

The World's Conservation Strategy*

by

LEE M. TALBOT, M.A., Ph.D. (California at Berkeley)

*Director-General of I.U.C.N., 1196 Gland, Switzerland;
Senior Scientific Adviser on Conservation and Natural Resources,
International Council of Scientific Unions.*

CONSERVATION

Human beings, in their quest for economic development and improvement of their conditions of life, must come to terms with the realities of resource limitation and the carrying capacity of ecosystems, and must also take account of the needs of future generations. This is the central message of modern conservation. As such, conservation is basic to human welfare, and, indeed, to human survival. But it has not always been recognized as such.

The word 'conservation' has been used with many different meanings. In the sense in which we are employing it here, it refers to conservation of living resources. This aspect of conservation may be defined as: due guidance of the human use of the Biosphere, such that it will yield the greatest sustainable benefit to present human generations while maintaining its potential to meet the needs and aspirations of future generations. A central part of conservation, then, is managing resources in such a way that the options for use of the same or other resources are maintained for future generations. If a species, ecosystem, or ecological process, is destroyed, future generations will be denied its use.

The terms 'conservation' and 'preservation' are often used synonymously, in contrast to utilization. However, as I employ 'conservation', it includes both preservation and utilization.

Within this definition of conservation, 'living resources' refer to those components of the Biosphere that reproduce themselves—flora, fauna, and microorganisms (comprising all groups of microbiota). Living resources are generally renewable if conserved, and they can be destroyed if they are not conserved. This fact presents an interesting paradox: resources are generally classified in two categories, 'renewable' (i.e. living resources) and 'non-renewable' (e.g. minerals). Yet most non-renewable resources, such as chemicals and minerals, can be synthesized in the laboratory if they are lost in their natural state, whereas if renewable resources—species of living things—are exterminated, they cannot normally be recreated. Renewable resources then become non-renewable, and management must take this fact into account.

*Based originally on the Author's Inaugural American Exchange Lecture, delivered to the Royal Society of Arts, London, England, on 19 March 1980, which we understand has now appeared in their Journal.—Ed.

THE OBJECTIVES OF CONSERVATION

Conservation has three basic objectives:

1. To maintain essential ecological processes and life-support systems;
2. To preserve genetic diversity; and
3. To ensure that the utilization of living resources and the ecosystems in which they are found, are sustainable.

These objectives are interrelated, in the sense that each impacts upon the others. They are explained briefly in the following numbered sections:

1. *Essential Ecological Processes*

These are the processes which are needed to maintain and sustain the living components of the Biosphere, including the maintenance of food production, health, and other necessities for human survival. They include the global biogeochemical cycles—such as those of nitrogen, carbon, and oxygen—and also more localized phenomena such as cycling of nutrients, soil formation, the regulation of water-flow, and the provision of critical habitats. Because these ecological processes are essential to maintain life, they have become widely known as factors in our life-support, or, collectively, as 'life-support systems'.

2. *Genetic Diversity*

This refers to the genetic material in the extraordinarily wide range of living organisms that are present on Earth. When a species or other taxon is exterminated, its genetic material, and its contribution to future genetic material, is lost for ever.

The question is frequently asked: Why do we need genetic diversity? Why worry about extinction of species? There is a series of compelling reasons: Some species are of clear and direct benefit to mankind—particularly those which are harvested for food or medicines, or which are managed for other values. Much the same is true of insects which pollinate human food-crops, or predators which prey on species that are considered harmful to Man. Other species or varieties have a present or potential role in breeding—for example, to maintain and improve crops, livestock, timber trees, and aquatic forms for aquaculture.

Chinese medicine utilizes some 4,000 species of plants, and Asia is widely regarded as the Continent which

has most fully developed the use of plants in medicine. But plants are an important part of 'Western medicine' also, and indeed one recent analysis indicated that 40% of the prescriptions issued annually in the United States contain some component of natural origin—either as the sole active ingredient or as one of the main ones (Farnsworth & Morris, 1976). A United Nations workshop held in 1978 compiled a list of medicinal plants found in Africa, Asia, and Latin America, whose active principles are used in modern medicine. Of the 90 species listed, more than 40 are found only in the wild, and another 20, although cultivated, are harvested also from the wild (UNIDO, 1978).

Only a very small percentage of the Earth's wild plants and animals have been investigated in any way for their possible direct values to Man. Yet new values for such species are being found constantly—sometimes quite by accident. For example, two North American mammals that are now on the list of endangered species were found quite recently to be of significant and totally unexpected value to Man. One instance was the discovery two years ago that the hollow hairs of the Polar Bear (*Thalarctos [Ursus] maritimus*) are extraordinarily effective heat-absorbers, and this has provided important information that has been used in the development of improved cold-weather clothing and solar-energy collectors (Anon., 1978). The other instance is the North American Armadillo (*Dasyus novemcinctus*), which is the only animal other than Man which has been found to contract leprosy. Consequently, research on the Armadillo has led to the development—for the first time in history—of a vaccine against this ancient scourge (Storrs, 1971).

In the long run, however, the most significant value to humans of most wild species may well prove to be their role in maintaining the health and stability of their ecosystems and the component ecological processes—namely their role in our life-support system. When we allow a species to be exterminated because we do not know that it has any value to us, it is analogous to passengers in a hypothetical space-ship throwing out part of their life-support equipment, because they want more room and do not know what the equipment is good for.

3. Sustainability of the Resource Yield

It is virtually a truism to say that, if the utilization of a plant or animal is not sustainable—that is, if it is chronically over-harvested—the point will be reached when the species becomes so depleted that its value to Man will be severely reduced or even lost. Whales provide a classic example—where over-harvesting has driven one species or stock after another into commercial, and in some cases biological, extinction. With the decline of stocks, the whaling industry of one country after another collapsed, and the dying industry now survives largely on the Minke Whale (*Balaenoptera acutorostrata*), a species which is so small that it was considered uneconomical to harvest until several years ago, when the large forms had virtually disappeared.

The increasing world population of *Homo sapiens* requires ever-increasing amounts of protein, of which

significant proportions are now provided by both commercial and subsistence harvesting of wild species—particularly of marine mammals, fishes, and invertebrates, but also of some birds, terrestrial mammals, and insects. Such foods provide a major part of the animal protein intake of people in large areas of Africa, Asia, and Latin America, and even in parts of northern Europe and America.

Rangelands—semi-natural grasslands as opposed to intensively managed pastures—cover nearly 25% of the land area of the Earth. These vast tracts support most of the world's livestock and, therefore, its production of meat, milk, and other animal products. Maintenance of this resource is clearly a critical global need.

Forests and other types of woodlands provide a rich variety of resources that are of value to Man. Thus they provide the fuel for cooking and heat for most of the human population in the less-developed nations, and also the timber for local uses and economic export. They are also critical to human welfare in their role in watersheds and their effect on climate. Clearly, sustainability in the management of both individual wild species and of biomes such as rangelands and forests, is critical to human welfare and indeed to human survival.

HUMAN SIGNIFICANCE OF CONSERVATION

It should be evident from the foregoing discussion of its objectives, that conservation, in the sense used here, covers a very broad set of environmental considerations which are of basic human concern from two principal viewpoints. First, conservation seeks to maintain the capability of the Earth to support life, including human life, by maintaining the health and proper functioning of the ecological 'life-support system'—including the ecological processes and the genetic diversity within them, all of which are essential for human welfare and survival. Secondly, for many people conservation represents an *ethical imperative*. This imperative is expressed in various ways, for example in the views that: 'We have no right to destroy any other form of life' or 'We have the capability to destroy other forms of life; therefore, we have the responsibility to see that they are not destroyed', or again 'We have not inherited the Earth from our parents, we have borrowed it from our children'.

Accordingly, conservation is of direct concern to all peoples and all nations—whether or not they recognize it at this time. Regardless of one's background, nationality, type of government, or political concern, and even regardless of economic level, one is directly concerned with human survival and welfare. And, of course, ethical concerns about conservation can also cut across political and ideological boundaries.

HUMANS' IMPACT ON THE FACE OF THE EARTH

Fundamental to conservation is the recognition that human activities have a significant impact on the face of

the Earth—particularly on its fauna, flora, soils, and waters. Rarely recognized, however, is the fact that these impacts extend far back into prehistory—probably virtually as far back as the human species itself. The human species has changed the vegetation, and consequently the soil and water régimes, of the Earth ever since Man domesticated fire—perhaps as far back as a million years ago—and his more recent agricultural practices, including shifting cultivation and grazing of domestic livestock, have further modified a large part of the world's land surface (Thomas, 1956).

My own ecological studies and other environmental work, which have taken me to over 100 countries, have convinced me that, with few exceptions, the present location and composition of tropical savannas and many other grasslands are largely anthropogenic; the same is true of many of the areas which are now desert. It is also clear that, to a degree, the same is true of some of the temperate forests, at least in comparison with the pre-industrial era—particularly those in western Europe and North America—while human activities also have had much to do with the present distribution and composition of the wild fauna and flora in many parts of the world (Talbot, 1957, 1960, 1964, 1972; Talbot *et al.*, 1961). For example, I am convinced that shifting cultivation allowed the spread of Southeast Asia's rich variety of large wild mammals (including many species of wild cattle, deer, and deerlike animals, elephants, rhinos, pigs, etc.) into areas which otherwise would have been closed tropical forests in which such animals cannot thrive or even survive.

It has long been my belief that the human activities which resulted in forest clearance, denudation of other vegetation, and desertification, resulted in local and possibly regional or even global climatic changes. For many years this view has not been popular or generally accepted. Now, at last, there is increasing evidence that anthropogenic environmental changes may have caused significant regional climatic changes, and indeed, 'that humans have made substantial contributions to global climate changes during the past several millennia, and perhaps over the past million years; further such changes are now under way' (Sagan *et al.*, 1979).

From this perspective, human impact on the Biosphere—including the lower atmosphere—is nothing new. What is new is the massive increase in the *rate* of change, due to the exponential increase in the human population, interacting with the leverage of modern technology; and there are *new dimensions* to the change—such as chemical pollution—that result from modern technology.

THE ORIGINS OF CONSERVATION

Just as human impact on the environment is not a new phenomenon, nor is human concern about that impact. More than two millennia ago, Plato eloquently recorded his concern about the hills of Attica in Greece, which had been denuded of their forest cover and had

consequently lost their mantle of soil and their water-courses. They were, he wrote, 'like the skeleton of a body wasted by disease' (*Timaëus and Critias*, translated from the Greek by A. E. Taylor, Methuen, London, UK: 136 pp., 1929). Farther east, in the same period, protected forest areas were established in India—precursors to our modern national parks and reserves. Also in India, Emperor Ashoka established the first recorded 'game laws', providing protection for certain species of mammals, birds, and fish.* Both of these Indian developments represented conservation actions taken in response to the clear recognition of the need to control human activities to avoid harmful impacts on wild living resources.

Throughout subsequent history, a few scientists and philosophers saw changes that were taking place on the face of the Earth, and perceived how these changes adversely affected Man; but fewer still recognized Man's role as a causative factor. At least in Western cultures, recognition of Man's voluntary causal role was clouded by the religious beliefs that such changes were expressions of 'God's will'. However, there was a growing recognition of the finite limits of resources, and of Man's role, which was crystalized in the mid-1800s by such writers as George Perkins Marsh (1864).

But even then, the intellectual insight of the few did not lead to general acceptance by the scientific establishment—much less by the public—nor, consequently, to meaningful action by governments.

It seems to be virtually a law of Nature that people are not moved to action until they see a problem clearly with their own eyes. I call this the 'instant catastrophe syndrome'. When change is slow it passes unnoticed. Plato referred to this phenomenon, noting that the only remaining evidence that forests had existed in Attica were the logs used in the construction of the temples, and that stone shrines marking long dry spring seasons were the only evidence of the once-abundant stream-flow. It is only when change is so rapid that it and its consequences occur within one person's memory-span, that such change may lead to action.

During all but the past few decades of human occupation of the Earth, change has been extremely slow. The denudation of significant parts of the forest cover of Europe, China, other parts of Asia, Africa, and the Americas, occurred over such long periods that many living in the now treeless regions have no concept that conditions there were ever any different. The same is true of many of the anthropogenic deserts.

However, a dramatic acceleration in the rate of change—and consequent rate of recognition of change—occurred in North America during the latter half of the 19th century. During the settlers' westward movement, farm land was exhausted, forests were cut and burned, and wildlife was wiped out, but there were always unlimited

*Artha Shastra, ca 300 B.C., quoted by the Secretary-General, Indian Board of Wildlife, Pan-Indian Ocean Science Foundation. Emperor Ashoka, *Pillar Edicts*, ca 250 B.C., quoted by Maharaja of Mysore, *Indian Wildlife Bulletin*, December 1952 [not available for checking].

new lands and resources to the west. Suddenly, they reached the Pacific Ocean and realized there was no more land to the west—they had reached the limit.

This dramatic change—the exhaustion of vast areas of prime agricultural land, clearing of once-vast forest land, and virtual annihilation of formerly endless herds of buffalo and other wildlife—occurred within the memory-span of those then living. The recognition led to action, and to an unprecedented series of conservation programmes—particularly for forests and wildlife.

Several decades later, North America experienced another ‘instant catastrophe’ in the form of the dust-bowl, which in turn resulted in dramatic national action to achieve soil conservation. The governmental recognition which led to action was stimulated by the dust from the afflicted states being blown over a thousand miles (1600 km) to the capital, Washington, DC, where it served as a most visible reminder of the problem.

The most recent period of instant catastrophe occurred in the late 1960s and was primarily linked with pollution. Burgeoning industrialization, in the absence of environmental controls led to a series of severe pollution incidents—such as the Minamata disease due to mercury poisoning in Japan, massive tanker spills, and increasingly severe atmospheric pollution over major centres of population. These episodes, combined with modern communications which assured that large numbers of people ‘saw’ the situation *via* television, provided the initial impetus for the unprecedented global conservation actions of the past decade.

THE NEED FOR A HOLISTIC APPROACH

The glorious photographs of Earth taken from space, brought some recognition that we have ‘only one Earth’ (the motto of the Stockholm Conference on the Human Environment), and that it and the resources on it are indeed finite. There has been growing scientific and public recognition of this fact, and of the concurrent one that everything is interrelated ecologically, so that we need to approach the management of our environment from a holistic point of view. Yet to date, most of our endeavours are fragmented, dealing with one or another problem in a largely isolated and consequently simplistic way—on the assumption that somehow one part of the environment was separate from, and could be dealt with apart from, the rest.

Nowhere is this unfortunate fallacy better illustrated than in a recent study undertaken by the United States Government.* The study was directed to examine the probable changes in the Earth’s population, resources, and environment, to the year A.D. 2000. It was intended that it would not simply project present trends forward, each in isolation from the others, but that it should consider the

synergistic interactions between the different factors. Clearly, factors such as population, agriculture, transportation, forestry, and energy production, are intimately interrelated. However, after three years of effort, the study concluded that, within the Government, there was not the capability to deal effectively with interrelationships between such different but clearly-related factors in terms of their environmental implications.

At first thought, this appears incredible. On further consideration, however, it is totally consistent with our cultural and scientific development. Western science operates largely on the basis of reductionism: a complex whole is divided into its simpler components, on the theory that they are easier to understand individually than collectively, and when once the components are understood, they can be reassembled to comprehend the whole. The difficulty stems from the emphasis being placed on, and the effort being devoted to, the first part of the process, namely the reduction, and not on the re-assembly, the (also quite vital) synthesis. A consequence is undue proliferation of specialities and specialists, rather than of synthesis and synthesizers.

This process is further exacerbated by the traditional academic divisions by disciplines, expressed in educational institutions which are commonly divided into virtually watertight compartments—which make elegant sense from a classical disciplinary point of view, but which bear little relation to the real world. The system of academic advancement and awards is based on these disciplinary divisions and specialities. One result is that, if a scientist emerges from such an educational system with the capability to synthesize with scientific rigour, i.e. to deal with a holistic environment in a realistic way, it is usually in spite of the system rather than because of it. This is equally true with other academic endeavours and social aspects of life, including government.

Here again the example of the US Government is instructive. In 1969, when Congress determined that the Government should develop an institutional capability to deal with the environment, it discovered that there were around 80 individual Federal agencies which either had responsibility for some aspect of environmental protection, or else had responsibilities that impacted on the environment. All these agencies had some relationship with the environment and, therefore, with each other; yet there was no liaison or coordination, and no central environment policy. Moreover the ‘missions’ of many of these agencies were in direct opposition to environmental protection or to those of one another (e.g. one agency’s road-building responsibilities would conflict with another’s agricultural responsibility, which in turn would conflict with yet another’s wildlife protection responsibility).

While the United States ameliorated the situation with subsequent legislation that established a national environmental policy and institutional arrangements to implement it, this example illustrates the fact that governments, like science and the educational system, are organized in a reductionist, compartmentalized way. Thus they are based along the lines of individual, isolated

**Global 2000 Study*, directed by President Carter in his Environmental Message to Congress in 1976, and conducted by the President’s Council on Environmental Quality and the US Department of State (Carter, 1980).

'missions' or objectives, and hence are not well adapted to approaching environmental problems from a realistic, holistic perspective.[†] This is a central problem facing modern conservation.

NECESSARY NEW DIRECTIONS IN CONSERVATION

This problem has also characterized most past efforts at conservation. To a large degree, conservation at both national and international levels has been a process of reacting. A problem was perceived—usually a threat to a species or area—and conservationists reacted. While this approach has been responsible for many of the considerable successes of conservation in past decades, it has little chance of lasting success against the challenges which lie ahead, as we may now see.

In the first place, the reactive approach constitutes an *ad hoc*, disjointed type of action. There is no way to assure that limited resources are applied to the highest-priority problems, rather than to the most-immediately-visible ones; nor are we clear on how to establish goals and focus a wide array of efforts, or to establish benchmarks by which achievement can be judged. This leads to the inane approach of 'jumping on a horse and galloping off in all directions at once'.

Secondly, the reactive approach virtually always focuses on the *effect* rather than the *cause*—the symptom rather than the sickness. If an attractive forest bird is threatened by forest clearance, the reactive approach would be to pass laws to protect the bird or to establish a small reserve for it. This amounts to putting a bandage on a symptom of a basic illness. Unless something is done about the basic causes of the clearance, eventually the forest will be gone, with all its other organisms, leaving the bird's reserve as an island of trees, and moreover likely soon to be lost through ecological change or economic pressure.

A further major weakness in the past reactive approach of conservation is its focus on cure rather than prevention. In the modern world, when once a conservation problem has emerged, it is extremely difficult to do anything meaningful about it. Government planning and development activities illustrate the point: there may be several years between the initial proposal for a given development activity or other agency action, and its actual initiation on the ground. By the time work actually starts, engineering and economic studies will have been made, budgets will have been developed and approved, national (and, as necessary, international) agreements will have been concluded, contracts will have been let, and people will have been hired or assigned. A major investment in time and money has already been made, and the bureaucratic process has swung into motion. Stopping or significantly altering the action at that time

is extremely costly and difficult, if possible at all—whatever changes may have occurred, or constraints emerged, in the interim. Clearly, the time to have acted would have been at the start—namely to waylay or redirect the problem, rather than react to it by attempting to cure it after its emergence.

This, in turn, leads to what is probably the most serious problem of the reactive approach—that it is virtually always perceived as being anti-development, or even against human welfare. Consequently it is apt to place conservationists outside of, or even in opposition to, the mainstream of human activity, denying them the political, economic, and moral, support that is necessary to achieve lasting conservation goals. Most conservation problems are caused by human activities and, as noted above, by the time an activity has progressed to the point where the conservation threat which it poses is perceived, the activity is far advanced. The conservationist is then put into the position of trying to stop it. Often, had conservation considerations been brought in at a much earlier stage in the planning or decision-making, it would have been possible to redirect the action both to the benefit of the development objective and to the avoidance of the conservation problem.

Recognizing the weaknesses of the past approaches to conservation, there is now a movement, led by the International Union for Conservation of Nature and Natural Resources (IUCN) and allied bodies, to redirect conservation endeavours. These 'new directions' may be described as programmatic, i.e. goal-oriented with a strategic approach to achieve high-priority goals, focused on causes as well as effects, and concentrating on prevention of problems before they occur rather than curing them after their emergence.*

THE NEED FOR NEW DIRECTIONS IN DEVELOPMENT

It is doubly unfortunate that, while the problems described above have posed major obstacles to achievement of *conservation goals*, a parallel set of problems has obstructed achievement of *development goals*. 'Development', in this context, refers to the broad array of activities—local, national, and international—that are intended to satisfy human needs and improve the quality of human life. To be successful, development must not only succeed in the short run but it must also be sustainable—economically and ecologically.

Unfortunately, much development world-wide has not been successful on those terms. Some activities are themselves short-lived because of inherent ecological errors. One example is range-management development which does not include control of livestock numbers, and which commonly leads to overgrazing and collapse of the resource. Other projects dealing only with part of

[†]It is ardently to be hoped that such movements as the one furthered in this issue on behalf of The Biosphere—see pp. 257–8 and 271–7—will operate very widely in favour of this 'realistic, holistic perspective.'—Ed.

*This is widely along the lines of the 'new-growth' society proposed by Maurice F. Strong in the first Baer–Huxley Memorial Lecture on 'The International Community and the Environment', first published in *Environmental Conservation* (Vol. 4, No. 3, pp. 165–72, Autumn 1977).—Ed.

a system, are defeated by problems posed by other parts of the same system. Examples here include hydroelectric or flood-control dams which end up short-lived because the essential watershed areas were not protected as part of the project; they became denuded, which led to erosion and consequent filling with silt instead of water.

Other projects, which may appear successful in themselves, may yet affect adversely the sustainability, for people, of the environment as a whole. Construction of industries, transportation systems, or housing, on prime farmland, is an example of this type of problem. Indeed, there has been so much ecological backlash from development projects which did not take conservation requirements into account, that in all too many cases such projects have reduced, rather than increased, the carrying capacity of the area for humans—consequently reducing, rather than enhancing, human welfare.

A further problem has involved the type and direction of the development assistance involved. For many years, much international development was based on the 'trickle down' theory, which assumed that development which assisted industry and the upper economic classes in a developing country would 'trickle down' to the poorest citizens. The fallacy of this approach is now being recognized, and the emphasis of international development is at last being directed to 'the poorest of the poor'.

Whatever the individual causes, the hard fact is that, in spite of the thousands of millions of dollars which have been spent on development in the past decades, some 500 millions—one-ninth of the world's population—are malnourished (FAO, 1977) and over one-quarter of the population is regarded as destitute or poor (World Bank, 1979, 1980). Even far more serious is the fact that there are indications that the life-support system of the Earth—its carrying capacity for humans—is being seriously eroded.

WHAT LIES AHEAD?

Recently there have been various attempts to analyse the present conservation situation on a regional or global basis, and to project current trends into the near future. These efforts have included individual scholars' models, institutional or organizational projects, governmental ones, and international studies and conferences.

Most studies agree on the present state of things, but, as would be expected, there are differences in the future projections. The major differences appear to be associated with how comprehensive the analyses were, how much they took into account interrelationships between major factors (such as the influence of the cost of energy on agricultural practices, or the impact of forest reduction on water régimes and consequently on agriculture and food productivity), and, above all, how much they took into account the environmental impacts of projected increased human populations and their activities.

However, the most recent and environmentally comprehensive studies lead to the following conclusions about some conditions in A.D. 2000—if present policies

and activities proceed relatively unchanged (World Conservation Strategy, 1980):

- With the possible exception of parts of the Amazon basin, tropical lowland forests will be largely gone. Even the most optimistic projections indicate that half of the present tropical forests will have gone by the year 2000.
 - Other forests (high-altitude forests, open forests, and woodlands) in the tropics and subtropics will be greatly reduced, and gone in many areas.
 - All vegetation over vast areas will be severely denuded. The world's drylands are being degraded at a rate of almost 60,000 square kilometres a year; 20 million square kilometres of land are regarded by the United Nations as being on the brink of desertification.
 - Roughly one-third of the world's present cropland will be gone—lost to erosion, bad irrigation, encroachment of desert, or replacement by cities, transportation systems, and industry.
 - Loss of the forests and other vegetation will destroy the watersheds and interrupt the water régimes, increasing floods in wet seasons and droughts in dry ones. This, in turn, will reduce the agricultural productivity of much of the remaining cropland.
 - Loss of habitat—particularly tropical forests—plus overexploitation, will result in the expected extinction of between 15% and 20% of all present species of plants and animals. Currently, more than one thousand vertebrate species and an estimated 25,000 species of vascular plants are known to be threatened with extinction.
 - Because of over-fishing and near-shore habitat damage, fishery yields will continue to decline, and many, possibly most, of the present major fisheries will collapse.
 - The world's human population is projected to increase from around 4,500 million people in 1980 to around 6,000 millions by A.D. 2000. Simply to feed these people at present levels will require a proportional increase in production from agriculture, fisheries, and wildlife. Yet the factors cited above will reduce productivity in much of the world. Therefore, there is a strong likelihood of substantial actual reduction in the available food, on a *per caput* basis, in parts of the world—particularly in southern Asia and Africa. This sobering warning was also central to the message of the Brandt Commission Report, published early in 1980.
 - Loss of forests, increased industrialization, and increasing desertification, will probably affect the climate on a global basis. There is some dispute as to what will eventually happen, but it seems likely that, in the near future, the climatic fluctuations, or instability of the 1970s (relative to the stable climate of the preceding decades), will continue and perhaps worsen. This could have further unfavourable impact on food production, particularly in the less-developed world. The longer-term impacts—particularly a global warming due to increased atmospheric CO₂—could be nothing short of catastrophic.
- The above set of prospects is a grim one indeed, and if it is reasonably close to the truth, it points up several

factors of great significance for conservation and development. For first, it would result in mass human starvation, which the world's political, social, and economic, systems would not allow to happen without very severe disruptions and instability.

Second, the scenario assumes no change in present policies and actions. Consequently, it constitutes the most powerful argument for the critical need to make changes to avoid these projected outcomes.

Third, the principal problems are ecological, involving degradation of the life-support system, and are intimately linked with development in two ways: one is ecologically unsound development, which is not sustainable and which, in the long run, lowers the carrying capacity for humans and defeats the original purpose of the development (examples include siting industry on prime farmland; unsuitable agricultural development leading to loss of the cropland; and commercial overexploitation of fisheries and forests). The other way is through lack of development: if present patterns of development continue, increasing numbers of people will be at the bare subsistence level, and will have no choice but to denude the land for fuel and grazing—overexploiting wildlife and whatever other resources are available to them simply to survive.

THE ESSENTIAL LINK BETWEEN CONSERVATION AND DEVELOPMENT

From what has been said above, it can be seen that conservation and development are essential for each other. Unless development conforms to conservation principles, it is not sustainable and human welfare is not served. At the same time, unless there is adequate development—which must be ecologically sound—conservation cannot succeed because of the subsistence requirements of the increasing population that is in need of development assistance. The essential linkage between development and conservation is a new thought for most developers and conservationists, and indeed, that is one reason why the global situation is as unsatisfactory as it is today.

Of the many factors involved, the main obstacles to achieving conservation and ecologically sustainable development are probably the following:

1. The belief, on the part of conservationists and others, that conservation is a separate, isolated concern, rather than one which must be integrated throughout human endeavours.
2. The failure to integrate conservation into development at all stages.
3. Development processes have too often been narrow (in terms of immediate goals), inflexible (i.e. bureaucratic), and ecologically damaging because of failure to incorporate environmental considerations.
4. Development processes have not sufficiently aided the increasing numbers of rural poor.
5. Inadequate conservation capacity and capabilities of governments in terms of such factors as governmental

mandate and legislation, inadequately trained personnel, and insufficient information on conservation processes and needs, have too frequently retarded advances.

6. There continues to be a lamentable lack of awareness of the need for conservation, and consequently a lack of support for conservation, among the public, industry, governments, and international institutions.

WORLD CONSERVATION STRATEGY

To meet these multiple challenges, a new approach is needed which recognizes the essential relationship between conservation and development—a strategy which can serve effectively to focus the efforts of all sectors of society onto basic conservation development goals, rather than leaving the various sectors to pursue their separate, often conflicting, courses.

In recognition of this need, IUCN, the United Nations Environment Programme (UNEP), and the World Wildlife Fund (WWF), collaborated in the development of a *World Conservation Strategy* (1980). IUCN prepared the document, and UNEP and WWF provided financial support and contributed to the evolution of the basic themes and structure. The breadth of the participation provided by these three organizations is most significant.

IUCN is a 'membership' organization which brings together governments, governmental agencies, and nongovernmental organizations, from throughout the world. Its present membership of about 450 includes over 50 national governments, governmental agencies from about 100 nations, and nearly 300 nongovernmental conservation organizations from over 100 nations. Its commissions of environmental specialists and advisers include well over 1,000 scientists and other specialists throughout the world, so that, with its membership and advisers, IUCN constitutes a unique global network of expertise in practically all phases of conservation.

WWF is an international foundation, wholly nongovernmental, with international headquarters and secretariat in Switzerland and national organizations in some 27 countries. Since its establishment under the aegis of IUCN in 1961, it has raised and allocated the equivalent of over 40 million US dollars on conservation activities. However, this figure is misleading because much of the money spent by WWF has led to immensely greater expenditure by governments and organizations. WWF has financed more than 2,000 projects in about 140 countries, and many of these have served as catalysts, stimulating and facilitating essential conservation action by governments, intergovernmental organizations, and other bodies.

The above two organizations are complementary components of *nongovernmental* world conservation; IUCN, through its provision of authoritative scientific and other conservation expertise on a truly global basis, and through the stimulation and execution of conservation activities world-wide, and WWF, through its fundraising, its linkage with leaders in business and industry,

its creation of awareness through the media, special campaigns, and education, and through its direct representations to governments and others. The two have recently come together again in a joint 'World Conservation Headquarters' near Geneva, Switzerland.

The *intergovernmental* component of world conservation is represented, in the World Conservation Strategy (1980), by the United Nations Environment Programme (UNEP). An outgrowth of the 1972 United Nations Conference on the Human Environment, held in Stockholm, UNEP represents the United Nations' response to the 'urgent need for a permanent institutional arrangement within the United Nations' system for the protection and improvement of the human environment'. As such, it functions primarily as a catalyst—a promoter of international cooperation, a sponsor of research, an assessor of the state of the environment, and an early-warning system within the UN for critical environmental issues.

By their collaboration, the three organizations have focused the efforts of a wide range of leading governmental and nongovernmental components of world society that are concerned with environment. We believe this is the first time that an effort of such magnitude has been made in the field of conservation.

The World Conservation Strategy is a document which presents a clear statement of conservation priorities and a broad plan for achieving them. It is a 'strategy' almost in the military sense, in that it defines goals, assigns priorities, and lays out a framework for specified action to accomplish the chosen objectives. Actually, it defines the major conservation goals, as I have done above: these are, maintenance of essential natural processes and life-support systems, maintenance of genetic diversity, and assurance that the utilization of species and ecosystems is sustainable. It identifies the major obstacles to achievement of these goals. It also defines specific steps—policy decisions and other actions—to achieve the goals at world-wide, regional, and national, levels and by governments, international organizations, and the private sector.

The Strategy is aimed at three main groups of users:

1. Government policy-makers and their advisers. For them, the document recommends ways of overcoming the main obstacles to conservation, and provides specific guidance on what action is most important. The Strategy is designed to be relevant to any level of government with significant responsibilities for planning and managing the use of living resources.
2. Conservationists and others in the private sector who are directly concerned with living resources. For them the Strategy indicates the areas in which action is most urgently needed, and where it is thought likely to yield the greatest and most lasting benefits. It also proposes ways in which conservation can participate in the development process, which is central to the success of the entire venture.
3. Development practitioners, including aid agencies, industry and commerce, and trade unions. The Strategy demonstrates the need for conservation to improve

the prospects of sustainable development, and identifies ways of integrating conservation into the development process.

The Strategy is far more than merely a conservation tract. For one thing, it is intended to be acted upon. The main document is presented in the form of a 'Decision-makers' Pack'—a set of brief, effective, and separate, documents intended for busy decision-makers, whether in or out of Government. My own experience, including eight years' service in the Executive Office of the President of the United States—for three Presidents, actually—has made it abundantly clear to me that an effective decision document must be extremely brief. In the Decision-makers' Pack, the Executive Summary is only two pages long, the total document comprising some 50 pages—well referenced, so that the single part of most concern to a given reader can be seen immediately and briefly.

In addition to the Decision-makers' Pack, there is a popular version, a paperback book, which is intended to explain the whole concept to the general reader (Allen, 1980). A series of 'Source-books' is also being produced to deal with individual areas of the Strategy (such as marine resources, desertification, forests, and genetic resources). These are intended to provide detailed, academic information in depth for those who must follow up on the specific actions of the Strategy itself. Further, in recognition of the fact that conditions change—and indeed, in the hope that conditions will change as a result of the Strategy—it is intended that the Strategy will be revised at periodic intervals.

DEVELOPMENT OF THE STRATEGY—EDUCATION AND CONCENSUS

The development of the Strategy itself provides some indication of one way in which the final document should work. Discussions about the need for a strategic approach were initiated within IUCN in 1969. Plans for the actual development of it were initiated in 1975, and work on the first draft was started after that. In all, there were four 'official' drafts prior to the final version, *plus* several intermediate efforts. Each draft was submitted, for comment, to the full IUCN membership and also to nearly a thousand scientists and other advisers. Several international meetings were held to review and comment on the then current draft, and a formal IUCN Advisory Committee met frequently. The final draft was also approved and formally endorsed by the sponsors, and by UNESCO and FAO.

The first draft was essentially a wildlife conservation textbook, for at that time many conservationists regarded development as the enemy to be opposed, and many developers, for their part, regarded conservation as, at best, something to be ignored (or, at worst, as an obstacle to progress). However, each draft brought the two sides closer, and involved a process of education. The final draft represents a concensus between the practitioners

of conservation and development—and a concensus which would not have been possible without the educational experience which the development of the various drafts provided. In a sense, the very existence of the present Strategy, with the formal support it has, is proof of the document's basic premise of the essential interdependence of conservation and development, and a proof that the 'two sides' can cooperate together—as indeed they must.

The Strategy has appeared at a time when there is growing international recognition of the interdependence of conservation and development. For example, early this year the Brandt Commission completed its two years' work and released its report, called 'North—South: A Programme for Survival'. The report analyses the world's economic and social predicament as it affects the Third World, and concludes with a set of far-reaching proposals for the reform and restructuring of the world system, implementation of which, in the Commission's view, will be essential to avert disaster, and which are claimed to be in the mutual interest of both North and South. The report states, *inter alia*, 'Few threats to peace and the survival of the human community are greater than those posed by the prospects of cumulative and irreversible degradation of the Biosphere on which human life depends.' Also, 'It can no longer be argued that protection of the environment is an obstacle to development. On the contrary, the care of the natural environment is an essential aspect of development' (Independent Commission on International Development Issues, 1980).

It was also early in 1980 that the heads of the World Bank and eight regional development banks and development assistance agencies met in New York and signed the 'Declaration of Environmental Policies and Procedures Relating to Economic Development'.* This is a very powerful document aimed at assuring that the development activities undertaken by the signatories adequately take environment into account, because they are 'Convinced that in the long run environmental protection and economic development are not only compatible but interdependent and mutually reinforcing'. A further consequence of the development of this 'Declaration' was a subsequent meeting, held in Berlin, of national development agencies to consider the possibility of suitable action to incorporate environmental considerations in bilateral assistance programmes.

Already in December 1979, the United Nations General Assembly, recognizing that 'The Strategy is based on a clear conception of conservation as a major factor in sustaining the much-needed development

especially in developing countries', unanimously adopted a decision which 'welcomes the collaboration between UNEP, IUCN, and WWF, in the development of guidelines to help governments in the management of their living resources through the formulation of a World Conservation Strategy to be launched in March 1980'.†

THE STRATEGY IS LAUNCHED

Normally, a programme of this magnitude would be initiated *via* a United Nations conference—such as the UN Conferences on Food, Population, Water, Habitat, and Desertification. However, it was considered that, for the Strategy, it would be more appropriate to introduce it in individual countries throughout the world, in a coordinated 'launch', which was held on 5 March 1980. As it was a 'simultaneous press-conference' in 35 nations' capitals, it constituted a remarkable 'media event' which itself served to bring the Strategy to the attention of many peoples throughout the world.

Moreover, as the Strategy resulted from cooperation between nongovernmental and governmental communities, it was not purely a UN operation and, therefore, was less appropriate for the UN conference format. Furthermore, conservation is basically non-political, serving as a valuable bridge across political and ideological differences which often separate peoples, and the launch was intended to emphasize that fact. Consequently, launches were held in the capitals of nations which covered the widest possible spectrum of political systems, levels of industrial development, and geographic locations—including Peking, Moscow, New Delhi, Brasília, Amman, Caracas, Nairobi, London, Washington, Jakarta, Bangkok, and Canberra.

Most of the launch events were presided over by heads of state or government, so emphasizing the level of endorsement of the Strategy by the nations involved. The United Nations Secretary-General, Dr Kurt Waldheim, described the Strategy as a 'remarkable pooling of international resources which has resulted in an unprecedented degree of agreement on what should be done to ensure the proper management and optimal use of the world's living resources, not only for ourselves but also for future generations'.** Many governments and intergovernmental organizations—including Australia, Egypt, India, Indonesia, Jordan, Kenya, the People's Republic of China, Spain, the U.S.A., the European Parliament, the European Economic Community, and the Organization of American States—announced decisions and programmes in direct support of the Strategy.

For example several governments, among them those of India, the USSR, New Zealand, and Thailand, announced their own development of national conserva-

*The 'Declaration of Environmental Policies and Procedures Relating to Economic Development' was signed at the United Nations in New York on 1 February 1980, by the International Bank for Reconstruction and Development (World Bank), the United Nations Development Programme, the African Development Bank, the Arab Bank for Economic Development in Africa, the Asian Development Bank, the Caribbean Development Bank, the Commission of European Communities/European Development Fund, the Inter-American Development Bank, and the Organization of American States.

†United Nations General Assembly Resolution A/Res/34/188.

**Message by Dr Kurt Waldheim, Secretary-General of the United Nations, on the occasion of the launching of the World Conservation Strategy on 5 March 1980. Office of the Secretary-General, United Nations, New York, NY 10017.

tion strategies, which is one of the key recommendations of the World Conservation Strategy. The European Parliament announced a programme for the creation of a European Environmental Fund. The People's Republic of China declared the month of launching as National Conservation Month, with intensive educational programmes reaching all levels of their society—thus bringing the Strategy to nearly one-quarter of the world's population in one single action.

The Strategy now exists, it has been introduced to the world, and it has already achieved significant results. In one sense, then, this represents the culmination of a major effort. In a broader sense, however, it represents the start of a new phase in conservation. For while the Strategy is the most ambitious effort yet undertaken in international conservation, in a historical perspective it is simply a part of the ongoing process. The challenge now is to make the Strategy work—to see that its recommendations are implemented—and, most important, to see that it really does serve as a focus for cooperation of all segments of the world society to achieve common goals to maintain a world in which human welfare, and survival, is possible.

SUMMARY

Rational use and conservation of living resources must be the active concern of all of us, rich and poor alike, if the world is to continue to develop in any reasonable degree of harmony with Nature. Accordingly it is necessary to recognize that industrial—and even some degree of demographic—development is not necessarily incompatible with environmental protection, and indeed that, in the world to come, conservation and development will have to be widely interlinked.

Cognizant of this and of the fundamental need to protect and perpetuate living, renewable resources in the face of ever-mounting and demanding human populations, and stressing the imperative of preserving a holistic approach to these problems of Man's and Nature's 'only one Earth', IUCN, with the support of UNEP and WWF, and the endorsement of some other bodies, launched, early in 1980, after several laborious redraftings, a 'World Conservation Strategy', in the manner described in the last part of this paper. It sets a policy for all to follow, taking mankind well away from the merely reactionist basis of conservation.

REFERENCES

- ALLEN, Robert (1980). *How to Save the World: Strategy for World Conservation*. Kogan Page, London, UK: 150 pp., illustr.
- ANON. (1978). Furry funnels: Are Polar Bears really white? *Time*, 4 December.
- CARTER, Jimmy (Dir.) (1980). *Global 2000 Report*. Council on Environmental Quality and U.S. Department of State, Washington DC: [not available for checking].
- FARNSWORTH, Norman R. & MORRIS, Ralph W., (1976). Higher plants: The sleeping giant of drug development. *American Journal of Pharmacy*, 146, pp. 46–52.
- INDEPENDENT COMMISSION ON INTERNATIONAL DEVELOPMENT ISSUES (1980). *North–South: A Programme for Survival*. Pan Books, London & Sydney: 304 pp.
- MARSH, George Perkins (1864). *Man and Nature, or Physical Geography as Modified by Human Action*. Charles Scribner's Sons, New York, NY: [not available for checking].
- SAGAN, C., TOON, O. B., & POLLACK, J. B. (1979). Anthropogenic albedo changes and the Earth's climate. *Science*, 206 (4425), pp. 1363–8.
- STORRS, Eleanore E. (1971). The Nine-banded Armadillo: A model for leprosy and other biomedical research. *International Journal of Leprosy*, 39, pp. 703–14.
- TALBOT, Lee M. (1957). The lions of Gir; Wildlife management problems of Asia. *Trans. North American Wildlife Conf.*, 22, pp. 570–9.
- TALBOT, Lee M. (1960). *A Look at Threatened Species; Conservation in the Middle East and Southern Asia*. Fauna Preservation Society, London, UK: 137 pp.
- TALBOT, Lee M. (1964). Wilderness overseas. Pp. 75–80 in *Wildlands in our Civilization*. Sierra Club, San Francisco, California: 175 pp.
- TALBOT, Lee M. (1972). Grasslands of the world. Pp. 142–7 in *1972 Britannica Yearbook of Science and the Future*. Encyclopaedia Britannica, Chicago, Illinois: 448 pp.
- TALBOT, Lee M., TALBOT, Martha H., & LAMPREY, H. F. (1961). *An Introduction to the Landscape*. Government Printer, Nairobi, Kenya: 38 pp.
- THOMAS, William L., jr (Ed.) (1956). *Man's Role in Changing the Face of the Earth*. University of Chicago Press, Chicago, Illinois: 1193 pp.
- UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION (FAO) (1977). *The Fourth World Food Survey*. FAO, Rome, Italy: [not available for checking].
- UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION [cited as UNIDO] (1978). *Report of the Technical Consultation on Production of Drugs from Medicinal Plants in Developing Countries*. Lucknow, India, 13–20 March. ID/222 (ID/WG.271/6), UNIDO, Vienna, Austria: [not available for checking].
- WORLD BANK (1979). *World Development Report, 1979*. The World Bank, Washington, DC: [not available for checking].
- WORLD BANK (1980). *World Development Report, 1980*. The World Bank, Washington, DC: viii + 166 pp., illustr.
- WORLD CONSERVATION STRATEGY (1980). *World Conservation Strategy: Living Resource Conservation for Sustainable Development*. IUCN/WWF, 1196 Gland, Switzerland, and UNEP, Nairobi, Kenya: special pack of brochures, etc., totalling 50 printed pages.

Rare Animal Relief Effort (RARE)

RARE, a non-profit volunteer organization devoted to the cause of disappearing wildlife, has made considerable progress in the past year in its efforts to aid endangered species and protect critical habitats, and is also focusing on conservation education programmes in the

United States and other countries. By supplementing conservation projects with educational efforts, we hope to engender an environmental awareness, in the general public, of the crucial need to preserve habitats especially of threatened animals and plants. By combining conser-