

World Heritage and the Man and the Biosphere Programme: Tools for Promoting Conservation in the Hindu Kush-Himalaya

MAH Secretariat, UNESCO

ABSTRACT. This paper describes UNESCO's work in the field of nature conservation, which essentially follows two major dimensions. The first aims at safeguarding the exceptional natural heritage elements of the natural areas of the world through an international standard-setting instrument known as the *Convention Concerning the Protection of the World Cultural and Natural Heritage*. The second dimension relates to carrying representative examples of the world's natural heritage and developing a network of biosphere reserves and protected areas. This work is done as the International Biosphere Reserve network of the Man and the Biosphere (MAB) Programme.

1. INTRODUCTION

Both the World Heritage Convention and the International Biosphere Reserve Programme are relatively less well developed in the Hindu Kush-Himalaya region than in other parts of the world for a variety of historic and practical reasons. However, by briefly reviewing the country statements at the Proceedings of the First International Symposium and Negotiation of ICNMOI one is struck by the keen awareness of the ICNMOI countries of the need to protect and safeguard the unique natural features of their territories and also to carefully develop and utilize the natural resources of their high, high mountain ecosystems. In parallel, there is a consciousness that these needs can best be met by international co-operation, not only within the region itself in managing catchment basins and mountain areas, which creates international linkages, but also with other countries whose expertise in managing and protecting high mountain ecosystems can provide useful lessons and ideas. It would appear, therefore, that it is timely for pursuing UNESCO's two cooperative programmes in the Hindu Kush-Himalaya region, particularly through the transnational approach. Indeed, nature conservation is well also be pursued, not by one country alone, but by a key element being during the development process and in this respect it is fitting that this workshop is being held by ICNMOI.

At the same time, it is important to recognize that the natural heritage of the world is not only a source of inspiration and pride, but also a source of economic and social benefits. The natural heritage of the world is a source of inspiration and pride, but also a source of economic and social benefits. The natural heritage of the world is a source of inspiration and pride, but also a source of economic and social benefits. The natural heritage of the world is a source of inspiration and pride, but also a source of economic and social benefits.

2. THE WORLD HERITAGE CONVENTION

Known as the "World Heritage Convention", the Convention concerning the Protection of the World Cultural and Natural Heritage was adopted by UNESCO in 1972. The Convention defines the World Heritage as those cultural and natural heritage of outstanding universal value which are of such outstanding universal value that they constitute a common heritage of the world. The World Heritage Convention provides a means for identifying the cultural and natural properties of outstanding universal value and for placing them on the World Heritage List. There also exists a list of World Heritage in Danger which is for the World Heritage properties threatened by "serious and specific danger" as defined under the Convention. This list acts as a "warning light" indicating to draw attention to seriously threatened properties. The Convention also has established a World Heritage Fund to which all nations (whether State Parties to the Convention or not), private organizations and individual persons are invited to contribute. The decisions of the Fund are used to assist experts from the member States Parties to help restore, protect and enhance their cultural and natural World Heritage properties.

The World Heritage Convention is therefore very much operational in character and serves as a tool for international co-operation, solidarity and exchange, particularly through sharing of resources and expertise and the building of a large core of training personnel specializing in the conservation of cultural and natural heritage. National efforts to these efforts are therefore coordinated and complementary; in addition, the international help and assistance offered by inclusion on the World Heritage List considerably strengthens protection under national legislation as well as helping the properties included in the operation of the international community.

The origin and evolution of the World Heritage Convention, a description of its provisions, and various case studies for natural properties throughout the world have been given in more depth in *World Heritage* and

World Heritage and the Man and the Biosphere Programme: Tools for Promoting Conservation in the Hindu Kush-Himalaya

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ABSTRACT. *This paper describes UNESCO's work in the field of nature conservation, which essentially follows two major endeavours. The first aims at safeguarding the exceptional and/or unique elements of the natural areas of the world through an international standard-setting instrument known as the Convention Concerning the Protection of the World Cultural and Natural Heritage. The second endeavour aims at conserving representative examples of the natural ecosystems of the world and developing a scientific basis for their rational use and protection: this work is based on the international biosphere reserve network of the Man and the Biosphere (MAB) Programme.*

1. INTRODUCTION

Both the World Heritage Convention and the International Biosphere Reserve Programme are relatively less well developed in the Hindu Kush-Himalaya region than in other parts of the world for a variety of historic and practical reasons. However, in briefly reviewing the country statements of the Proceedings of the First International Symposium and inauguration of ICIMOD one is struck by the keen awareness of the ICIMOD countries of the need to protect and safeguard the unique natural features of their territories and also to carefully develop and utilise the natural resources of their fragile, high mountain ecosystems. In parallel, there is a consciousness that these needs can best be met by international co-operation, not only within the region itself in managing catchment basins and mountain chains which straddle international frontiers, but also with other countries whose experience in managing and protecting high mountain ecosystems can provide useful lessons and ideas. It would appear, therefore, that it is timely for promoting UNESCO's two conservation programmes in the Hindu Kush-Himalaya region, particularly through this international workshop. Indeed, nature conservation, as will also be pointed out by our colleagues from IUCN, is a key element underpinning the development process and in this respect it is fitting that this workshop is being held by ICIMOD.

2. THE WORLD HERITAGE CONVENTION

Known as the "World Heritage Convention", the Convention concerning the Protection of the World Cultural and Natural Heritage was adopted by UNESCO in 1972. The rationale behind this Convention is that there are elements of the cultural and natural heritage of individual countries which are of such outstanding universal value that their protection and enhancement should be the concern and responsibility of the international community. The World Heritage Convention provides a means for identifying the cultural and natural properties of outstanding universal value and for placing them on the select World Heritage List. There also exists a list of World Heritage in Danger which is for the World Heritage properties threatened by "serious and specific dangers" as defined under the Convention. This list acts as a "warning light" mechanism to draw attention to severely threatened properties. The Convention also has established a World Heritage Fund to which all nations (whether States Parties to the Convention or not), private organisations and individual persons are invited to contribute. The resources of the Fund are used to meet requests from the less-favoured States Parties to help restore, protect and enhance their cultural and natural World Heritage properties.

The World Heritage Convention is therefore very much operational in character and serves as a tool for international co-operation, solidarity and assistance, particularly through sharing of resources and expertise and the building of a basic core of training personnel specialising in the conservation of cultural and natural heritage. National efforts in these fields are therefore stimulated and complemented; in addition, the international legal protection afforded by inclusion on the World Heritage List considerably strengthens protection under national jurisdiction as well as bringing the properties concerned to the attention of the international community.

The origin and evolution of the World Heritage Convention, a description of its procedures, and concrete case studies for natural properties throughout the world, have been given in some depth in *Ambio* (1983) and

Monumentum (1984). It is the World Heritage Committee which makes all decisions on nominations emanating from States Parties to the Convention (for both the lists of World Heritage and World Heritage in Danger) as well as on requests for assistance under the World Heritage Fund. This Committee is made up of 21 of the States Parties to the Convention and its membership changes on a rotational system. The Committee is assisted in making its decisions by non-governmental organisations which provide impartial technical advisory services for three following tasks: elaborating guidelines for implementing the convention, including the establishment of criteria for selection of World Heritage properties; evaluating the nomination of properties against these criteria; and advising on the allocation of resources from the World Heritage Fund. The International Council for Monuments and Sites (ICOMOS) and the International Centre for Conservation (ICCROM) are the advisory non-governmental organisations for cultural heritage. IUCN is the non-governmental organisation giving advisory services for natural heritage. UNESCO provides the Secretariat which implements the decisions of the World Heritage Committee, including providing assistance financed by the World Heritage Fund. The World Heritage Secretariat has a mandate from the Committee to encourage the adherence of more countries to the World Heritage Convention and to stimulate its implementation throughout the world. It was thus possible for the Secretariat to obtain support for this workshop from the World Heritage Fund to promote the Convention in this part of the world.

Indeed, at the time of writing (April 1985) there are 86 countries which are States Parties to the Convention. The Hindu Kush-Himalaya region is represented by the following States Parties which have adhered to the Convention: Afghanistan, Bangladesh, India, Nepal, and Pakistan. At the 25th meeting of the IUCN Commission on National Parks and Protected Areas held in Corbett National Park, India, in February 1985, the representative of Bhutan indicated that his country was considering ratifying the Convention in the near future.

It is therefore promising that the majority of Hindu Kush-Himalaya countries have already taken concrete steps to implement the Convention. However, of the 186 properties inscribed on the World Heritage list, only two are natural properties from this region, namely Sagarmatha National Park, Nepal (inscribed in 1979) and Royal Chitwan National Park, Nepal (inscribed in 1984). This year, the World Heritage Committee and its Bureau will examine three natural sites which have been nominated by India, namely Kaziranga National Park, Keoladeo National Park and the Manas Sanctuary. The latter nomination is of particular interest to this workshop as it lies within the Hindu Kush-Himalaya region. Interested participants at this workshop may wish to reflect on which sites within their countries may qualify for World Heritage nomination.

It was stated earlier that the nomination and eventual inclusion of a natural property on the World Heritage List

has the advantages of strengthening its protection of making the site better known. The case of Sagarmatha National Park has been documented in *Ambio* by Hinrichsen *et al.*, (1983) and by Coburn (1984) in *Nature and Resources*. Increased recognition worldwide usually results in increased tourism and foreign income but consequently can exacerbate the problems of managing the World Heritage Site. For Sagarmatha, the rise in the number of trekking parties and visitors would probably have happened anyway, due to the international appeal of the world's highest mountain and the increase in world tourism in general. What is interesting to note, however, is how the World Heritage Fund has provided seed money to help mitigate some of the inherent management problems of the park, notably to replace depleted fuelwood resources by other energy sources such as solar energy or micro-hydroelectric power, and to protect reafforested areas from grazing livestock.

The World Heritage Fund has also been used to develop the level of training of the personnel responsible for wildlife management. In the Hindu Kush-Himalaya region, to date, support from the World Heritage Fund has been used to train two such persons from Nepal, and another two from Pakistan. Preference has been given however by the World Heritage Committee to training courses within the beneficiary countries themselves, if possible within a park inscribed on the World Heritage List. This is because more people can be trained per unit of money and, furthermore, trainees need not be absent for the long period of time required to complete university studies. This means that "training" under World Heritage is a very flexible form of assistance which can be tailored to fit the need of specific countries.

The World Heritage Fund can also be used to assist States Parties in identifying properties of "World Heritage quality" for the preparation of indicative lists and eventually of the nomination dossiers themselves. Such "preparatory assistance" as it is called can furthermore aid in the formulation of technical co-operation and training requests. Many examples of such assistance exist for countries other than those of the Hindu Kush-Himalaya region, for example Algeria, Benin, Guyana, and Zaire.

It should not be construed that the World Heritage Convention can help everywhere and provide the ideal solution to the problems of safeguarding the world's most remarkable cultural and natural properties. Its procedures of nomination and listing may appear to be cumbersome and too formal. The support available from the World Heritage Fund may appear pathetically small in comparison with the sums required for the restoration, protection and enhancement of the properties on the World Heritage List. However, the Convention has the invaluable virtue of existing and actually working. It constitutes an extremely valuable tool in marking these natural or cultural sites for which every effort should be made to ensure their sound management and protection by the international community as a whole.

3. THE INTERNATIONAL BIOSPHERE RESERVE NETWORK OF THE MAB PROGRAMME

The Man and the Biosphere (MAB) Programme, launched in 1971, is a worldwide programme of international scientific co-operation dealing with people-environment interactions in the whole range of bioclimatic and geographic situations of the biosphere – from polar to tropical zones, from islands and coastal areas to high mountain regions, from sparsely populated regions to dense human settlements. Research under the MAB Programme is designed to provide the information needed to solve practical problems of resource management. It also aims to fill the still-significant gaps in the understanding of the structure and function of ecosystems, and of the impact of different types of human intervention. Key ingredients in the MAB Programme are the involvement of decision-makers and local people in research projects, training and demonstration in the field and the pooling of disciplines from the social, biological and physical sciences in addressing complex environmental problems.

The International Co-ordinating Council which supervises the MAB Programme, at its first session in 1971, decided that one of the themes of this programme was to be the "conservation of natural areas and the genetic material they contain". Under this theme was introduced the concept of the "biosphere reserve" which was intended to be a series of protected areas linked through a co-ordinated international network, which would demonstrate the value of conservation and its relationship with development. The concept was innovative because of this network character and because it combined nature conservation with scientific research, environmental monitoring, training, demonstration, environmental education and local participation. Since the very beginning of the implementation of the concept of biosphere reserves as representative ecological areas, the international biosphere reserve network has formed a geographic focus for implementing the MAB Programme.

The first biosphere reserves were designated in 1976. Subsequently, the network has grown steadily until at present, it consists of a total of 243 in 65 countries. Much has been written about biosphere reserves and the reader is referred to UNESCO (1974), IUCN (1979), Batisse (1982), di Castri and Robertson (1982) and Maldague (1984) for basic information on this subject. Note should be made, however, of the First International Biosphere Reserve Congress, jointly convened in Minsk, USSR, in 1983 by UNESCO and UNEP in co-operation with FAO and IUCN, at the invitation of the USSR. The contributions to this Congress (UNESCO/UNEP, 1984) give many case studies from biosphere reserves throughout the world which provide an indication of the variety of ways in which the biosphere reserve concept has been adopted and implemented in very different cultural, institutional and ecological contexts.

The first International Biosphere Reserve Congress furthermore gave rise to the basis of the Action Plan for

Biosphere Reserves which was adopted at the intergovernmental level by the International Co-ordinating Council for the MAB Programme at its last session in December 1984. This Action Plan provides a working framework for governments and international organisations to expand and improve the international biosphere reserve network in the period 1985-1989.

The Action Plan identifies a total of 35 actions grouped under the nine main objectives which came out of the First International Biosphere Reserve Congress.

At present, of the 243 biosphere reserves, only one biosphere reserve lies in the Hindu Kush-Himalaya region: namely the Kinghu Nature Reserve in China. (The Lal Sohanra Biosphere Reserve in Pakistan lies in the Cholistan desert and is therefore not included). However, we believe that the biosphere reserve concept has great potential in the region, for two main reasons.

First, the integrated approach to nature conservation is inherent within the biosphere reserve concept. In other words, nature protection is not regarded separately from other sectors such as forestry, basic scientific research, agricultural improvement, socio-economic development and/or the preservation of traditional cultural values. The need for an interdisciplinary approach to planning in mountain ecosystems is echoed by very many specialists, including Messerli (1984) and the planning and management of protected areas is no exception. The multiple-function approach of the biosphere reserve lends itself to accommodate these different considerations. For example, biosphere reserves can provide basic research sites, where long-term observations can be made and experiments repeated in the same place at different periods of time, a fundamental requirement to understand and better predict mountain ecological processes. Also, a key element in the "ideal" biosphere reserve is the involvement of the local people both directly and indirectly in the running and planning of the reserve and indeed, as an example, Jeffries (1984), has recognised that in Sagarmatha National Park, success lay in the selection and training of Sherpas who were entrusted with the management of the area.

Another aspect of the concept is the place of the reserve in regional planning. Rather than being considered an area which is put aside from the development process and is thereby artificially cut off from its surroundings, biosphere reserves offer an excellent way of integrating conservation with development, by building on the traditional knowledge of how best to manage such high-risk ecosystems and about the properties and values of the plants and animals therein. The biosphere reserve concept therefore provides a new way of thinking about conservation and land-use problems.

A second reason why the biosphere reserve concept should be attractive to the Hindu Kush-Himalaya region is that it is a tool for regional and international co-operation. Individual biosphere reserves have an added value in that they belong to an international network which should generate and disseminate knowledge from one reserve to

another. Such a network is very important and has great potential for the countries of the Hindu Kush-Himalaya which share the same ecological conditions and environmental problems. Useful links can also be established with other countries of other mountainous areas, e.g. the Alps or the Andes, in order to exchange experience and ideas and to build up personal working-level contacts between comparable biosphere reserves. ICIMOD could play a vital role in developing such a regional network of biosphere reserves, particularly by acting as a documentation centre, serving as a focus for information exchange through articles, newsletters, workshops, and acting as a training centre to expand

the knowledge and experience of the personnel assigned to the biosphere reserves of the region.

4. CONCLUSION

It would appear from this very brief overview of the World Heritage Convention and the MAB biosphere reserve network that there are many opportunities to develop both endeavours in the Hindu Kush-Himalaya region. These two activities can serve to enhance national efforts in protecting the natural heritage of the region and to promote inter-regional and international co-operation in this field.

Ding Hu Shan Biosphere Reserve

Wang Zhu hao

ABSTRACT. *Ding Hu Shan is an area of 1,200 ha in China's densely-populated Guangdong Province. Now strictly protected, it contains over 2,000 species of higher plants, including many which are important for human welfare. The area is particularly important because it contains elements from both the tropical and subtropical Zones. In order to ensure that the area is well-protected for scientific investigation yet can still meet some of the needs of local people, the area is divided into two zones, one for science, the other for certain limited human used.*

1. INTRODUCTION

Ding Hu mountain rises west of Guangzhou (Canton), China, 86 km from the city. Ding Hu Shan Arboretum was established there in 1956, organised by the South China Institute of Botany, Academia Sinica. For many years, Ding Hu Shan has fascinated scientists with its unique biology. Since 1956, when Ding Hu Shan was designated a nature reserve, it has been a base for scientific research, academic exchanges and student field work. In 1979 it was made part of the international network of Biosphere Reserves by UNESCO. In 1981, it was linked with a research centre in northeastern Australia as one of the interactions between countries of a region in the first project of the MAB Programme — The ecological influences on tropical and subtropical forest ecosystems by increasing human activities.

In recent years the environmental and biological conservation in Ding Hu Shan has been promoted by China's Environmental Protection Law, which is designed to guarantee a rational utilisation of natural resources in socialist modernisation, to prevent environmental pollution and violation of ecological balance, so as to create a clean living and work environment for the people, protect their health and promote production. Under the Act, "Forest resources must be protected and developed and great efforts made to making the country green. Natural flora and fauna must be protected, developed and rationally used".

2. ENVIRONMENTAL CONDITIONS

Ding Hu Shan Biosphere is situated in the central part of Guangdong Province, near the Tropic of Cancer and

in the southern fringe of a south subtropical region. The total area is 1,200 ha.

The rocks in the biosphere reserve are sandstone, sandy shale and shale belonging to the Devonian period. There are many hills and low mountains running from northeast to southwest with slopes ranging from 30 degrees to 40 degrees. The elevations range commonly from 150 m to 500 m. The altitude of the highest peak is 1,000.3 m.

The soils in this region are lateritic red earth, yellow earth and mountain shrubby-meadow soil. There is a vertical zonality in the distribution of soils. The growth of plants on these soils is vigorous and the organic matter content of the soil is high. Decomposition and synthesis of organic matter are rapid.

The mean annual temperature is 21.4 degrees C, with an annual precipitation of 1,900 mm and a mean annual relative humidity of 80 per cent.

3. FLORA, VEGETATION AND FAUNA

The vegetational forms in Ding Hu Shan Biosphere Reserve include: subtropical monsoon evergreen broad-leaved forest; ravine rainforest; subtropical evergreen broad-leaved forest; needle and broad-leaved mixed forest; needle and broad-leaved forest; riparian forest; shrub forest; and shrubby grassland.

Statistics gathered over many years by the Ding Hu Shan Arboretum of the South China Institute of Botany reveal that Ding Hu Shan has about 2,110 species of higher plants including 349 cultivated by the scientists. Ancient tree ferns and cycads are living specimens for research in plant evolution from the Mesozoic Era. More than 30 species of endemic plants are named after Ding Hu Shan, including *Ilex dingshanshi*, *Rhododendron dinghuense*, etc. In addition, there are 320 kinds of timber trees, 185 oil-bearing plants, 40 starch plants, 100 fabric plants, 60 tanning extract plants, 900 medicinal plants and more than 300 species of fungus.

In total, the biosphere reserve has 45 families, 86 genera and 141 species of bryophyte; 37 families, 74 genera and 128 species of pteridophyte; 4 families, 4 genera and 5 species of gymnosperm; and 181 families, 713 genera and

1,488 species of angiosperm. In addition to these wild plants, there are 349 species of cultivated plants. The chief families of the flora are Lauraceae, Theaceae, Fagaceae, Aquifoliaceae, Myrtaceae, Symplocaceae, Elaeocarpaceae, and Hamamelidaceae. These families compose the main elements of the climax, subtropical monsoon evergreen broad-leaved forest. Because the biosphere reserve is near the Tropic of Cancer, its floristic composition is a transition between the tropic and subtropic, but some typical tropical families are lacking, such as Dipterocarpaceae, Nepenthaceae, Ecythidaceae and Restionaceae.

The woody plants including the woody climbers, belong to 112 families and 371 genera, about 51.7 per cent of the total genera. Most of the woody plants are evergreen trees, shrubs or lianas; just 30 species of trees are deciduous.

According to geologists, the influence of Quarternary glaciers is not strong in South China. Therefore, many species of relic plants occur in the floristic composition, such as *Psilotum*, *Lycopodium*, *Selaginella*, *Angiopteris*, *Helminthostachys*, *Osmunda*, *Dicranopteris*, *Hicriopteris*, *Lygodium*, *Cibotium*, *Blechnum*, *Brainea*, *Equisetum*, *Cycas*, *Ginkgo*, *Glyptostrobus*, *Podocarpus* and some genera of Magnoliaceae.

In a 400 sq m quadrant 94 species of higher plants have been measured in the subtropical monsoon evergreen broad-leaved forest. The upper layer of the canopy consists of several important tree species, but there are no conspicuous dominant species. Because the shapes of the crowns of the important species are quite different, the physiognomy of the canopy is irregular.

The climax community indicates some characteristics of tropical rainforest. Many woody lianas and climbers climb up the trunks and branches of trees, and many epiphytic ferns and orchids grow on the tree trunks and branches. *Ficus microcarpa* and *F. virens* are common stranglers in the forest; some of the host trees are killed by them. Several species bear inflorescences and fruits on the trunks or old branches, and some trees have prominent buttressed base roots.

Several species of tree ferns, such as *Cyathea podophylla*, *C. gigantea* and *C. spinulosa* grow in the forest especially beside the ravines. In certain parts of the forest *C. podophylla* is locally the dominant species of the community.

Ding Hu Shan's high, densely forested slopes provide all kinds of wildlife with a suitable habitat. There are 1/8 species of birds; 38 mammals including serow, pangolin, muntjak, and wild boar; 20 snakes including pythons and various cobra-related snakes; and innumerable insects.

The conservation and management in Ding Hu Shan Biosphere Reserve are conducted by Ding Hu Shan Arboretum. The Biosphere Reserve is divided into two zones: the larger portion, the central and western part, is

zoned for conservation and research; the smaller eastern part for tourism, recreation, religion and education.

Since Ding Hu Shan Biosphere Reserve became a MAB research centre, a new research organisation, Ding Hu Shan Forest Ecosystem Station, was established in 1979. Narrowly-focused research has given way to an interdisciplinary programme in which the South China Institute of Botany, Academia Sinica, Guangzhou Institute of Geography, Guangdong Institute of Soil Science, Guangdong Institute of Microbiology, Guangdong Institute of Entomology, and the Departments of Biology and Meteorology of Zhongshan University participate.

In recent years scientists have worked in every corner of Ding Hu Shan, observing its biological resources and natural environment. A number of reports on geography, soil, climate, flora and vegetation and indices of local plants, fungus, algae, birds, mammals and insects have been published. Scientists have set up permanent experimental plots and a meteorological observation tower for further research on the forest ecosystem.

5. THE RELATIONSHIP BETWEEN CONSERVATION AND LOCAL PEOPLE

Subtropical evergreen monsoon broad-leaved forest is the climax community in this reserve. This forest has been protected for over 400 years, but most forests in other regions of this province have been disturbed or destroyed partially or wholly by the impacts of human activities. Therefore, the conservation of this forest is very valuable for economic, scientific, educational and other purposes. Historically, Ding Hu Shan is a famous beautiful landscape, and there is a large old temple located at the fringe of the forest on the mountain, so it is also a notable religious site. In addition, the people who live in the villages around the reserve collect plant materials for timber, fuel, medicine and some other uses. So some conflicts have arisen between tourism, religion, and other needs of the local people on the one hand, and the conservation of the biological resources and environment in the biosphere reserve on the other hand.

In the past three decades, the following approaches have been taken to resolve the above problems and have yielded good results:

- Posters, booklets, newspaper articles and radio announcements have educated the people to understand the value and necessity of the conservation of nature and natural resources.
- Several workshops have been organised for the cadres of forestry and nature conservation and the teachers of middle schools from many districts in the province. The courses on protection of nature and natural resources were especially useful.
- After the discussion between the leaders of Ding Hu Shan Biosphere Reserve and the chief officers

of local government, the provincial government issued a degree to separate the region into two zones, one for conservation and research which is strictly protected, the other for tourism, recreation, education and religion, which is open to tourists, pilgrims and local people.

— An area for fuelwood collection is arranged for the local people outside the boundary for the reserve so that disturbance to the climax forest is diminished. Permission is given to the local people to

enter some parts of pine forest to prune the dense of dead branches for fuel.

- Some trials of fuelwood forest composed of fast-growing trees of *Acacia*, *Cassia*, *Leucaena*, *Liquidambar*, *Schima* and some other genera have been established. The local people were trained to plant such kinds of forest near the villages for their permanent resources of fuelwood. It is hoped that the natural forest in the reserve will no longer be disturbed by fuelwood collection, and the conservation objectives of the reserve will be achieved.

ABSTRACT. International support for training of park managers has a number of advantages but also some disadvantages, especially if it prevents an indigenous training capacity from being developed. The most important training is for the field staff, whom most will be mobile and flexible in order to cover the various needs of different reserves. Funding support for such courses is available from a number of international agencies; the Canadian International Development Agency is particularly active in this region.

1. INTRODUCTION: WHY INTERNATIONAL AID?

International support for training park managers has at least three major justifications.

- Because the involvement of international aid organizations, especially non-governmental organizations, is a two-way educational process that can help to foster interest, perception and understanding on a worldwide rather than just a regional basis.
- Because national and local budgets do not generally give high priority to the provision of managerial education or training.
- Because training programmes for national park personnel are required not regularly to be self-sufficient in the intellectual development of the non-governmental aspects of formal education.

2. WHAT CAN INTERNATIONAL AID DO?

Earlier conferences and workshops have pointed out that international aid can provide experts with experience in planning and management (Barr, 1966; Gilbert, 1979; IUCN, 1984). It can also provide access to scientific and training institutions in various parts of the world. However, Dr. Susan M. Barry, in summarizing the success of training at the Second World Conference on National Parks in 1972, stressed "... the danger of relying too much on

international co-operation to take the place of development of training facilities within individual countries."

Of particular importance is aid to national, national and local training programmes aimed at what Miller has called "mainline and basic level personnel" (Miller, 1984). These are the personnel who guard the park, guide and interpret for both tourists and local people, and maintain and improve park facilities. The success of a park will depend much upon the majority of such personnel being local people whose former sources of subsistence may well have been cut off by the park (Curry-Lindell, 1976).

Training programmes for such personnel should be:

- Mobile: Teams of instructors capable of operating from temporary facilities such as a covered camp may be more useful than teachers tied to institutional buildings.
- Flexible: Instruction need to be capable of giving instruction in the local language and relating it to the traditions and beliefs of the people. Concepts of the interrelationships of living beings and their environment, being more readily for them from familiar religious teachings than from one-book ecology.

Training programmes should also be designed to ensure that the management and operation of recreational and tourist facilities meets standards that will maintain the quality of the environment inside and outside the park.

3. INTERNATIONAL AID FOR TRAINING FIELD PERSONNEL

Mobile, flexible vocational training is most useful at the grassroots level and typical of the programmes offered by international non-government agencies. For example, the Non-Governmental Organization Division of the Canadian International Development Agency (CIDA) was formed in 1962 to sponsor a programme of co-operation between governments and private commercial

International Aid and Environmental Training for the Management of Himalayan National Parks

Barry Leach

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3. INTERNATIONAL AID FOR TRAINING FIELD PERSONNEL

Mobile, flexible vocational training to meet urgent needs at the grassroots level are typical of the programmes offered by international non-government agencies. For example, the Non-Government Organisation Division of the Canadian International Development Agency (CIDA) was formed in 1968 to operate a programme of co-operation between governments and private overseas aid

organisations. In 1982-83 over 300 such organisations contributed more than US\$ 120 million to 2,000 projects. These included agricultural development, school and medical centre construction, and vocational training for Himalayan peoples.

This experience demonstrates clearly the ability of overseas governments and NGOs to respond quickly and flexibly to the need for funds for training programmes at the grass roots level. If this workshop can serve to define the need and stress the urgency of aid for national parks, I have no doubt that the people of Canada and of the world will respond fittingly.

BARRY LEACH

international co-operation to take the place of development of training facilities within individual countries."

Of particular importance is aid to regional, national and local training programmes aimed at what is often called "medium and basic level personnel" (IUCN, 1974). These are the personnel who guard the park, guide and interpret (to both tourists and local people), and maintain and maintain park facilities. The success of a park will depend much upon the majority of such personnel being local people whose former means of subsistence may well have been cut off by the park (Cruickshank, 1974).

Training programmes for such personnel should be:

- Mobile. Teams of instructors capable of operating from temporary facilities such as a school camp may be more useful than teachers tied to institutional buildings.

- Flexible. Instructors need to be capable of giving instruction in the local language and relating it to the traditions and beliefs of the people. Concepts of the non-existence of living beings and their movement being more useful for them than familiar religious teachings from text-book ecology.

Training programmes should also be designed to ensure that the management and operation of national and regional parks meets standards that will maintain the quality of the environment both inside and outside the parks.

3. INTERNATIONAL AID FOR TRAINING FIELD PERSONNEL

Mobile, flexible vocational training is most urgent needs at the grass-roots level are typical of the programmes offered by international non-government agencies. For example, the Non-Government Organisation Division of the Canadian International Development Agency (CIDA) was formed in 1968 to operate a programme of co-operation between governments and private overseas aid

ABSTRACT. International support for training of parks has a number of advantages but also some disadvantages, especially if it prevents an indigenous training capacity from being developed. The most important training is for the field staff; courses need to be mobile and flexible in order to meet the variable needs of different situations. Funding support for such courses is available from a number of international agencies; the Canadian International Development Agency is particularly active in this region.

1. INTRODUCTION: WHY INTERNATIONAL AID?

International support for training protected area managers has at least three major justifications:

- Because the involvement of international aid organisations, especially non-governmental or foundations, is a two-way educational process that can help to foster interest, perception and understanding on a worldwide rather than just a regional basis.

- Because national and local budgets do not generally give high priority to the provision of environmental education or training.

- Because training programmes for national park personnel are required too urgently to be left entirely to the methodical development of the environmental aspects of formal education.

2. WHAT CAN INTERNATIONAL AID DO?

Earlier conferences and workshops have pointed out that international aid can provide experts with experience in planning and management (Hart, 1966; Gibbon, 1974; IUCN, 1984). It can also provide access to academic and training institutions in various parts of the world. However, Dr. Simon Alex Franky, in summarising the session on training at the Second World Conference on National Parks in 1972, stressed "the danger of relying too much on

Management of the Giant Panda in Nature Reserves of China

Wang Menghu

ABSTRACT. *The giant panda is one of China's rarest species, with a total population of less than 1,000 individuals. Totally dependent on bamboo, the panda has suffered greatly with the recent mass flowering and subsequent die-off of bamboo, requiring intensive management efforts which have included field research, artificial insemination, capture and rehabilitation of starving individuals, and captive breeding. A management plan for the entire giant panda habitat is now being prepared.*

1. INTRODUCTION

After millions of years of evolution, the present distribution of the giant panda has been reduced to a few areas in the Chinese provinces of Sichuan, Shanxi and Gansu. From 1973-1975 a three-year survey was undertaken by the Chinese Forestry Department, in an attempt to ascertain the range and population status of giant pandas in these three provinces. A great deal of biological information has now been collected and indications are that the number of giant pandas remaining in the wild is approximately 1,000 animals.

2. RESCUING THE GIANT PANDA

Ten years ago, mass flowering of bamboo occurred in some areas of panda habitat in Sichuan Province. Since bamboo is the principal food of the giant panda, the subsequent death of the bamboo after flowering resulted in the loss of at least 138 pandas from starvation. In 1983, mass flowering of the bamboo occurred again in Sichuan, Shanxi and Gansu provinces. This natural calamity is far more serious than in 1975 since it covers a much larger area and is persisting for a longer period. This crisis has caused much concern to the Chinese and to people all over the world.

The Chinese Government has committed significant resources backed by considerable manpower to a rescue operation for giant pandas threatened by starvation. We have received a great deal of help from other countries and from international conservation bodies. Up to the present time the Chinese Government has allocated 8 million yuan

(RMB) to this rescue operation for the pandas. In addition to this sum the Chinese people have themselves donated a further 2 million yuan. We have also received US\$ 90,000 from our overseas friends and a donation of 50 million yen from the Japanese Government. Within the terms of the co-operative agreement between China and WWF International for the Panda Project, WWF Japan and Japanese N.T.V., were entrusted with the task of shooting a documentary film on the rescue campaign in Sichuan Province. This resulted in a further donation of US\$ 200,000. Altogether our country has raised 10 million yuan and contributions from abroad total 16 million yuan (note: 2.5 yuan = US\$ 1). These funds have played a very important role in supporting the preservation of the Giant Panda.

By the end of March this year, although 47 pandas have been found dead, we have achieved much in our rescue efforts.

Many stirring deeds have occurred during this rescue operation. For example, in March 1985 in Baoxing County, Sichuan Province, a local peasant named Chen Cau Jiun saw a starving giant panda exiting from the forest and sitting by the side of a forest path. Chen rushed back to his home and returned with food and water — but the panda was too weak to take nourishment. Help was summoned the next day and the local government transported the animal to Chengdu Zoo that night. Under the care of the veterinary staff, the panda slowly recovered.

At the moment there are five giant pandas recovering under medical treatment, all of which were found and saved by local people. We have now organised patrols in all areas of panda distribution. In spite of these efforts, because of the large area involved and poor communication, the deaths of some pandas is unavoidable. Our goal is to reduce to a minimum the loss of animals from starvation.

3. FUTURE MANAGEMENT EFFORTS

The Chinese Forestry Ministry, IUCN and WWF are all very concerned over the future of the giant panda and are preparing a new co-operative agreement with this concern in mind. The new co-operative plan begins this year

with an overall survey of the distribution and population of pandas as well as surveys of bamboo and human social and economic activities within the range of the pandas. On the basis of this survey we will work out a long-term management plan for preservation of the giant panda.

We in China believe that the implementation of this plan will play a very effective role in the long-term pre-

servation of the giant panda and will also benefit countless other species occurring in the same habitat. The most immediate problem is that the bamboo die-off will require ten years regrowth before the bamboo is again providing adequate food for giant pandas. How to take adequate artificial measures to bridge this ten year period is a problem that will require serious study.

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The Khao Yai Management Plan and Action for the Future

Robert J. Dobias

ABSTRACT. *The "Khao Yai National Park Management Plan 1985-1989" represents Thailand's first attempt to use an efficient managerial approach in its protected area system. In light of experience from plan preparation, four major issues are discussed: integration of community development and park management; staff training; establishment of an infrastructure for expansion of management planning; and procurement of government support. Gaining government support for proper protection and management of parks and sanctuaries is of principal importance. It is suggested that Thailand's protected area managers develop a method to evaluate beneficial uses in these areas and then present the data in a cogent form to the country's decision makers.*

1. INTRODUCTION

The Khao Yai Management Plan was prepared in 1984 by the Royal Forest Department (RFD) with assistance from World Wildlife Fund (WWF) and the International Union for the Conservation of Nature and Natural Resources (IUCN). It sets an important precedent in being the first management plan for any Thai protected area, and it is expected to serve as a prototype for similar action at other parks and sanctuaries. The plan addresses 5 major management parameters — community development, park administration, law enforcement, visitor use and interpretation, wildlife management, and research and monitoring — for which management recommendations were written following careful assessment of park resources (structural, human, financial and biological) and of past and present management practices. As a prototype plan, it is intended to supplant the RFD's traditional day-to-day management of Thailand's protected areas with long-term planning, considering all major issues treating them as an integrated whole rather than isolated incidents to be dealt with separately.

Preparation of the Khao Yai plan has brought to light several issues regarding the future management of Thailand's protected area system. Below, four of the major and most immediate issues are discussed.

2. INTEGRATING COMMUNITY DEVELOPMENT WITH PARK MANAGEMENT

Poaching and encroachment are threatening most of Thailand's parks and sanctuaries, including Khao Yai. Surrounded by about 100 villages, Khao Yai National Park is suffering acute pressures. Approximately 100 sq km of the park boundary has been deforested by shifting cultivators; populations of most major wildlife species are being depleted through poaching; and plants such as *Aquilaria crassna* and certain orchids are in danger of extinction due to over-collection. The RFD has responded to these threats primarily by increasing the level of law enforcement. Nonetheless, villager abuse of park resources does not appear to have decreased and in fact may be increasing.

The Khao Yai Plan has broken with tradition by examining the causes for this illegal activity and tracing much of it to rural poverty — the average annual per capita income in villages surrounding Khao Yai is just US\$ 200, lower than Thailand's northeast, which itself has the lowest PCI of the country's 5 regions. Acting on the assumption that most poaching and encroachment is being done by subsistence farmers who rely on Khao Yai's resources to supplement their meager incomes, a park management programme was formulated to provide villagers with significant economic inputs derived from non-consumptive use of the park and from outside sources.

The programme involves a wilderness trekking scheme, based in villages along the park boundary, and a direct rural development aid scheme. Demonstration projects are now in operation. The development aid project is particularly exciting and holds much promise for the future, not only for Khao Yai but for other areas as well. An "Environmental Protection Society" (EPS) is now being established in a village which has been a source of frequent park abuse. The EPS will function as part collective business enterprise, part credit co-operative and part non-formal education centre besides being a base for conservation activity (Suvanakorn and Dobias, 1985). The EPS has great potential for significantly improving economic conditions in the village, thereby lessening the villagers' need to exploit the park's forest, wildlife and soil resources.

The aid project is being co-implemented by two private concerns, the Population and Community Development Association (PDA), which has over 10 years of experience in rural development, and Wildlife Fund Thailand (WFT), a national conservation body, in co-operation with the RFD. It is expected that this collaboration between a rural development organisation and conservation agencies will produce a "mushrooming" effect. That is, it should allow PDA to apply the conservation techniques it will learn to many of its 16,000 project villages. Similarly, the RFD and WFT can incorporate their acquired rural development knowledge into conservation programmes at other parks and sanctuaries.

An equally important benefit of this management programme is that it provides the basis for increased support of Khao Yai from two critical sectors: the rural population and government. The community development programme is in line with one of the government's major national development policies, thus providing for favourable reactions by decision makers and helping to sway their support for other park programmes. It has already begun to affect the attitudes of some villagers, who formerly perceived park policy as directly opposed to their welfare. It should be emphasised, however, that the trekking and development aid schemes are not intended to obviate the need for law enforcement. Rather, community development and law enforcement should complement one another if park protection is to be improved.

3. TRAINING

The RFD has few officers with previous experience in protected area management; many superintendents, though possessing university degrees, lack formal instruction in this field. Realising that certain management programmes, particularly those related to visitor use/interpretation and law enforcement, need trained officers for effective implementation, the Khao Yai Plan calls for training seminars to be held annually at the park. In anticipation of future management plans for other areas, training should be offered on a Division-wide basis for key personnel so that a pool of knowledgeable people is available to carry out more ambitious management programmes. Steps have been taken in this direction by some Bangkok universities which offer extended site visits to parks and sanctuaries for students in natural resource and related fields.

4. PROVISION OF PLANNING SECTIONS

With preparation of the Khao Yai Management Plan, a base of planning skill has been formed in Thailand. But if management plans are to be prepared for a significant number of protected areas within a reasonable time, a suitable infrastructure must now be established. This should take the form of Planning Sections within the National Park Division and Wildlife Conservation Division (which is responsible for management of wildlife sanc-

tuaries). The Planning Sections should be staffed by one full-time Chief Officer, two assistants and a secretary. In close consultation with the respective superintendents, the Planning Sections could produce a minimum of three plans annually. University professors and other experts could be hired on short-term consultancies to provide any technical assistance beyond the capabilities of the Planning Sections, and to review the plan before it is finalised. Establishment of Planning Sections is crucial because it will "institutionalise" the preparation of protected area management plans. When these sections become operational, they will remain permanent fixtures in the RFD's central administration (Chettamart, 1985).

5. GAINING GOVERNMENT SUPPORT

In Thailand, development pressures and economic realities are forcing the government to look more critically at protected areas and their impact on the population. In the absence of quantifiable justification for protected areas, decision makers are tending to support uses which run counter to the reasons for which these areas were established. Ironically, they are doing so at a time when protected areas are playing, or could play, an increasingly important role in the country's sustained economic growth and development (Snidvongs, 1984).

In order to turn the tide against destructive uses in protected areas and to secure needed funds for the proper management and maintenance of these areas, Thailand's protected area managers not only need to prepare long-range management plans but must also develop a method for evaluating the benefits which parks and sanctuaries, in an undisturbed state, provide the Thai people. The evaluation must then be presented in a form which decision makers can more readily understand and support (Ludwig and Evans, 1984).

A proposed method for Khao Yai National Park would include, first, the identification of existing and potential beneficial uses in Khao Yai which are non-destructive. These beneficial uses would then be quantified in socio-economic terms to the extent possible. A few examples: the average amount of money spent by Khao Yai's 200,000 visitors from point of departure to Khao Yai and back; the estimated impact of dry-season stream flow on agriculture equated to monetary terms from the market value of these crops or their real value as subsistence crops; improvement in village incomes by park-initiated rural development projects; the estimated potential value of the park's genetic material based on precedents both inside and outside the country. In cases where economic quantification is not feasible, such as the cultural importance of elephants, the benefits would be qualified in terms understandable to economists and politicians. The third step would involve projecting the impact of these beneficial uses on the population over the next 20 years, assuming complete protection of Khao Yai compared to graded levels of consumptive use of park resources. Finally, the data would be presented in a

suitable form commonly used by government agencies when presenting their case to decision makers as benefit-cost analysis.

Such a method would not be easily developed and would rely on inputs from a variety of disciplines. But it would allow the park manager to compete for funds on the same turf, using the same weapons, as other agencies. It would also provide him with tools to better rationalise the protection of parks against destructive exploitation; since 1975, government-approved development projects have had serious detrimental effects on no less than 14 protected areas. Two of Thailand's premier parks are now being threatened with dam projects.

Thailand's conservation proponents have never successfully stopped a major development scheme from being implemented in a protected area. One of the primary reasons is that the projects' backers present their case to government decision makers in concrete terms (whether justifiable or not) showing how the population will be better off with the project than without it. In Thailand, all requests for government funds must first pass through an agency staffed primarily with economists possessing virtual veto power over submissions; projects rejected by them never reach the political arena for debate. Although most staff members consider factors other than purely economic ones, all members are heavily influenced by the economic justifications presented. Thai conservationists have thus far been unable to develop such justification beyond a primitive level.

Another major reason is the reactionary character of protected area conservation. Thai conservationists normally

do not take issue with these development schemes until project planning is well underway. And when they do decide to fight, it takes additional months to prepare a case of enjoining or modifying the scheme. An existing beneficial use analysis of the protected area would allow for immediate rebuttal of plans for destructive development.

Finally, beneficial use analysis of parks and sanctuaries will help improve management of these areas by pointing out potential benefits which could be supplied to the population. New management strategies can then be formulated, or existing strategies modified, to maximise these benefits. In doing so, the arguments for protection will be further enhanced.

6. CONCLUSIONS

The Khao Yai National Park Management Plan is a useful document for showing how Thailand's protected areas can be better administered and thus more fully achieve their biological and social objectives. Management programmes outlined in the plan, especially the community development programme, offer patterns that other parks and sanctuaries can follow to alleviate the widespread problems of persistent poaching and encroachment. However, without proper government support, the future of park planning and the viability of the protected area system as a whole is in doubt. A system to evaluate the benefits Thailand receives from these areas must be developed so that protected area managers can present cogent and prevailing arguments to the country's decision makers.

Management Problems in the Andean National Parks and Protected Areas of Peru

Marc J. Dourojeanni

ABSTRACT. Peru shares many features with countries of the Hindu Kush-Himalaya, being mountainous, diverse, and filled with difficult social and ecological problems. Therefore, many of the lessons learned in Peru can be applied in this region, and vice versa. Peru has established a range of different categories of protected areas which maintain the integrity of the national park ideal for the most superb areas, while also providing some degree of conservation to other areas where some human involvement is desirable or at least inevitable. Public awareness among the urban decision makers and improved co-operation with local people are highlighted as the two critical problems.

1. INTRODUCTION

Three natural regions clearly define the 129 million hectares of Peru: the long and generally narrow desert coast, along the Pacific ocean; the wide Andean range, composed of three more or less parallel chains of tall mountains delimitating high plateaux and deep valleys; and the vast Amazon jungle, covering the eastern slopes of the Andes from 3,800 m above sea level (asl) and extending to the lowland forests at 100 m asl on the boundary with Brazil. The geography of Peru makes this country ecologically complex, 84 life zones being recognised (*sensu* Holdridge, 1978; ONERN, 1976). Thus the establishment of a representative network of national parks and protected areas is a difficult task, well advanced but still not yet complete.

The Peruvian system of Conservation Units is formed by 21 areas covering 5,137,725 ha (4 per cent of the national territory). The Peruvian categories included are national parks (6), national reserves (8), national sanctuaries (4) and historic sanctuaries (3). There are also other categories of protected areas such as national forests (6 covering 5,500,102 ha), biosphere reserves (3 covering 2,511,841 ha, mostly existing national parks), reserved zones (2 covering 305,735 ha), and official hunting reserves (2 covering 124,735 ha). Excluding the biosphere reserve areas superimposed to other categories, Peru has 8.6 per cent of its land territory under protective status.

In the Andes there are several conservation units, protecting important examples of the biogeographic provinces (*sensu* Udvardy, 1975) known as Yungas, Puna, Southern Andes and Titicaca Lake. The Yungas correspond to the eastern slopes of the Andes and includes Manu National Park and Macchu Picchu Historic Sanctuary. Other conservation units in the Eastern slopes are not included because most of their area is below 2,000 m asl.

2. ESTABLISHMENT OF ANDEAN CONSERVATION UNITS

The Andes have been heavily populated for several thousand years. The main human impacts prior to the European arrival, were the fire-clearing of forests (*Polylepis*, *Buddleia*) to allow the establishment of natural grasses for vicuna, guanaco, and deer, and later also for the domesticated llama and alpaca as well as to develop agriculture in the valleys. More than a million ha of irrigated terraces were built. The Andes are the source of more than a hundred domesticated plants, including potatoes, tomatoes, corn, ullucu, maca, quinoa, coca, beans, tobacco, lucumo and hot peppers. After the Spanish arrival the modification of the environment was even greater due to introduction of cattle, sheep, goats, horses, and donkeys and the disruption of the communal lifestyle. Today, only some 6,000 ha of degraded *Polyepis* and *Buddleia* stands still remain, mainly in the Huascarán National Park and a few other conservation units. All other natural ecosystems of the Andes were also heavily modified during more than 15,000 years of human presence and especially during the last five centuries.

When establishing the Peruvian system of conservation units in the late 1960's and 1970's it became evident that only the snow peaks were unmodified by man and that most lands were privately owned. Despite the heavy modification and degradation of the natural ecosystems, it was also obvious that the Andes still had significant genetic diversity as well as other natural values such as scenery.

The strategy to establish conservation units in the Andes had to be different from what was currently ap-

plied on the coast or in the Amazon, where virgin natural areas were still available and most of the land was still in State hands. This strategy was based on the concept of "national reserve", which in Peru, is a category of protected area where some of the natural renewable resources (e.g., grasslands for livestock, wild animals of high value, fisheries or some species of plants) are managed for the benefit of local people following traditional uses of the land (e.g. pasture of alpaca, llama, sheep or cattle) or applying new technologies (e.g., management of vicuna, guanaco or waterfowl). The ownership of the land could be entirely private and national reserve status is used to restrict destructive land use patterns (e.g. grassland burning, over-fishing).

The success of the national reserves depends on the advantages and benefits that accrue to local people. Usually it is easy to demonstrate that more effective use of natural resources is achieved. The vicuna management in Pampa Galeras National Reserve and in hundreds of thousands of ha of communal land is one of the better known examples (Brack *et al.*, 1981; Ponce, 1984). The same applies to Titicaca and Junin National Reserves, where peasants living in artificial islands on the lake or around it obtain benefits from waterfowl and frog management as well as from aquatic vegetation (Dourojeanni and Ponce, 1977; Dourojeanni *et al.*, 1967). Another advantage is that the status of national reserves avoids external exploitation of local natural resources by consolidating the ownership of local people. There are many other advantages and benefits, such as tourism and recreation, sport hunting and fishing, which may provide extra income from the land as well as employment.

The above description of natural reserves is also partially valid for national sanctuaries with the important difference that species or other resources which are the reason for the establishment cannot be used. Calipuy National Sanctuary protects a relictual stand of *Puya raimondi* and some spectacled bears (*Tremarctos ornatus*). Huayllay National Sanctuary protects unique geological features and also some interesting wildlife. In both areas there is livestock grazing and the land is privately owned.

In the case of two of the three historic sanctuaries the land is also private. Only Macchu Picchu is partially State-owned and an expropriation procedure is being undertaken.

Peruvian forestry legislation requires that national park land be State-owned. This is the case for Manu National Park although tribal groups are resident and allowed to follow their traditional lifestyles. In the Huascan National Park the greatest part of the area is owned by the State but there are several small portions of its lower range which are communal land. The agreement for the use of this portion is that only native livestock (llama and alpaca) should be allowed and that grass burning is prohibited. In general, the Peruvian Forestry Service policy for the establishment of conservation units in the Andes was very successful and most of the social and

environmental goals were reached. Failures were always a consequence of local mismanagement or mistakes. These policies were perhaps even more effective than when the land was State-owned as in the Amazon region, which caused antagonism with neighbouring populations. In summary, policies consisted of:

- full recognition of local people's rights and interest;
- a realistic approach to categories of protected areas, especially definition of national reserves;
- elasticity in the application of the legislation in order to cover exceptions as in the Huascan National Park.

3. MANAGEMENT OF ANDEAN CONSERVATION UNITS

Management problems in Peru are essentially of an administrative nature: inadequate funding; scarcity of qualified staff; lack of equipment and infrastructure; lack of control; and poor application of plans.

Financial resources available for national parks and protected areas received a low political priority and even lower priority in the Forestry Service to conservation responsibilities (wildlife, protected areas, watersheds). This is a symptom of a lack of national public awareness for environmental matters. This is essentially a characteristic of the urban population which make up the majority of the voting citizens.

Of all Andean conservation units only Pampa Galeras National Reserve and Manu and Huascan National Parks have official budgets. Some others, like Junin, Titicaca and Salinas-Aguada Blanca National Reserve, have some funding from the local Forestry District offices. But others have no funding and are essentially "pauper" protected areas such as Calipuy National Reserve and Calipuy National Sanctuary. Macchu Picchu, as well as the other Historic Sanctuaries, receive some funds from other from other public sectors, like Education or Army, but those resources are not usually oriented to environment management.

The major management problems of the Peruvian Andean conservation units are:

- the interference of protectionist — minded activists against the utilisation of natural renewable resources for the benefit of local populations. The resistance is strongest when there is need to manage populations of endangered species like vicuna (even when the local vicuna population is high);
- the interference of anti-government politicians in rural communities; and
- the interference of local or regional economic power groups, especially those dealing with mining activities.

The scarcity of well trained people, but especially the lack of commitment among the professionals in charge of the units, is a key constraint. Alcoholism is a very serious problem affecting professional staff. Low salaries are not the only cause of this behaviour; curiously enough, guards and technicians, with the lowest salaries and opportunities, generally show more interest and enthusiasm than their superiors. However, a slow but noticeable positive change in the professional staff attitude, has begun.

Manu, Huascarán, Huayllay, Titicaca, Junin and Pampa Galeras have management plans, though they are not officially approved except in the case of Titicaca. In fact, management plans have never been effective due to lack of adequate budgets. Year after year implementation has been postponed. Often only emergency actions receive attention.

Many of the conservation units are submitted to threats. These may be grouped as follows:

- threats originating from regional or national interests like road building (Huascarán, Manu), mining (Huascarán, Manu, Huayllay, Salinas-Aguada Blanca), pollution (Titicaca, Junin, Salinas-Aguada Blanca), new settlements (Manu), oil exploration and exploitation (Manu), hydraulic development (Junin, Salinas-Aguada Blanca, Macchu Picchu, Manu).
- threats originating from local interest such as over-grazing (Titicaca, Junin, Huascarán, Salinas-

Aguada Blanca, Calipuy), unlawful hunting and fishing (all units); and

- threats originating from land-owners in the units.

A special threat to Huascarán National Park and Macchu Picchu Historic Sanctuary is tourism. Huascarán receives hundreds of high mountain climbers and many more hikers. Macchu Picchu receives several thousand visitors. In both cases tourists are a major cause of pollution and vegetation destruction, including forest fires.

4. THE FUTURE

The key issues for the future of Andean conservation units in Peru are twofold: on the one hand it is critical to raise public awareness, especially among the dominant urban citizenship, to highlight the political priority for conservation. This action must focus on obtaining increased budgets for management of protected areas and support to address the threats to them. On the other hand, the Forestry Sector should follow its present relationships with local people, making them full participants in the long-term goals of conservation. The relationship between the conservation units and the local communities must be a mutual symbiosis and the main effort of professional staff must be to build, with originality and inventiveness, these relationships.