 3). People depend on the ecosystem which surrounds and supports them much as the white of an egg surrounds and supports the yolk. At the same time, a healthy ecosystem is no compensation if people are victims of poverty, misery, violence or oppression. Just as an egg can be good only if both the yolk and white are good, so a society can be well and sustainable only if both people and the ecosystem are well.

Human wellbeing is a requirement for sustainability because no rational person would want to perpetuate a low standard of living. Ecosystem wellbeing is a requirement because it is the ecosystem that supports life and makes possible any standard of living. Although trade-offs between the needs of people and the needs of the ecosystem are a part of life, they can only be limited and short term. Ultimately, human and ecosystem wellbeing are equally important, and a sustainable society needs to achieve both together. Hence a logical goal for every society is ***to improve and maintain the wellbeing of people and the ecosystem.***



For these reasons, the wellbeing of people and the ecosystem are considered together but measured separately. Information is organised into two subsystems: people (human communities, economies and artifacts); and ecosystem (ecological communities, processes and resources). Interactions between the two are recorded under the receiving subsystem. Thus human stresses on the ecosystem (resource depletion, pollution, etc.) and benefits to the ecosystem (conservation) are recorded under ecosystem; and ecosystem benefits to people (economic resources, health, etc.) and stresses on people (natural disasters, etc.) are recorded under people.

This basic division of people and ecosystem allows progress in human development and ecosystem conservation to be compared. Without knowing what combinations of human and ecosystem wellbeing would be sustainable, it is not possible to measure sustainability *per se*. However, a society is more likely to be sustainable if human wellbeing is high and ecosystem stress (the opposite of ecosystem wellbeing) is low. Progress toward sustainability can therefore be shown by the amount of human wellbeing achieved per unit of ecosystem stress.

HIERARCHY OF ISSUES AND OBJECTIVES

A hierarchy of issues (Figure 4) provides a series of stepping stones from system to indicators, helping users to identify the features that reveal most about the conditions and interactions of people and the ecosystem. A hierarchy of objectives (also Figure 4) provides a matching series of stepping stones from overall goal to specific performance criteria, helping users to translate the concept of sustainable development into concrete improvements in people's lives and the condition of the ecosystem.

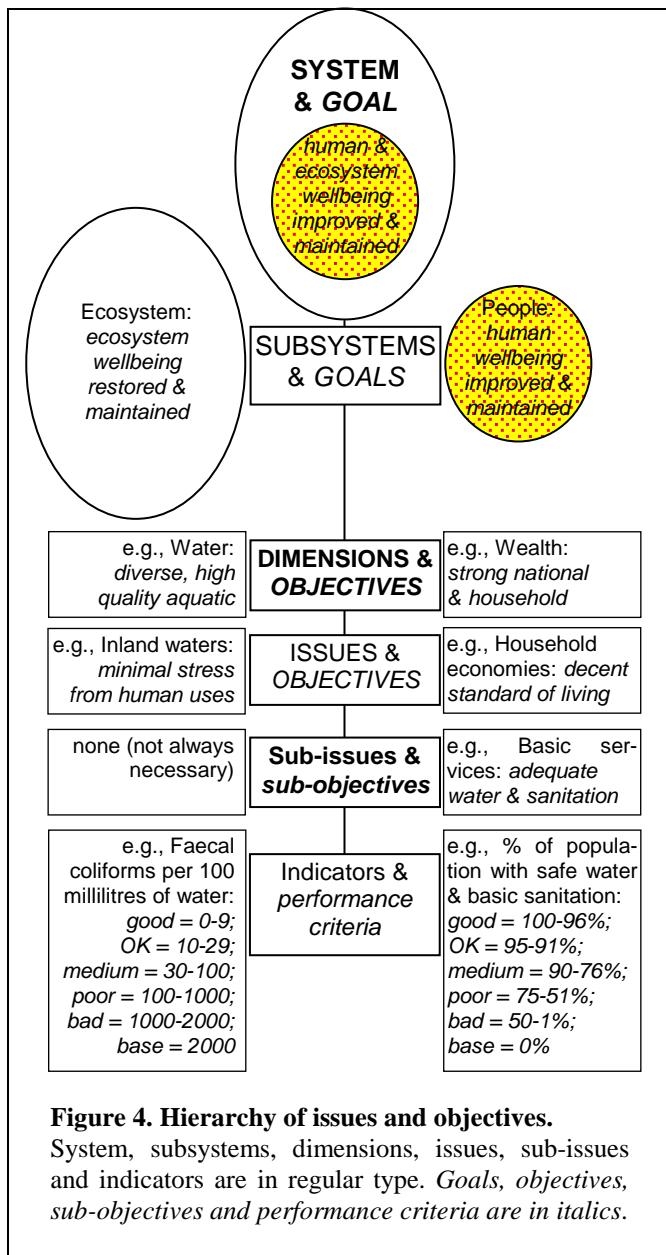


Figure 4. Hierarchy of issues and objectives.
System, subsystems, dimensions, issues, sub-issues and indicators are in regular type. *Goals, objectives, sub-objectives and performance criteria* are in italics.

hierarchy of objectives helps users to focus the assessment on what needs to be done to achieve sustainable development. It also provides a logical way of converting general concepts of sustainable development, wellbeing and progress, into a set of explicit human and environmental conditions.

COMMON FRAMEWORK OF DIMENSIONS

Five human dimensions and five ecosystem dimensions have been identified to provide a common framework for all assessments using the WON method (Figure 5). Within this framework, users select their own issues and indicators.

Since it is impossible to account for everything, and no instrument exists for measuring wellbeing and sustainability directly, assessments measure representative aspects, or indicators. Indicators require the collection and analysis of often large amounts of data. The more there are, the more expensive and cumbersome the assessment. Each additional bit of information also increases the difficulty of discerning and communicating overall conditions: the big picture disappears in the details. The challenge, therefore, is to identify those features that reveal most about the state of the system, using the fewest indicators.

In the WON method, this is done with a hierarchy that goes from system and goal via increasingly specific issues and objectives to measurable indicators and performance criteria. The hierarchy of issues ensures that a manageable set of indicators is as diagnostic as possible of human and ecosystem wellbeing. It helps users of the assessment to understand the selection of indicators, how well the indicators represent key features of the system, and their relationship to each other. The

A common framework of dimensions allows assessments to be tailored to local conditions and needs and at the same time to be comparable with other assessments. The framework is designed to combine a wide range of issues into a few major groups of roughly equal importance. The dimensions are broad enough to accommodate most of the concerns of most societies: any issue regarded as significant for wellbeing and sustainable development has a

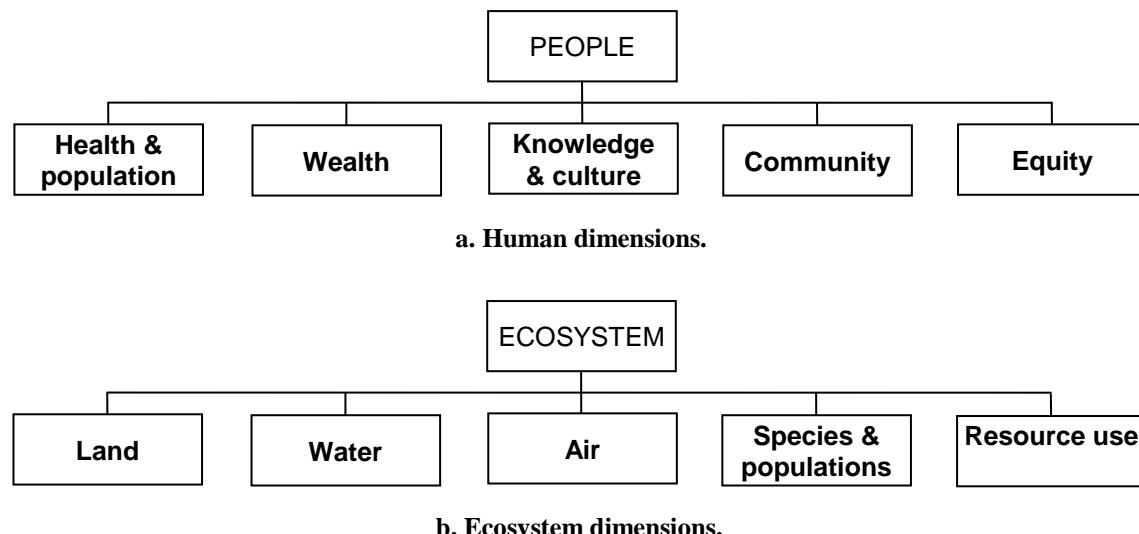


Figure 5. Common framework of dimensions.

place in one of the dimensions. They represent non-technical and accessible concepts (wealth, water, etc.). Because they are equally important, they are easily combined into indices of human and ecosystem wellbeing.

A sample of possible issues in each dimension includes:

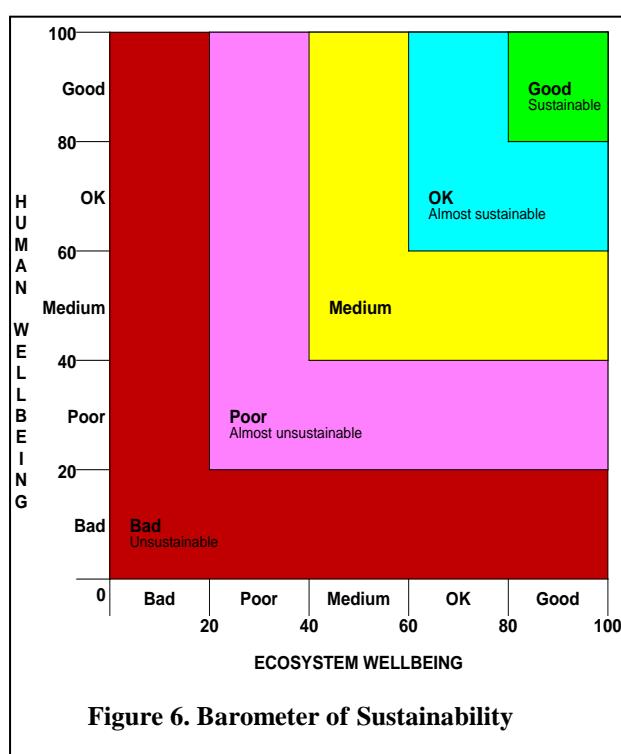
- o Health and population: physical and mental health, disease, mortality, fertility, population growth.
- o Wealth: the economy, income, material goods, infrastructure, basic needs for food, water, clothing and shelter.
- o Knowledge and culture: education, state of knowledge about people and the ecosystem, communication, systems of belief and expression.
- o Community: rights and freedoms, governance, institutions, peace, crime, civil order.
- o Equity: distribution of benefits and burdens between males and females and among households, ethnic groups and other social divisions.
- o Land: the diversity and quality of land ecosystems, including their modification, conversion, and degradation.
- o Water: the diversity and quality of inland water and marine ecosystems; modification by dams, embankments, pollution, and water withdrawal.

- o Air: local air quality and the global atmosphere.
- o Species and populations: status of wild species and wild and domesticated (crop and livestock) populations.
- o Resource use: energy and materials, waste generation and disposal, recycling; resource sectors such as agriculture, fisheries, timber, mining, and hunting.

BAROMETER OF SUSTAINABILITY

The Barometer of Sustainability (Figure 6) is a tool for combining indicators and displaying the results. It presents indices (compound indicators) visually, providing anyone - from villager to head of state - with an immediate picture of human and ecosystem wellbeing. It can display the main dimensions of each index to highlight the aspects of performance that need most attention. It can portray changes in the indices over time and compare the indices of different societies.

Every indicator sends a signal: the more indicators, the more signals. Even a modest number of indicators produces a perplexing cacophony of good, bad and somewhere-in-between news. Moreover, an indicator conveys information about the particular feature it represents, not about the system as a whole. Only by combining the indicators is it possible to obtain clear messages, gain an overview of wellbeing and sustainability, and show where performance is especially weak or strong.



Indicators can be combined in one of two ways: by converting their measurements to a common unit, such as money; or by putting them on a performance scale. Common units tend to distort the indicators and lose or bury information. For example, it is impossible to convert life, freedom, or a wild species into dollars without losing most of what we value about it. A performance scale gives a score to an indicator measurement based on the distance between the measurement and a standard level of performance. Performance criteria (definitions of standard performance) can differ with each indicator, but since their scores are calculated in the same way on the same scale, the scores can be combined.

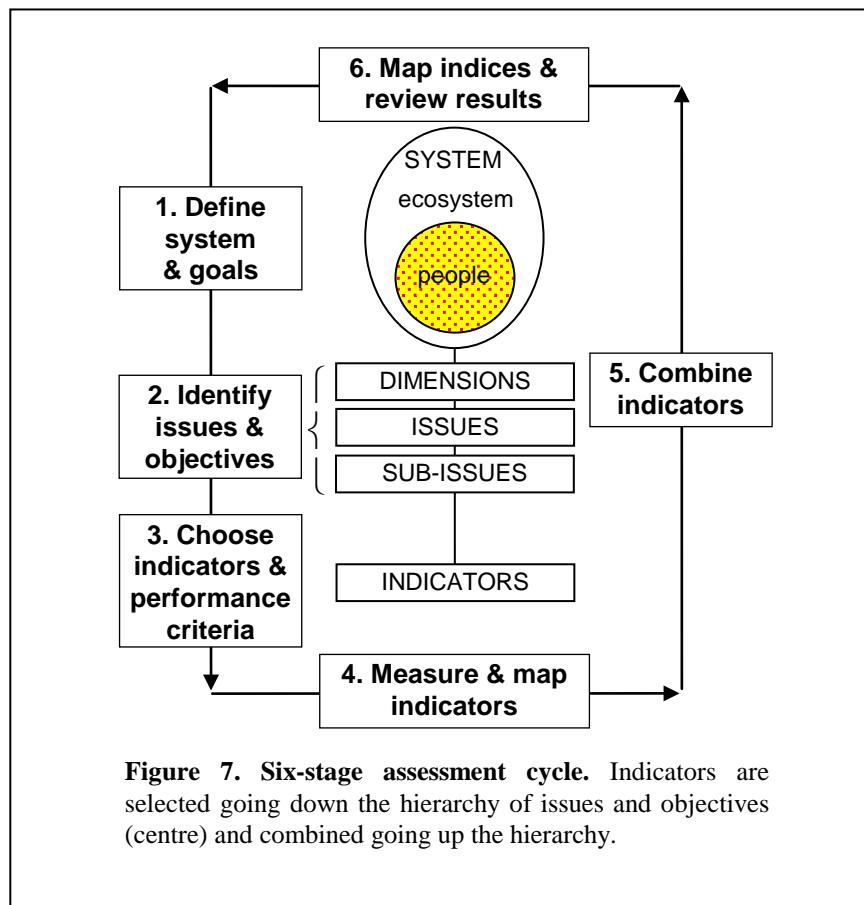
The Barometer of Sustainability is the only performance scale designed to measure human and ecosystem wellbeing together without submerging one in the other. The Barometer's key features are:

- o Two axes, one for human wellbeing, the other for ecosystem wellbeing. This enables each set of indicators to be combined independently, keeping them separate to allow analysis of people-ecosystem interactions.
- o The axis with the lower score overrides the other axis. This prevents a high score for human wellbeing from offsetting a low score for ecosystem wellbeing (or vice versa) - sustainable development must improve and maintain the wellbeing of both.
- o Each axis is divided into five bands. This allows users to define not just the end points of the scale but intermediate points as well, for greater flexibility and control of the scale.

SIX-STAGE CYCLE

Each assessment follows a cycle of six stages (Figure 7):

- o From overview to indicators - the first four stages, which determine what and how the assessment will measure, and then take the measurements.
- o From indicators to overview - the last two stages, which combine the measurements, analyse the results, and translate them into conclusions for action.



The stages are:

1. **Define the system and goals.** The system consists of the people and ecosystem of the area to be assessed. The goals encapsulate a vision of sustainable development and provide the basis for deciding what the assessment will measure.
2. **Identify issues and objectives.** Issues are key subjects or concerns - features of human society and the ecosystem that must be considered to get an adequate sense of their condition. Objectives make the goals more specific.
3. **Choose indicators and performance criteria.** Indicators are measurable and representative aspects of an issue. Performance criteria are standards of achievement for each indicator.
4. **Measure and map the indicators.** Indicator results are recorded in their original measurements, given scores on the basis of the performance criteria, and mapped.
5. **Combine the indicators.** Indicator scores are combined up the hierarchy: indicators into sub-issue indices; sub-issue indices into issue indices; issue indices into dimension indices; and dimension indices into subsystem indices (separate indices for people and the ecosystem).
6. **Map the indices and review results.** Indices are mapped to give a visual reading of results and to reveal the big picture and patterns of performance. The review links the assessment to action by analysing the patterns and the data behind them to suggest what actions are needed and where. The review also provides the diagnosis for the design of programmes and projects.

It is critically important to go through the first two stages before choosing indicators. Less structured methods often go straight to identifying indicators, which usually produces an excessive number of them. Worse, when indicators are chosen in a conceptual vacuum, it is very difficult to tell how important or how relevant they are to what people want to achieve (Table 1).

USER-DRIVEN PROCESS

The users of an assessment are decision-makers and the people who influence them, at the level of the assessment: for example, villagers in a village assessment, or national leaders and constituencies in a national assessment.

The crucial assessment decisions are to identify the issues and objectives, choose the indicators, and decide the performance criteria. These decisions are made by the users. The users are likely to be assisted by a technical support team that would compile and manage data, combine indicators into indices, map the indicators and indices, analyse the results, and

draft texts. But the users - the people expected to use the results of the assessment to decide policies and take actions - are the ones to make the main assessment decisions.

HUMAN INDICATORS		ECOSYSTEM INDICATORS	
Life expectancy at birth: years	54.7	Cultivated + built land: % of total land	22.3
Child deaths/1,000 live births	87	Natural land: % of total land	27.0
Total fertility rate: children/woman	3.3	Change in area of native forest: %/year	-0.2
Children with low weight for height: %	22.8	Protected area index: weighted %	8.1
Population with access to safe water: %	59	Degraded land index: weighted %	70.3
Real Gross Domestic Product: PPP\$/person	4,334	Total suspended solids in rivers: mg/l	1,111
Average annual inflation rate: %	8.9	Water withdrawal: % of renewable supply	29.7
Average annual unemployment rate: %	4.7	Nitrogen dioxide in city air: $\mu\text{g}/\text{m}^3$	72
External debt service: % of exports	67	Particulates in city air: $\mu\text{g}/\text{m}^3$	106
Central government deficit: % of GDP	-5.9	Carbon dioxide emissions: T/person	2.01
Net primary school enrolment rate: %	94	Use of ozone depleting substances: g/person	18.8
Net secondary school enrolment rate: %	49	Threatened higher plant species: % of total	35.6
Adult literacy rate: %	81.8	Threatened higher animal species: % of total	7.9
Main phone lines + cell phone subs/100 persons	12.3	Threatened animal breeds: % of total	6.8
Homicides/100,000 population	24.1	Energy requirement: gigajoules/person	73.8
Assaults/100,000 population	358	Food crop production: T/ha harvested area	4.4
Military expenditure: % of GDP	1.8	Fertiliser consumption: T/100 ha harvested area	6.8
Ratio of richest 20%'s income to poorest 20%'s	19:1	Fishing capacity: T/km ² of continental shelf	0.3
Female share of earned income: %	30.9	Fish catch: T/T of fishing capacity	7.1
Female share of decision-making posts: %	16	Timber removals + imports: % of volume	2.5

Table 1. What's the message? Without a structure to show the relative importance of the indicators, and without performance criteria to show the significance of the indicator measurements, this typical collection of indicators is extremely difficult to interpret.

Participation in the process of an assessment is more likely to influence decisions and actions than simply reading the results of someone else's assessment. Therefore, there should be an inclusive, open approach to participation, giving anyone who wishes the opportunity to contribute constructively. In addition, the data used in the assessment need to be made available to all, and assumptions and judgements clearly stated so that others may test alternative interpretations.

The WON assessment method has been made as easy to use as possible, to make it accessible to potential users at all levels, and to ensure that users can control their own assessment process.

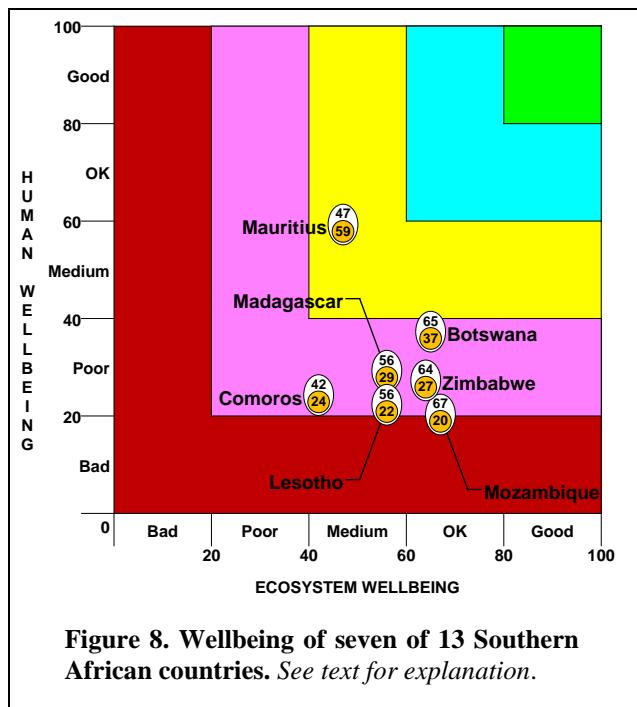


Figure 8. Wellbeing of seven of 13 Southern African countries. See text for explanation.

Without these key features...

Without these features, assessments can degenerate into mere compilations of data from which it is hard to draw useful conclusions - all mess and no message (Table 1). At best, the assessment's investment of money, time and effort will not return full value in useful information for decision-making.

With these key features...

With these features, assessments can show:

- Condition and trend of people.
- Condition and trend of the ecosystem.
- Overall wellbeing.

- Progress toward sustainable development.
- Condition and trend of major components (health, economy, land, species diversity, etc.).
- Issues where performance is weakest (or strongest).
- Key relationships, such as benefits from resource sectors per unit of ecosystem stress.
- Priority information gaps.

All but one of the examples that follow come from *The Wellbeing of Nations*.

HUMAN WELLBEING, ECOSYSTEM WELLBEING, OVERALL WELLBEING

Figures 8 and 9 summarise the overall wellbeing of countries in Southern Africa. Each country is represented by its Egg of Wellbeing. The human wellbeing index (HWI) is in the yolk of the egg, the ecosystem wellbeing index (EWI) in the white. The location of the egg in the Barometer marks the overall wellbeing index (WI). Note that the WI corresponds to the lower of the HWI and the EWI.

This portrayal clearly reveals significant differences in performance. Mauritius, with a medium WI, does best; Angola and Mozambique, with bad WIs, score worst. The remaining 10 countries have poor WIs. (The indices are not as precise as the numbers suggest: countries on the boundary of a band - Lesotho, Mozambique, and South Africa - could well be on the

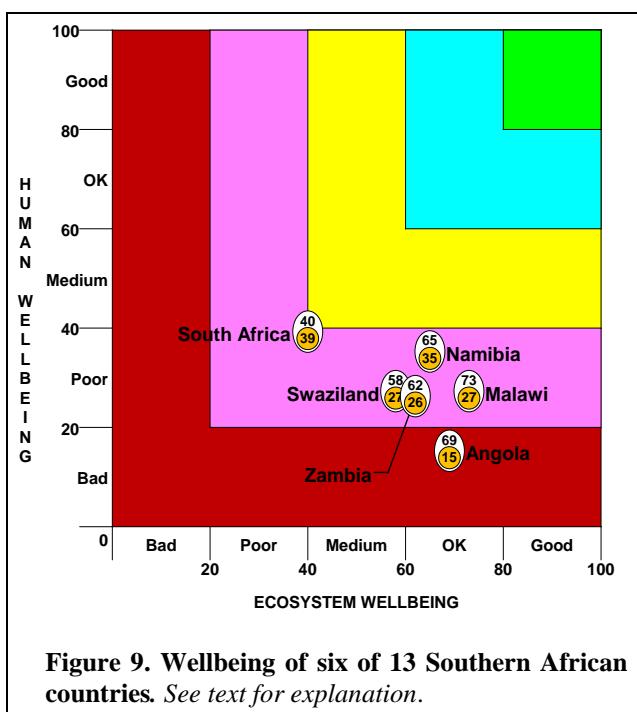


Figure 9. Wellbeing of six of 13 Southern African countries. See text for explanation.

countries with poor HWIs and EWIs in the upper medium or lower OK bands begin to show distinct differences: Botswana has a medium index of progress toward sustainability, Lesotho a bad index, the rest a poor index. Malawi and Zimbabwe have identical HWIs but ecosystem stress is significantly higher in Zimbabwe.

other side.) Most of the countries are held back by human rather than environmental conditions. The notable exception is Mauritius, with a "developed" country mix of better human wellbeing than ecosystem wellbeing. South Africa is also unusual, with the conditions of people and the ecosystem about the same.

PROGRESS TOWARD SUSTAINABLE DEVELOPMENT

Figure 10 and Table 2 summarise progress toward sustainable development, measured by the amount of human wellbeing per unit of ecosystem stress. Mauritius and Comoros have similar levels of impact on the environment, but the conditions of people in Mauritius are very much better. The cluster of eight

countries with poor HWIs and EWIs in the upper medium or lower OK bands begin to show distinct differences: Botswana has a medium index of progress toward sustainability, Lesotho a bad index, the rest a poor index. Malawi and Zimbabwe have identical HWIs but ecosystem stress is significantly higher in Zimbabwe.

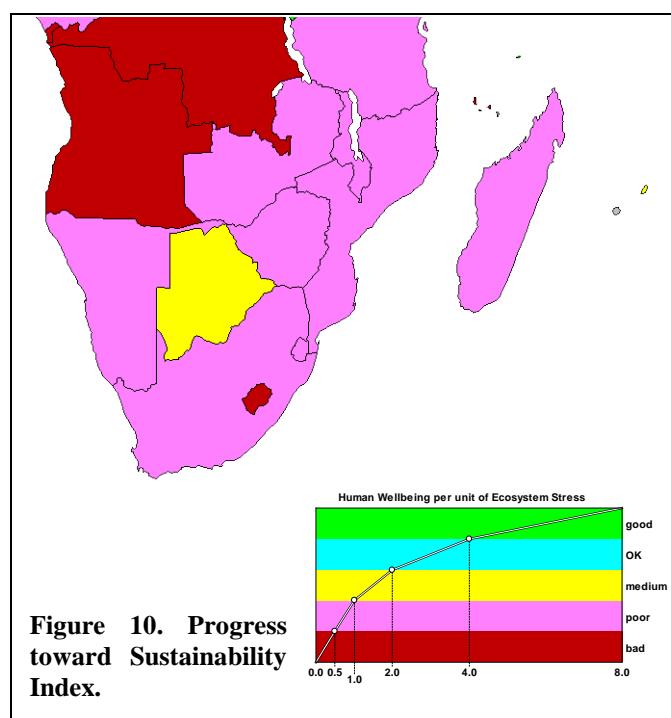
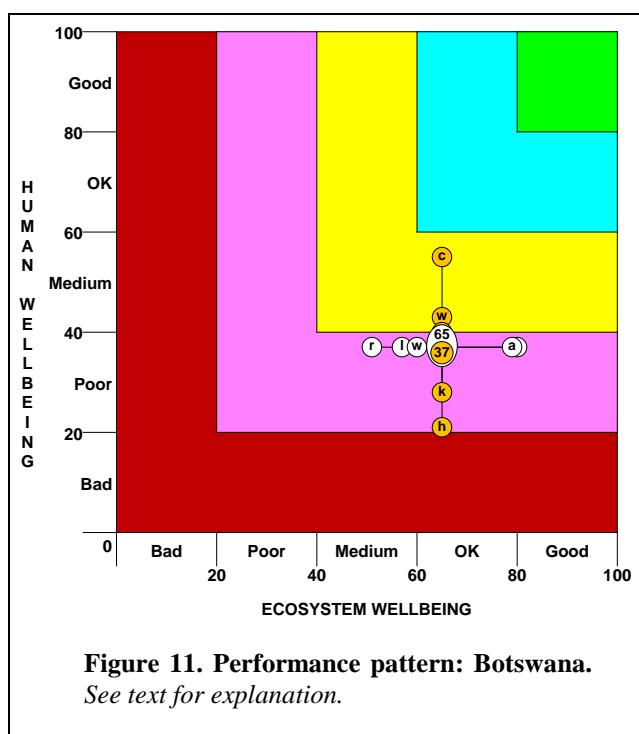


Figure 10. Progress toward Sustainability Index.

country	Human wellbeing	ecosystem stress	human wellbeing/ ecosystem stress
Mauritius	59	53	1.11
Botswana	37	35	1.06
Namibia	35	35	1.00
Malawi	27	27	1.00
Zimbabwe	27	36	0.75
Zambia	26	38	0.68
Madagascar	29	44	0.66
South Africa	39	60	0.65
Swaziland	27	42	0.64
Mozambique	20	33	0.61
Lesotho	22	44	0.50
Angola	15	31	0.48
Comoros	24	58	0.41

Table 2. Southern African scores for human wellbeing, ecosystem stress, and progress toward sustainability index (human wellbeing per unit of ecosystem stress).



PERFORMANCE PATTERNS (MAJOR COMPONENTS)

The Barometer of Sustainability can also display performance patterns so that users can see at a glance the effect of the different dimensions. In Figures 11 and 12, the letters in the grey circles refer to the five human dimensions:

- c Community (political rights, civil liberties, crime, peace).
- e Equity (household and gender equity).
- h Health and population.
- k Knowledge (education and communication).
- w Wealth (household and national economies).

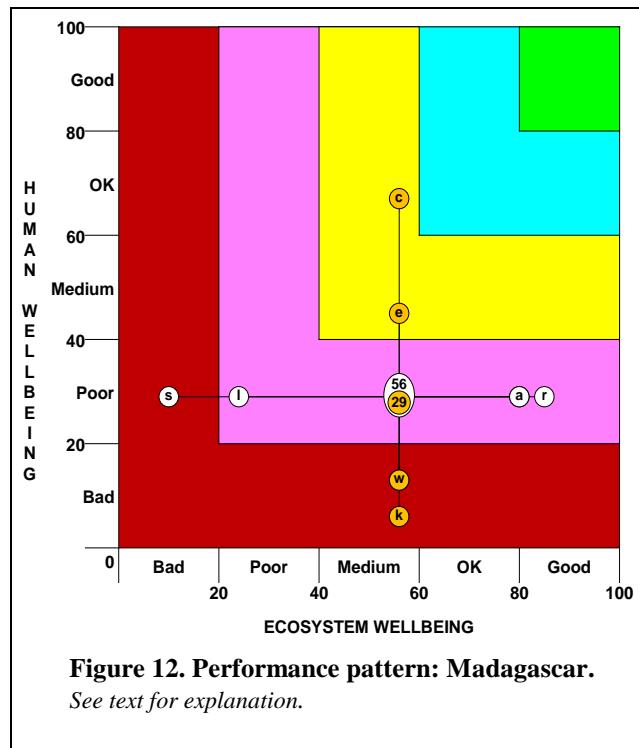
The letters in the white circles refer to the five ecosystem dimensions:

- a Air (global atmosphere and local air quality).
- i Land (diversity and quality).
- r Resource use (energy, agriculture, fish, timber).

The letters in the white circles refer to

- s Species and populations.
- w Water (inland waters only).

Some circles may be hidden by the egg or by another circle if scores overlap.



Botswana's human performance ranges from medium to poor, with community and wealth medium and the other dimensions poor (Figure 11). Its ecosystem performance ranges from OK to medium, with air and species and populations OK, and water, land and resource use medium.

By contrast, Madagascar's performance has a much wider spread and a different pattern of strengths and weaknesses (Figure 12). Its human performance goes from OK to bad: community OK, equity medium, health and population poor, and wealth and knowledge bad. Its ecosystem performance goes from good to bad: resource use good, air OK, water medium, land poor, and species and populations bad.

Strengths and Weaknesses

The performance patterns are the starting point for analysis of strengths and weaknesses. The indices reveal the big picture. The individual issues and indicators show why the picture looks the way it does.

Botswana, for example, has the highest wealth score in Southern Africa after Mauritius, due to its strong national economy and relatively high income per person. However, resource use, the source of its economic strength, is where Botswana is weakest environmentally. Agricultural productivity is only moderate and agricultural self-reliance very low. Despite a large proportion of natural land and impressive protected areas, Botswana's land score is only medium because of high rates of soil degradation. The country can better its environmental performance by improving land and resource use. But the most urgently needed advances are on the human side. The poor scores for knowledge and health and population are due to low literacy rates, bad communication infrastructure, a life expectancy at birth of only 47 years, high child and maternal mortality rates, and a high total fertility rate. In addition, the strong national economy masks serious problems with household economies, notably 29% of the population with insufficient food and only 55% of the population with access to both safe water and basic sanitation.

KEY RELATIONSHIPS

A well organised assessment facilitates exploration of relationships among issues, such as:

- o Consumption, human wellbeing, and ecosystem stress.
- o Food sufficiency, income level, income distribution, land degradation, agricultural productivity, and food self-reliance.
- o Human benefits and ecosystem stress from resource sectors.

The last example is illustrated in Table 3. In an assessment of the sustainability of the Canadian province of British Columbia, total ecosystem stress was broken down by source: food industry (agriculture, fishing, aquaculture, food manufacturing), timber industry (logging, wood and paper manufacturing), mineral industry (mining, quarrying, oil and gas extraction and processing, metal manufacturing), and the rest of society. The benefits produced by the industries could then be compared with the ecosystem stress they caused. This provided a benchmark against which to measure each industry's progress in increasing its contribution of GDP and jobs and reducing its overall stress on the ecosystem.

Resource sector	Ecosystem stress	GDP CA\$m	jobs 000	CA\$m GDP/ ecosystem stress	000 jobs/ ecosystem stress
Food	9	2000	54	222	6
Timber	14	4987	106	384	8
Mineral	2	3396	38	1698	19

Table 3. Gross Domestic Product (GDP) and employment (jobs) per unit of ecosystem stress: resource sectors in British Columbia, Canada. Source: Prescott-Allen (1997).

PRIORITY INFORMATION GAPS

Assessments commonly conclude that more research is needed. It is important that they identify the information gaps that are crucial for decision-making on sustainable development. Organising assessments into dimensions, issues and sub-issues makes this possible. Since these components are chosen for their significance for sustainable development, gaps in the structure (issues or sub-issues with no or inadequate data) highlight gaps in information essential for sustainable development policies.

Taking Southern Africa as an example, Table 4 classifies the status of information on issues and sub-issues by dimension and in three categories: little or no data; big gaps and flaws; and fairly good data. It is easy to tell from this that the dimensions with least information are water, knowledge and culture, air, species and populations, and resource use - and to set priorities accordingly.

Dimension	data status of issues & sub-issues		
	little or no data	big gaps & flaws	fairly good data
Health & population	mental health		physical health, POPULATION
Wealth	shelter, unemployment	food sufficiency, basic services	income, inflation, investment & saving, debt & deficit
Knowledge & culture	state of knowledge, CULTURE		education, communication
Community	governance	crime & civil order	freedom, peace
Equity	ethnic equity	household equity	GENDER EQUITY
Land		LAND ECOSYSTEM DIVERSITY, LAND QUALITY	
Water	SEA, inland aquatic ecosystem diversity, water quality	water withdrawal	
Air	LOCAL AIR QUALITY	Greenhouse gases	ozone depleting substances
Species & populations	crop diversity	plant species diversity, animal species diversity, livestock diversity	
Resource use	material requirement & waste disposal, wildlife	fisheries, timber	energy, agriculture

Table 4. Status of information on issues and sub-issues: Southern Africa. Issues are in capitals, sub-issues in lower case.

CONCLUSIONS

A full description of the WON system assessment method is given in IUCN/IDRC International Assessment Team (1999). It is already proving to be an effective tool for analysing and measuring the conditions and interactions of people and the ecosystem. Its values lies not only in its yield of information and insights for better national and local decision-making, but also in its power to stimulate reflection and debate on the essence of human and ecosystem wellbeing. The method continues to grow and improve as new users apply it to new experiences.

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RESPONSES TO KEYNOTE SPEECH

By: Carmen Miranda, Estación biológica del Beni (Bolivia)

In the El Beni Biosphere Reserve in Bolivia, we are working with many partners to measure and assess ecosystem values. This is a particularly appropriate setting to carry out such work, because we have a reasonably strong scientific foundation upon which to build. We are looking at a number of dynamic trends, as various kinds of changes are affecting the natural ecosystems in the rainforests of lowland Bolivia. Part of our work involves experiments in trying to implement sustainable development on the ground. We are finding, however, that tension still arises between the needs of the local human population and the health of natural ecosystems. Clearly, we need ways to measure sustainability so that we can meet the needs of different populations. Our experiments are linked to the Beni Biosphere Reserve.

We are investigating how the changes in the local communities are affecting the protected area and its buffer zone. We are looking at the efficiency of institutional management in hopes that better institutions will take us towards a more sustainable state. We are measuring both environmental and social parameters, and the methodological approach that has been described by Robert Prescott-Allen will help us to determine wellbeing. We are combining maps and other measures to illustrate trends, and clearly combining indicators is an important means of presenting the overall picture. We conclude that societies often have very different definitions of wellbeing, with the local context often having very different characteristics. Further, individuals and communities may have very different understandings of wellbeing. A critical element for us is how to move ahead when the information is very limited, and how we can collect the necessary information at the lowest possible cost.

COMMENTS FROM PARTICIPANTS

It is important to ensure that indicators are clearly linked to the conditions under which they are needed. We should not fall into the trap of developing indicators just because they are there.

Aggregating indicators, as suggested by Robert Prescott-Allen, can lead to errors, so sensitivity analysis clearly is needed.

Universal indicators are highly elusive, because different indicators are needed for different regions. The issue of scale is also relevant here, as many indicators will be most effectively applied at relatively local levels.

IUCN should be working with other efforts being carried out on the development of indicators, including under the various Rio Conventions. IUCN should contribute to building linkages and synergies among these various efforts.

The indicator measuring the share of species threatened as a percentage of the total biases the results against New World countries, since many of the Old World countries long ago eliminated their most vulnerable species.

Indicators that measure the importation of (renewable) natural resources take no account of the degree to which the stock from which the resource is drawn is well or poorly managed.

We also need some standards to be established along with measures of sustainability on state of environment reporting.

Regional assessments, drawing on stakeholders who develop their own indicators and define their own performance criteria, can generate nationally formulated data and foster dialogue between stakeholders and countries.

KEY CONCLUSIONS

Indicators of sustainability are of great interest to many constituencies, and IUCN should continue to develop these for application at a number of levels. However, the tool needs to be relatively flexible, and applicable in situations where data may be in relatively short supply.

Important future directions for IUCN include:

- o Undertaking further work on measuring its own performance, as an essential means of determining where IUCN is going;
- o Incorporating indicators and performance measures within all IUCN programmes and commissions; and
- o Promoting measures of sustainability to be included within the various environmental conventions.

3. CONSUMPTION

3.d APPROPRIATE INSTITUTIONS FOR THE 21ST CENTURY

Numerous global environmental conventions have been agreed since the founding of IUCN (and indeed many of them were drafted by IUCN's Environmental Law Centre), but the institutional response - at global, national, and local levels - to the responsibilities of these conventions has lagged well behind the requirements. How can the various international conventions work more effectively together? How can governments meet the demands in a time of shrinking budgets and growing demands? What are the appropriate institutional responses in a time of increasing globalisation and simultaneous decentralisation?

Organizer: IUCN Environmental Law Programme (Nicholas Robinson)

Chair: Lee Kimball (USA)

Keynote speaker: Joke Waller-Hunter, OECD (Netherlands)

Respondents:

- o Silvano Briceno, Deputy Executive Secretary, Convention to Combat Desertification (Switzerland)
- o Bernd von Droste, UNESCO (Germany)

CHAIR'S OPENING REMARKS

CHAIR: LEE KIMBALL

RAPPORTEUR: NICHOLAS ROBINSON

As the 20th century draws to a close, most nations are confronting multiple challenges to the environmental quality which underpins and nourishes their socio-economic development. With all parts of the globe tied together in an intricate web of economic relationships, the legal structure to support globalization has also become highly complex, with numerous international agreements governing various aspects of human enterprise.

The need for concerted national and international measures to manage our resources and promote environmentally sustainable development has long been recognized. For those concerned with sustainable development, one of the central challenges facing developing countries is how to create "synergies" in national implementation of the various international conventions that have been agreed over the past few decades. Each of the new conventions arising out of the 1992 Rio Earth Summit requires that countries develop specific implementation mechanisms and fulfil obligations involving reporting, training, public education, research, and various other kinds of activities. However important, even essential, these activities are, they also place a considerable financial and human resources burden upon countries. Therefore, recognizing the synergies among these instruments and finding ways to coordinate and harmonize activities among them can help lead to success at the national level.

Given the challenges being faced by both individual nations and the global community, IUCN needs to contribute to developing and enhancing synergies between the conventions in terms of their implementation at national, regional, and global levels. All of this requires appropriate institutions, so this session will begin with an overview of appropriate institutions for the 21st century, followed by contributions from several of the relevant international conventions.

Appropriate Institutions for the 21st Century

By: Joke H. Waller-Hunter, OECD, Paris, France

ABSTRACT

Over the past few decades, institutions have undergone several major changes. The policy emphasis has begun to move from environment to sustainable development, though the latter does not yet have adequate institutional arrangements. But the change in policy emphasis has also hampered the strengthening of environmental institutions, even though such institutions provide an essential pillar for sustainable development. For example, it is possible that the "sustainable development wave" has weakened UNEP. Sustainable development is a process rather than a clearly defined objective; numerous international institutions are important contributors, in which economic actors (and their institutions) have to take responsibility and assume accountability. It is becoming increasingly well recognised that the key question to be addressed is the sustainable management of natural resources. The institutional requirements for the management of national resources include providing sound and authoritative scientific information; establishing norms; providing financial incentives for implementation; involving civil society; establishing compliance, monitoring, and enforcement systems; and building the capacity to settle disputes. Not all functions are currently fulfilled in a satisfactory manner. When looking at the future, it is important to position environment in such a manner that it can be effectively managed. This implies certainly more activity on the part of economic institutions, with more emphasis on a regional approach. Clustering of conventions would be a first step towards enhanced coherence in the environmental field. In general, incremental changes are more likely and recommendable than sweeping reforms.

INTRODUCTION

The environment is not in good shape and neither are the institutions - collection of rules, decision making procedures and programmes - dealing with it (Young, 1998). Looking ahead towards the institutions for the 21st century is only feasible if we try to assess where we stand today.

I will review some recent developments, identify functions that institutions need to fulfil and provide some suggestions for the future. I will deal only with international institutions, but would like to underline at the outset that without adequate national and local institutions, progress is derisory. Their development, including through support to capacity building, is essential.

RECENT DEVELOPMENTS THAT HAVE AFFECTED INSTITUTION BUILDING

One of the major changes in addressing environmental issues over the past ten to twenty years has been the recognition that environment, in order to be effectively addressed, is best considered in the context of sustainable development. After IUCN launched the concept in its

1980 World Conservation Strategy, the concept received a real political boost through the Brundtland report (WCED, 1987), which urged economic actors and the related international institutions to take responsibility for the environmental implications of their activities and to be held accountable for them.

This message was carried and reinforced by the preparations for and outcome of the UN Conference on Environment and Development. Fundamentally the message is correct and the objective must be pursued as vigorously as possible. In practice, however, its implementation has led to a number of unwanted effects.

Although the Brundtland report stressed that strengthening of environmental institutions is needed, the shifted emphasis towards the economic institutions left the environmental institutions weakened. Not assigning responsibilities to UNEP for the preparations of UNCED and for major new conventions marginalised UNEP for an extended period of time.

And the economic institutions, like the World Bank, the IMF, the WTO, FAO etc., that were supposed to integrate environment into their daily routine, were, at best, unprepared. Up to then, they were mainly seen, and criticised by the environmental community, for the indirect, mostly negative, environmental impacts of their activities. Their constituency was, and still is, not always convinced of the need to integrate environmental objectives into their overall operations in order to pursue sustainable development.

The question thus remains, will these economically-oriented organizations be allowed by their leaders to pursue environmental objectives, or, in other words: will they use their instruments to enhance the efficiency of environmental management? I'll come back to this question later.

The mere fact that sustainable development requires appropriate integration of environment, economic and social objectives leads to the conclusion that no single institution can be entrusted with it. Thus, out of necessity, the need for environmental expertise increases. The legitimate need to strengthen environmental expertise in organizations that do not have environment as their main or sole objective, has redirected financial support and led to neglecting the need to maintain strong environmental organizations, like UNEP.

This was reinforced by the fact that the United Nations Commission on Sustainable Development was created as a follow up to UNCED. From the outset it suffered from two main problems: it had no real power to make others deliver on the agreements reached in Rio; and it was dominated by Ministers of Environment, who made it their new body, despite many appeals to have ministers other than environment ministers represented. As environment ministers are dependent on their colleagues for implementing their objectives and achieving sustainable development, the direct impact of decisions taken by the Commission is limited. However, the CSD recognised that sustainable development is not a clearly-defined, ready-made concept. Based on a common set of principles and orientations, as embedded in the Rio principles, Agenda 21 and various Conventions, it has to be defined in different circumstances, for different economic sectors, and for different actors. It is the result of a process. This was realised by the CSD, which became a rather successful facilitator of such processes as a result.

It also fulfilled an important role in agenda setting. Thus the work program that was adopted at the Special Session of the General Assembly in 1997 (Earth Summit + 5) reflects well how the priorities have evolved since the adoption of Agenda 21. It shows clearly that the emphasis has moved towards the sustainable management of natural resources (fresh water, oceans, atmosphere, biodiversity, forests), in recognition of the fact that our current development patterns are degrading the biological systems that produce these renewable resources. It is thus essential that the institutions for the future deal adequately and coherently with the sustainable management of natural resources.

INSTITUTIONAL REQUIREMENTS/FUNCTIONS FOR THE MANAGEMENT OF NATURAL RESOURCES

Based on experiences with the various conventions and other international agreements which have the sustainable management of natural resources as their objective, one can distinguish several functions that institutions must fulfil:

- o providing sound and authoritative scientific evidence (on the functioning of systems under environmental stress);
- o providing agreed norms;
- o providing financial incentives for implementation;
- o broadly involving civil society;
- o providing compliance monitoring/enforcement systems; and
- o providing dispute settlement.

Without even trying to be comprehensive, I would like to make a few remarks related to some of these functions.

PROVIDING SOUND AND AUTHORITATIVE SCIENTIFIC EVIDENCE

Underpinning the management of natural resources is an understanding of the interactions between socio-economic and natural systems. It is important not only that the required research is carried out into the functioning of the systems, resource dynamics, socio-economic dynamics, etc., but also that a process is in place that leads as far as possible to a broad scientific consensus, including uncertainties, which will then form the basis for regulatory action. A good example is the Intergovernmental Panel on Climate Change, without which the UNFCCC and the Kyoto Protocol would probably never have materialised. In my view, the Biodiversity Convention is missing a similar authoritative body, addressing the scientific issues at a certain distance from the bodies of the Convention itself. While the stakes and the economic implications may be just as high as in the case of climate change, attention for biodiversity on domestic policy agendas is still rather limited. One could have imagined that IUCN, with its Commission structure that promotes networking among approximately 9000 scientists, and given its unique mixed government/NGO membership, would have evolved into or facilitated an "IPCC" for biodiversity.

THE NORMATIVE FUNCTION

So far, the norms agreed upon internationally, mainly in conventions, are largely qualitative, with a few exceptions where quantitative objectives have been set. The Kyoto Protocol and the regional transboundary air pollution protocols in Europe are noteworthy examples, thanks to the availability of authoritative scientific evidence on where system changes will occur. Having quantitative norms or targets provides strong guidance for the development of national policies and it facilitates monitoring of compliance. IUCN has largely contributed to the thinking on quantitative approaches to the management of biodiversity, especially in the field of species protection and protected areas. This has, to a certain extent, been translated into international instruments, but more seems feasible.

FINANCIAL INCENTIVES AND MECHANISMS

International agreements dealing with global issues have underlined the need to support the developing countries in the implementation of their obligations under the agreements. Without appropriate funding, those agreements would not be acceptable to the developing countries. This has led to the creation of special mechanisms, like the Montreal Fund and the Global Environment Facility (GEF). The relatively successful implementation of the Montreal Protocol can be partly attributed to the availability of the Fund. The GEF, after an initial period of trial and error, has evolved into a stable mechanism. It is still too early to assess its concrete contribution to achieving the objectives set out in the conventions for which it facilitates implementation in developing countries.

The Kyoto Protocol will lead to new markets for trading emissions under the so-called flexible mechanisms (including emission trading, Joint Implementation and the Clean Development Mechanism) and once a regime for trading in property rights under the Biodiversity Convention comes into being, this will also create new markets. Institutions, most likely private, will have to be developed to facilitate the trading.

In addition, the UNFCCC and its Kyoto Protocol and the Biodiversity Convention advocate the use of economic and fiscal instruments, like taxes and subsidy removal, for the implementation of domestic measures. The implementation of such measures raises questions of competitiveness, although there is no evidence so far of loss of competitiveness due to their unilateral application. Appropriate institutions at the international level are needed to provide for a certain bottom-up harmonisation, for example, through exchange of experience and peer-pressure. So far, attempts made by UNEP to set up an Intergovernmental Panel on the use of economic instruments in conventions have been unsuccessful, but there is certainly a need for such a mechanism to exchange experience at the global level. Perhaps the Commission on Sustainable Development should broaden its work on financing of sustainable development to better fulfil this function.

INVOLVING THE PRIVATE SECTOR AND CIVIL SOCIETY

UNCED and its preparations has been a landmark in involving non-state actors in international decision-making processes. It also led to the creation of new network organizations like the World Business Council for Sustainable Development. Since then, at

least in the UN context, international meetings have been open to business and NGOs. Related organizations like the World Bank, GEF and WTO have opened up following outside pressure by, mainly, environmental NGOs. The further development and use of electronic communication systems, like Internet, is important for enhancing transparency of international decision-making. The recently-adopted Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (the Aarhus Convention, adopted in June 1998 at the fourth Environment for Europe Conference in Aarhus, Denmark), consolidates the recognition of the importance of civil society involvement.

Also interesting is the enhanced consultation, sometimes leading to joint statements, between international NGOs and multinational corporations. I would welcome a development in which, at the national or international level, voluntary agreements would be concluded between NGOs and business where the government or intergovernmental organization would set the overall objectives and monitor compliance.

While progress is evident in involving the private sector and civil society in international decision-making processes, where practices mainly developed in environmental circles have now been adopted by the economic organizations in the fields of compliance monitoring, enforcement and dispute settlement, much remains to be done. Suggestions to give a central role to the International Court of Justice, which could establish an "environmental chamber", have not been followed up by concrete action. A first step in this context might be to provide a type of Ombudsman function where practices of non-compliance could be challenged.

ALTERNATIVE FUTURES

When thinking about future institutional arrangements one should envisage first how one would position environment. As a security issue? Primarily as an economic issue? As an issue supporting other sectors?

The discussion on environment as a security issue has re-emerged, after a first "wave" in the mid-eighties. In 1996, the then Secretary of State of the US, Warren Christopher, made the link explicitly (Wirth, 1998; OECD, 1998). Indeed, global environmental change, be it climate change, scarcity of water or dwindling fish resources, has the potential for generating instability and conflict in geopolitically important areas. Would this be a reason for institutions dealing with security issues, like the UN Security Council, to take the lead in dealing with international environmental issues? Or should the idea be pursued to establish an Environmental Security Council?

Although this would certainly attract the needed policy attention for environmental issues, it would bear the risk that issues would only be addressed in a crisis setting, while environmental management is better served by a long-term strategic approach that would prevent crises.

Positioning environment as an economic issue is more likely to generate results. If the economic institutions do not take environment into account, not much progress will be made in terms of sustainable development. Integration is the key, perhaps in two steps. A first step

could be improving environmental performance, which implies a consideration of the economic costs and benefits of environmental policies, as well as the environmental costs of economic activities. "Getting the prices right" is the advocated approach. The second step would be moving towards sustainable development which is concerned with maintaining the wholesale viability of the system in which economic actors operate; the environment and the social context are not seen as constraints that have to be traded off against economic growth, but as essential infrastructure which has to be strengthened as a necessary condition for economic growth. However, the difference in time horizon between economic policy and environment policy must be overcome. It is evident that an appropriate, new, economic framework is needed as a basis for the approach, or, if you wish, the change in paradigm, at national and international level. It is encouraging that an organization like the OECD, which is more than anything else an economic organization, has taken it upon itself to try to develop such a framework. The fact that this has been triggered among other things by the concerns of economic departments in member countries on the economic impacts of achieving the Kyoto targets (as part of the first step referred to above) is also revealing. If we agree that getting the prices right is an important step towards achieving sustainable development, then we must hope that the institutions that set the prices, which are normally not the environment institutions, start playing their role adequately.

Would this mean that there will be no role for environmental institutions in the future? Certainly not. The environmental institutions must continue their role in providing the evidence on the functioning of the systems (marine and land ecosystems, climate systems) under the stress of economic activities (scientific function). Based on these findings the norms must be set, taking into account economic competitiveness concerns. Once the norms are set, they should not become subject to trade-offs in other fora or institutions. It is important, nevertheless, that the environmental institutions recognise that for the implementation of the agreed targets they are dependent on other institutions, including those of the private sector, which will develop their own strategies for implementation, within the conditions set in the context of the environmental institutions.

The environmental institutions are again key in monitoring the actual progress or lack thereof in complying with the objectives. They are thus certainly an essential part of the overall institutional set-up and much must be done to strengthen them. A first step in that direction in the UN context would be to implement the proposals put forward by the Task Force chaired by Klaus Töpfer, and that are among other things aimed at bringing some coordination among the conventions and UNEP, through annual ministerial meetings that would give overall political guidance and that could be held back to back with joint meetings of representatives of the Conferences of the Parties of selected conventions. Although this is a mechanical solution, it may be the first step to substantive cooperation and coordination. Personally, I would suggest not waiting too long before clustering, if not merging, the conventions dealing with biodiversity. This would create a much stronger body of law, which, in combination with an "IPCC for Biodiversity" that I mentioned before, would become an effective force in protecting and otherwise managing biodiversity before it is too late.

But if we want to achieve the integration without which sustainable development will be difficult to realise, then priority should be given to further developing the economic and trade institutions so as to make them fit to deliver on the implementation of environmental

objectives. Assuming that globalisation of markets, goods and services will continue, the role of the trade agreements will continue to strengthen. The debates on trade and environment, and in particular between trade and the multilateral environmental agreements, have borne little fruit so far, so it is important that the emphasis in the discussions in the trade fora shifts from trade measures in MEAs and their compatibility with WTO rules to trade effects more generally that can arise from MEAs. The Millennium Round of trade negotiations must be used to redress the imbalance in the passive approach taken by the WTO Committee on Trade and Environment so far.

More focus on a regional approach is also recommended. The importance of regional trade agreements (like NAFTA and Mercosur) or development banks (like the Asian Development Bank and the Inter-American Development Bank) is certainly on the rise. Because they are much more closely related to problems at the practical level, and, perhaps as a result, seem to be more inclined to and effective in dealing with the economic-social-environmental interface, they will certainly be key players in the future.

What I have suggested so far are mainly incremental steps to make existing institutions work better for achieving sustainable development, including through enhanced coordination or mergers. I have not advocated radical change through the creation of new institutions. Why not? Mainly, because it does not seem to be politically realistic. When I was still a delegate representing a government, my brief invariably included: "do not support the creation of new institutions". The willingness to pay for the work of international institutions has certainly not improved, if you allow me this understatement. Besides, based on my experience in the UN, my confidence in the UN decision-making power has not increased. In addition, for various reasons, including the disappointment of the developing countries in the support received from the industrialised countries for the implementation of the Rio agreements, the "climate" in the social-economic sector of the UN proper does not seem very favourable for sustainable development. It may sound strange, six years after Rio, but the time is not ripe. Of course, I would have liked to have seen a body that has the power, for example through the allocation of resources, to direct the work of the various UN organizations and agencies towards sustainable development. What seems to be the maximum feasible at this stage, is real coordination and cooperation based on concrete programmes, such as the cooperation of the various UN bodies dealing with forests on the implementation of the recommendations of the Intergovernmental Panel on Forests. In fact, dwindling resources may facilitate this process. The 2002 Rio + 10 Conference may be an appropriate moment to adopt such programmes in the fields of, for example, energy and water, which would then lead to the related institutional arrangements for implementation.

However, the existing institutions could be supplemented by new types of institutional arrangements, like the "public policy networks" suggested by Jean François Rischard of the World Bank. His proposal is to create standing international networks on a limited number of issues of global importance. They would combine government ministries, and work together with the private sector, NGOs and civil society representatives. Such horizontal networks could bring superior knowledge and problem-solving power to bear, while acting to deepen public involvement and support for inevitable policy choices. I am tempted by such an approach as it would counter the inertia in many international single-topic fora, that do not bring the right people together to deal with the complexity of horizontal issues. Whether

sustainable development should have its own network or be part of several would be a question to be answered. Transparency is another concern to be addressed. The OECD is currently experimenting with such an approach. As part of its sustainable development initiative, it has set up a Round Table on Sustainable Development that, coincidentally, fits the characteristics of the networks proposed by Rischard.

CONCLUSION

As sustainable development cannot be achieved by any single institution, realising more synergy in existing environmental institutions and pressing economic and trade organizations to deliver on sustainable development objectives would be my main proposed course of action. The momentum that will be created by the Rio + 10 Conference in 2002 and the Millennium Round of trade negotiations should be fully used.

More interaction between the private sector and NGOs may lead to faster positive results for the environment than current intergovernmental processes could achieve. IUCN is extremely well placed to move the agenda in that direction.

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RESPONSES TO KEYNOTE SPEECH

By: Silvano Briceno, Deputy Executive Secretary, Convention to Combat Desertification (Switzerland)

The linkage between environmental quality and economic growth is widely recognised and understood as an absolute priority for sustainable development. However, the need for connecting the institutional arrangements - organizations, legislation and programmes - that conduct and support the various processes involved remain insufficiently understood. While a great deal of institutional interaction, Cupertino, and networking is indeed underway, these linkages remain, to a large extent, superficial. A new approach for developing synergies among programmes and organisations would use more substantive and systematic involvement, which is gradually becoming a pre-condition for sustainable development.

The Biodiversity, Climate Change and Desertification Conventions have a great deal in common. While each addresses a specific area of work, all three have an important impact on political, social, economic and cultural factors. In addressing subjects that are in many ways different, these treaties can and should contribute to each other's objectives in important ways. This can be achieved through closer collaboration not only among secretariats of the three conventions but also among their political processes at both the national and international levels.

The physical processes of biodiversity, climate change and desertification are intertwined. Climate change will affect drylands by influencing water supplies, heat extremes, the humidity and temperature of soils, and agricultural production. It will also threaten biological diversity on land and in the sea. As climate zones shift poleward, the composition and geographic distribution of ecosystems will change rapidly. In parallel, deforestation and dryland degradation are influencing local climates, the global carbon cycle, and the albedo, or reflectivity, of the earth's surface.

Biodiversity and desertification are also influenced by dryland degradation, which affects agricultural productivity, natural vegetation, wildlife and soils. The loss of biodiversity likewise undermines the environmental health of drylands and makes them more vulnerable to humans and natural pressures.

Fortunately, the three issues are also linked by common solutions. For example, combating deforestation reduces net carbon dioxide emissions, land degradation and the loss of biodiversity. Similarly, the introduction of renewable energy technologies can cut greenhouse gas emissions while easing pressure on land and forests by providing an alternative to unsustainable biomass fuels.

A process towards integration and the search for synergies cannot be undertaken globally because it would require previous agreement on principles, criteria and procedures which would take too long to negotiate. Therefore, a better approach is to move forward on a trial-and-error basis, where short-term issues are worked out with a long-term vision in mind, and organisational approaches are developed (improving management, decentralisation, openness, partnerships, sharing resources and skills, etc). Some positive initiatives exist, for example in

the field of trade and environment, involving the WTO, UNEP, UNCTAD, NGOs, private business and governments. Many areas, however, remain largely unattended, such as disarmament and the production of environmental technologies where efforts can be combined to achieve a large-scale reconversion of industrial processes. For example a concentration (synergy) of international efforts utilising all relevant programmes could serve to address more effectively priority geographic areas such as Africa.

The servicing of national and local needs should be the main purpose of international organizations, including assisting them to understand and participate in global issues. Synergies at the international level need to be geared towards nurturing and supporting synergies at the national and local levels and the relations among themselves.

By: Bernd von Droste, World Heritage Centre (France)

Close ties between nature and culture were once a novel concept, but today the World Heritage Convention with 155 State Parties has global coverage with 552 natural and cultural sites of both unique and universal value enjoying protection.

A few examples from the World Heritage List will suffice to show that it is artificial to dissociate culture and nature. You merely have to look at the temples of Angkor in Cambodia, Tikal in Guatemala, the Mont St Michel in France, Machu Picchu in Peru, the historic Solovetsky Islands in Russia and Gorée Island in Senegal.

The cave paintings of Fos Coa in Portugal, Mesa Verde in the United States, the Nubian Monuments in Egypt are all sites where the intricate link between the work of man and of nature is particularly evident. In a way all natural sites are also shaped by humans.

The World Heritage Convention has become the prime framework for protecting sites that show that a harmonious relationship between man and nature is possible. Thus, cultural landscapes such as Tongariro in New Zealand, the rice terraces of the Ifugao people on Luzon, Philippines, and Cinque Terre in Italy are all on the World Heritage List.

I would like here to acknowledge the pioneering work of French experts, especially MM. Chabasson and Alain Megret of IUCN and especially of Bing Lucas and Adrian Philips. But IUCN should give even more attention to the cultural dimension in its work.

The global approach to the World Heritage Convention has also had organisational consequences. First, State Parties, which steer the implementation of the Convention through the World Heritage Committee, are obliged to call on the services of experts in culture and nature. Similarly, the designated advisory bodies are IUCN for natural heritage, and ICCROM and ICOMOS for cultural heritage.

Six years ago in UNESCO I was given the task of setting up the World Heritage Centre. This is a unique body bringing together experts in the fields of anthropology, archaeology, history of art, economics, social science, geography, education and ecology. Implementing the convention has helped to bring closer together fields that were previously separated, and has unleashed fresh energies. Needless to say the very basis of our mission is our conceptual,

ethical and moral work. This is essential for our work in education that is so vital for long-term conservation. With help from NORAD, Rhône Poulenc and the Osaka Chamber of Commerce we have developed educational materials on "Our Heritage in the hands of youth" which will initially be tested in practice in our 3,000 associated schools before being handed, if resources allow, to millions of teachers world-wide.

This educational work is of prime importance if we are to create a climate of tolerance and respect for other peoples' cultural identity. Some of the teaching material is intended to explain sustainable development, the stakes behind biodiversity conservation and the close links between preserving cultural and biological diversity.

COMMENTS FROM PARTICIPANTS

As a representative of youth, we would like to have more information and support for today's young people in better understanding the major environmental issues that are being addressed by the international conventions. We need scholastic programmes that are much more dynamic and related to changing environmental conditions.

A major weakness of the conventions is that they seldom provide appropriate opportunities for NGOs to become engaged with their work. Local communities similarly are not well represented, and it is unrealistic to expect that governments are able to reflect such interests.

A new international treaty on environment and development is required, to promote a more effective North-South partnership. Such a convention could support regionalization, capacity building, and access to dispute resolution mechanisms.

Effective and efficient use of human and financial resources, along with clear vision and motivation, are essential to the success of the institutions that are needed for the 21st century. Effective management and leadership approaches are required to achieve synergies in building the essential partnerships that will enable success.

An assessment by IUCN, working with major religious traditions or the UNEP partnership of scientists who are also religious leaders, would serve to create a network of persons to help identify reasons behind behaviour change that would link science and ecology.

KEY CONCLUSIONS

As the world becomes increasingly globalised, a strong legal framework is essential if environmental factors are to be considered within the globalisation process. IUCN has played a strong role in developing international environmental legislation, but even greater attention is required in the future to ensure that the progress is consolidated and applied to the challenges of the future. IUCN therefore needs to maintain a strong environmental law programme.

CONCLUDING PLENARY SESSION

CONCLUSIONS AND PROGRAMMATIC IMPLICATIONS FOR IUCN

The concluding session was chaired by Pierre-Marc Johnson, IUCN Regional Councillor from North America. It began with presentations from each of the workshop streams, seeking broad directions for IUCN in the future. The following summaries are the attempt by the editor to capture the main messages from each workshop, leading to several major conclusions.

Following the stream presentations, comments were welcomed from the floor. Particularly interesting was a presentation from a group of secondary school students who were "representing" the perspectives of the next generation of leaders - the ones who will inherit the results of the decisions made by the current generation in power.

IUCN's 50th anniversary celebrations at Fontainebleau addressed a dozen major issues of current or prospective concern for IUCN, organized under the themes of Conservation, Communities, and Consumption. Coming at the mid-term between the 1996 IUCN World Conservation Congress in Montreal and the 2000 IUCN World Conservation Congress in Jordan, the symposium offered an ideal opportunity to assess current thinking about some of the key conservation issues facing the global community today. All sessions were rich expressions of useful ideas for the IUCN community, including Members, Commissions, the Secretariat, and partners (both existing and prospective). From this diversity, the following main conclusions have been distilled, along with their implications for IUCN. These will be further developed over the coming months to contribute to IUCN's programme for the 21st century.

CONSERVATION

Expanding the Scale: Biodiversity is everywhere, and conservation approaches must deal with the entire planet. Ecosystem approaches and the biosphere reserve network are important conceptual complements to a representative system of protected areas and action on particular species. Enabling environments are needed at the geographic, institutional, stakeholder, and sectoral levels, leading to adequate capacity to manage resources by all relevant sectors. Key conclusions:

- o Local communities must have ownership of landscape conservation initiatives if these are to be sustainable in the long term, and IUCN needs to develop policies and practices towards this end.
- o Protected areas can play a significant role in developing a culture of peace, and conflicts can be perceived as opportunities. "Parks for Peace" offer important new opportunities for IUCN.

- o The Vth World Congress on Protected Areas will enable IUCN to further expand the approaches discussed in this workshop, with the 2002 Congress in South Africa bringing together all parts of the IUCN system.

The Biological Century: Biology will become an even more important force in development in the 21st century. Research in various parts of the world is leading to much better understanding of genetic diversity as a critical component of biological diversity, but the relationship between population levels, ecosystem function, and environmental security needs to be further explored as well.

Traditional biological and ecological knowledge helps support links to the land, and provides the basis for value systems and means of transferring technologies among all interested parties. The focus on the future is appropriate, but we also need to work on a better common present. Bioethics, biosafety, and biosurveillance are key issues in this regard.

IUCN should sponsor a Global Knowledge System for ecological and livelihood security. This can lead to a millennium of hope, building on appropriate relationships between biodiversity conservation and the alleviation of poverty.

Dealing with Extinction: About 1.5 million species have been described, though a reasonable best guess is that at least 7 million species in total may exist (though the number could conceivably be ten times this high). But we are on the verge of a sixth wave of extinctions, with extinction rates several orders of magnitude higher than they have been historically. Knowledge of biodiversity at gene, species, population, and community levels is critical for managing and modifying the current very high rate of extinctions. We also need to improve our taxonomic knowledge as a basis for species conservation efforts.

Deciding on priorities for investing in species conservation is a highly complex process, with different approaches appealing to different interests. The problem is not simply one of giving highest priority to endemic species; research is needed to seek a better idea of species numbers and extinction rates as a basis for IUCN's work, while proceeding to do the best possible with the information that is already available.

Finally, global climate change may in any case make ours a planet of weeds, calling for totally new strategies to deal with this problem. The major implication for IUCN: species will need to be a major focus for the conservation community for the foreseeable future, building on the application of SSC Red List criteria at the national and local level.

Sustainable Use: Sustainable use is a necessary and appropriate dimension of conservation, and is recognised as such by the Convention on Biological Diversity. General and global principles for sustainable use need to be adapted to regional, national, and local conditions because sustainable use involves social, ecological, economic, technical, political, legal, and cultural components that vary with setting and scale. Sustainable use also brings wider questions into play, including the relationship among conservation, welfare and ethics. The sustainable use of wild species will involve constant re-adaptation requiring policy studies

and assessments of the environmental consequences of various options for utilising living resources.

Many of the problems facing sustainable use are caused by semantic arguments that may obscure the real issues. The challenge is to find ways to put into place effective control mechanisms for supply and demand, using various kinds of positive and negative incentives. The key point for IUCN is to develop mechanisms to allow communities to recover their traditional and local knowledge, enabling them to develop the ability to manage species and ecosystems in a sustainable way. IUCN must continue to promote a balance between conservation and sustainable use, while seeking more equitable distribution of benefits arising from such use.

COMMUNITIES

Cultural Diversity and Globalisation: The western perception of nature tends to dominate and overshadow traditional perceptions and knowledge. Many people in the dominant industrialised countries believe that their perception of nature is shared by other cultures, and this perception is reflected in today's dominant approaches, policies, and laws relating to the conservation of biodiversity. To have a more balanced view that takes other cultural views into consideration, IUCN needs to:

- o recognise cultural diversity and endorse the rights of indigenous peoples;
- o improve its understanding of societies, cultures, and differing perceptions of nature;
- o undertake more comprehensive social science studies and apply the findings to its programme; and
- o examine the relationship between the global marketplace and cultural diversity, with a view to generating recommendations on how cultural diversity can be maintained in the face of the global marketplace.

Greening Urban Society: In the 21st century, most of the world's population will live in cities and these urban-dwellers will consume the bulk of the world's resources. Thus cities have major indirect impacts on forest, wetland, and marine ecosystems, but the three billion people living in cities often are only vaguely aware of their dependence on the healthy functioning of ecosystems in rural areas. What means are available to help enlist urban populations in the conservation movement? How can IUCN help to enable urban people to live within their limits, produce more with less, and know when they are living in a sustainable way? Cities also are centres of illicit wildlife trade, are major emitters of the greenhouse gases affecting the world's climate and its biodiversity, and have destructive impacts on traditional cultures and their sustainable resource management systems. To address the challenges of urban society, IUCN should:

- o work with Habitat and other relevant international agencies to foster improved information on environmental performance and conditions of cities;

- o maintain an active population and resources programme, with a focus on the conservation implications of the changing proportions of rural and urban populations;
- o develop IUCN approaches to urban issues, appropriate to the regional and national differences that characterise the world's cities;
- o extend its education role to address best practices on urban policies that affect conservation; and
- o encourage scientific and business expertise to develop new generations of urban technologies that can contribute to the conservation of biodiversity.

Fair Shares: International corporations are rapidly coming to dominate and control financial and information flows. Globalisation undermines the ecosystem approaches adopted by IUCN and other conservation agencies. However, IUCN should not assume that it already knows how to achieve conservation in the increasingly globalised societies of the coming century. Adapting to the coming changes will require objective, value-neutral research that addresses conservation issues in a holistic way, incorporating economic, social, political, and institutional components. IUCN should:

- o develop productive ways of working with the private sector on resource management issues;
- o promote the sharing of knowledge between local and global levels;
- o expand its activities in developing new and more efficient ways of managing areas important for conservation, including objective examination of alternative management regimes, in some cases involving the private sector; and
- o decentralise its scientific networks, sharing knowledge about levels of consumption that reflect cultural diversity around the world.

Environmental Insecurity: H.E. Queen Noor pointed out that, "For many nations today, security concerns centre less on boundaries and external military might than on increasing conflicts stemming from poverty, displaced peoples, economic instability, and competition over shared resources. These conflicts are major issues and all of them are environment related". Because environmental degradation, resource depletion, population growth, and inequality of access to resources are contributing to violent conflicts in many parts of the world, IUCN should enhance its understanding of the relationship between national security and the environment, seeking to expand its collaboration with others working in this field. For example, it could:

- o convene policy dialogues to address environmental security;
- o set up communication channels among groups interested in this topic;

- o sponsor and facilitate applied research into environmental and human security; and
- o raise awareness about linkages between environment and security among politicians.

CONSUMPTION

Living within our Limits: Human pressures on natural resources inevitably are growing as an expanding population is coupled with increasing per capita consumption. But the problems of over-consumption are not insoluble, with solutions ultimately depending on governments enabling people to behave in their own self-interest. The move from representative democracy to participatory democracy, driven by technological globalisation and the communications revolution, is a very heartening sign. Experience from at least some parts of the world indicates that increasing population can be accompanied by environmental renewal, with local initiatives backed up by appropriate government policies. A critical factor in enabling this optimistic vision to be realised is a transition from fossil fuel sources of energy to renewable ones; renewable sources of energy would enable countries to use as much energy as they wished, without negative impacts on the environment.

Better consumer information is certainly one part of the answer, but much more effective action is also needed at the local level. A critical issue that remains to be satisfactorily addressed is how local populations can be appropriately compensated for the opportunity costs of conservation. When rural people, often living in conditions of abject poverty, are expected to limit their impact on forests, wetlands, savannahs, and coastal habitats in the name of conservation, how can appropriate benefits flow to them? Without satisfactory answers to this question, poverty may continue to grow while biodiversity is lost.

The issue of excess consumption is a difficult one for IUCN, but it might begin by collecting information to enable IUCN Members to take a much more active stand against excess consumption in industrialised countries and by elites in the developing countries.

Producing More with Less: The focus of this session was on the negative impact of subsidies, reflecting a very welcome shift in interest toward the impact of subsidies on the environment. While converting subsidies from harmful activities to more environmentally benign ones, often driven by NGOs, will be useful, the more important point is to target the work of the conservation community on the subsidy issues that are most directly relevant to biodiversity.

More broadly, IUCN should:

- o take active steps to engage the commercial sector in relation to conservation, while reserving the right to scrutinise the behaviour of the private sector as it relates to conservation; and
- o become increasingly active in developing and applying economic instruments to address market failures and improve the distribution of costs and benefits of conservation measures.

How Do We Know When We Are Sustainable? This workshop focused on the development of a tool that can assess how close societies are to being sustainable. Based on practical experience in various parts of the world, it can enable governments, NGOs, and donors to determine whether budgets are being allocated for the most appropriate expenditures. A particular advantage of this method is that it can be used for self-assessment, and can be tuned to different levels of availability of data. However, it is essential to ensure that such indicators are in fact relevant to the specific cases to which they are being applied. It is particularly important that indicators be relevant to both the problem being addressed and the scale of the response.

In programmatic terms, IUCN should ensure that appropriate criteria and indicators are developed as part of its system of monitoring and evaluation. IUCN must work to develop better measures for ensuring that it knows when the activities it is promoting are in fact contributing to sustainable forms of development.

Appropriate Institutions for the 21st Century: The increasing trend toward globalisation of commerce has been matched by globalisation in environmental responses, especially through the various conventions that have an impact on biological diversity. These various conventions - the Convention on Biological Diversity, the Framework Convention on Climate Change, the Framework Convention to Combat Desertification, the World Heritage Convention, the Convention on International Trade in Endangered Species, the Convention on Wetlands of International Importance, and various regional conventions - are all highly relevant to IUCN's work, and indeed IUCN has been deeply involved in their development. But not all governments are Party to all Conventions, and even within governments, different conventions may be assigned to different ministries, leading to fragmentation of effort, some duplication, and insufficient communication between the government institutions involved. A greatly expanded effort is required to build synergy among these conventions. IUCN is very well placed to promote such synergy.

IUCN needs to be far more active in working with the various "biodiversity conventions", because these are the mechanism by which the governments of the world agree on their priorities. At the same time, IUCN needs to be far more active in ensuring that the perspectives of civil society feed into the convention negotiations. IUCN often has focused on the development of the conventions, but now it needs to shift its attention to their implementation on the ground.

CONCLUSIONS

While the preceding pages have highlighted results from the individual workshops, five overarching conclusions emerged from the presentations and discussions.

First, while the Union has been successful in increasing awareness about environmental issues, conservation action continues to fall farther behind the drive for consumption, leading to accelerating loss of biodiversity. Rates of extinction are high and are getting higher, and political responses are inadequate. Even the important new conventions that came out of the Rio process are still generating more talk and analysis than effective action on the ground.

Appropriate IUCN responses involve supporting greater synergy among the conventions, more effective use of economic instruments and other forms of incentives for conservation, more effective involvement of the multiple stakeholders involved, and expanding the scale of analysis and action to a more effective level.

Second, information is growing at a rapid and accelerating rate, and many people are simply overwhelmed by the flood of information. This has been likened to "drinking from a firehose". The growing number of websites, digital libraries, e-mail networks, and so forth are beginning to challenge IUCN's absorptive capacity. The critical challenge is in packaging the information in forms that are useful to the key audiences that need to be influenced. A new IUCN Global Knowledge System could support the global desire for ecological and livelihood security.

Third, IUCN is reaching out to new partners and establishing new linkages to strengthen our constituency. Important new partners can include the private sector, farmers, and people living in cities. Many of the workshops also stressed the importance of bringing in women and youth, with the intention of having the broadest possible support for the mission of IUCN. Bringing in new partners - broadening the constituency - is essential to IUCN's future success.

Fourth, the pace of change - social, economic, and environmental - is accelerating. This requires constantly accelerating adaptation to these changes, and such adaptation needs to be based on maintaining the biological diversity upon which natural systems depend, and the cultural diversity in the ways that people respond to various environmental challenges. Adaptation is required at various levels, including global-level policy responses, regional responses that identify the common interests of governments within the region, and local responses which need to be carefully tailored to the particular social, economic, political, historical, and biological heritage with which people are working. Conservation objectives at these various levels may be very different, requiring informed negotiation and a willingness to consider how costs and benefits are distributed.

Fifth, the Symposium agreed that IUCN plays a key role in integrating the international environmental effort. It leads by developing resource management approaches for biodiversity conservation at all scales, at all levels of protection, under conditions of global change and stress, and by linking agro-biodiversity, traditional knowledge, and genetic imperatives to conservation priorities for peace, equity, and security. Future roles for IUCN in building an environmentally secure world can include:

- o developing a capacity as a technical adviser or mediator to the parties of international environmental conflicts, which affect areas or species important for conservation, and attempting to resolve these equitably and peacefully. IUCN's roles might include providing technical advice to UN mediation efforts, advising on issues surrounding bilateral disputes over shared resources involving two or more countries, advising on conflicts over global commons via national sovereignty in natural resource use, and other similar issues;

- o developing the capacity to articulate and implement a conservation agenda under circumstances of considerable insecurity, sometimes requiring approaches which go directly to communities rather than through governments;
- o facilitating mediation between Members with divergent views on key environmental issues, developing a role as a global ecological conscience;
- o building stronger linkages among multinational corporations, security, and the environment, based on the vested interest in maintaining environmental security in those areas of the world where multinationals trade and have their labour forces; and
- o finding ways of stimulating greatly expanded public participation in the management of biological resources.

And finally, IUCN needs a renewed sense of urgency. While we can all be justifiably proud of our successes, we must be deeply concerned about our lack of greater success. The global governing structure does not yet recognise that biotic impoverishment is as pervasive and global a threat to economic and political security as war itself. For the environment as for any machine, once parts start breaking, damage spreads rapidly. Repairing our troubled world will require fundamental alterations in many aspects of human behaviour. The issues are complicated and the available evidence does not provide simple answers; natural resources are just one of the factors that lead to insecurity and conflict. But it is hard to avoid the conclusion that modern means of transportation and communication; growing human populations and levels of resource consumption; increased vulnerabilities of inter-dependent, integrated economies; and the spread of modern instruments of war - including chemical and biological weapons, land mines, and increasingly-effective firearms - can make future conflicts extremely destructive for both people and the rest of nature. What can IUCN do to promote environmental security as a contribution to broader issues of human welfare? We must redouble our efforts to demonstrate more positively the benefits of conserving biodiversity, using biological resources in a sustainable way, and ensuring the equitable distribution of benefits arising from such use.

New approaches such as bioregional planning, ecological engineering, and cultural diversity all offer productive new ways ahead. Many of the workshops generated important new ideas for IUCN to convert into activities that require funding. A major challenge for IUCN is to ensure that the good ideas are tested in the market place, effectively promoted, and competently implemented. This is the challenge that we carry from Fontainebleau to the Amman Congress in Jordan next year.

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We are reporters for **Earth Focus**, a youth magazine produced by the International School of Geneva and the Bellerive Foundation, of which Prince Sadruddin Aga Khan is the President. It has been a privilege for all of us to listen to such distinguished experts, who have given us a rare insight into the state of the planet.

As Her Majesty Queen Noor of Jordan and IUCN's President Yolanda Kakabadse mentioned, today's youth are the torchbearers for the future. But the truth is, we simply do not know how to go about this, and without **close** communication between adults and youth, the information gap grows. The knowledge is too important to remain solely with adult experts; we are all part of the problem, so we should **all** take part in the solution. We must now link arms with you and tackle this problem together, combining our courage, enthusiasm and idealistic naïveté with your experience and expertise. This will be a powerful formula for action. Could IUCN consider the creation of a Youth Secretariat that would **actually** involve young people?

To achieve global environmental awareness information should be "taken to the streets" by means of publicity, use of magazines and public demonstrations. For example, how many local residents of Fontainebleau are really aware of what is going on today?

But above all, for knowledge to get through, environmental education must be implemented in educational programmes and social sectors worldwide - not to one side, but integrated as a practical aspect of everyday situations.

Could IUCN organize forums for teachers to create powerful and dynamic environmental programmes in schools all over the globe? The future offers us an opportunity to learn from each other: North from South, West from East, and present from past. Let us learn from indigenous people, before their knowledge is lost forever.

It is vital that from now on, we strive to keep our promises and stick to our commitments. Time and time again, nations have signed declarations and conventions, such as Climate Change, and broken them. Isn't it time for us to make a stronger stand on environmental issues? Alongside the Declaration of Human Rights, we could revisit the idea of an "Earth Charter", and even establish an Environmental Security Council to increase international environmental laws.

In conclusion, the problem is not so much a lack of information as it is an inability to touch the younger generation emotionally, regarding the welfare of our planet Earth. We would like to propose that IUCN explore ways to change the image of the environment for youth, and encourage people to care and develop a passion like that you so obviously have.

The final question we are asking ourselves, however, is "Do we have enough time to train the next generation to care?" By then, one-quarter of the world's species might have disappeared, and the demand for resources will have almost doubled. We look to you for guidance, and action.