

# Conserving diversity mountain environments: Biological and cultural approaches

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## 1. Introduction

A small sign nestled among the pines by the side of a road in central Bhutan quotes the Lord Buddha: "The forest is a peculiar organization of nature that makes no demands for its sustenance and extends protection to all beings, offering shade even to the axe man who destroys it".

This quotation encapsulates the relationship between man and nature in mountainous regions. Mountain residents broadly appreciate the values of the forest, water, wildlife, and soils that support human society in these often inhospitable environments. But at the same time, nature's productivity is being threatened as people attempt to wrest more from the environment than can be sustained; the result can be the loss of the biological and cultural diversity upon which people depend for their continued survival.

In mountain areas close to the treeline, and in a climate where wood is required for house building, as fuel for cooking and heating, and as trees to protect villages from avalanches and landslides, deforestation is a form of biodiversity loss which is a danger to the very existence of many village communities. Most mountain peoples have responded to this danger by developing ways and means of conserving the forests. One of the best known is the Sherpa custom of *shinginawa*, or forest guards, where several men from a village are elected to protect the forest which protects the village. They also have the power to prevent cutting of protection forests, determine where trees may be cut, inspect firewood stocks in people's houses, and levy appropriate fines for transgressions. Their power is reinforced by annual celebrations where the fines are paid and the perpetrators are subjected to good-natured ridicule by their peers (FurerHaimendorf, 1964).

This mechanism worked for many years in the Khumbu region around Sagarmatha (Mt. Everest) in Nepal to prevent unrestricted fellings which would threaten the community.

FurerHaimendorf (1964) concluded, "Compared with the forests of lower and climatically more favoured regions where peasants of Chettri, Brahman, and Newar stock have in recent generations wrought enormous devastation, the forests of Khumbu are on the whole in good condition. This is mainly due to an efficient system of checks and controls developed and administered by a society which combines a strong civic sense with a system of investing individuals with authority without enabling them to tyrannize their fellow villagers."

But times have changed in Khumbu since van FurerHaimendorf wrote some thirty years ago, and the forests of Khumbu have now been seriously depleted by rapid economic development, as the central government assumed responsibility for the forests. Once the local Sherpa villages lost direct control over the forests, their strong cultural controls against overexploitation were lost (Jeffries, 1984).

In the western Himalaya, where tree growth is limited by low rainfall, the situation may be even worse. George Schaller pointed out the irony of the situation in Pakistan: There are large provincial forest departments but few forests and no range management departments even though much of the terrain was rangeland. "Many treeless slopes, now useless wastes of rock, as those around Chitral and Gilgit towns, were forested until recent times," says Schaller (1977). "About 22 million kg of firewood were used by the military in the Gilgit Agency during 1973. Herds of sheep and goats have denuded most upland. With a predilection for certain grasses and forbes, livestock has eliminated much of the palatable forage, leaving behind primarily those plants which can somehow protect themselves....Asian ranges consist not just of pristine peaks untrodden by man, an impression left by the books of mountain climbers, but also of populated areas where man is an enduring presence whose activities have had a devastating effect."

Another tendency seen in some Latin American countries has been the concentration of population and of the main productive activities in the mountainous areas. The Andean Highlands, which had had a sacred status for most of the pre-Columbian civilizations, have been subject to intense deforestation and degradation to house large urban populations, industries, and technical agriculture of products such as coffee. Traditional people have been pushed to marginal areas where land and resources are insufficient to be exploited in a sustainable way. Communal patterns for resource management have been lost in the face of privatization models. Indeed, mountain and cloud forests in Latin America may be now more endangered than the more charismatic lowland forests (Hamilton, *et al.*, 1993).

In conclusion, mountain villages in the Himalayas and in other mountain regions need forests and other natural vegetation, and in traditional times these habitats were conserved by strong social controls which constrained individual

behaviour for the benefit of the larger society. But in the face of change, traditions are fast fading into memories and are no longer able to control over-exploitation of biological resources. If people are to again live in harmony with their environment, then new means of conservation and sustainable use are needed to balance the new forces of exploitation. Building on traditional common proper regimes (Berkes, 1989) and sound productive technologies, the new means should be based on assigning direct responsibility for resource management to the local community, on planning from a bioregional perspective and on developing incentives for sustainable use.

## 2. Threats to Biological and Cultural Diversity in Mountain Regions

Mountains are important for the conservation of biological diversity, as they contain high levels of species richness and endemism (Groombridge, 1992). Giant pandas, snow leopards, mountain gorillas, mountain tapirs, spectacled bears, wild sheep and goats, and wild yaks are just a few of the "flagship species" which are confined to mountain habitats. Many of the centres of plant diversity identified by Davis *et al.*, (1994) are also in mountainous regions. They also harbour many small ethnic groups which have developed specific cultural adaptations to life in these challenging settings. But mountains are also essential for humanity at large; important crops such as potatoes, tomatoes, and beans have originated in this kind of environment. Important civilizations such as the Incas and the Tibetans have also developed in mountains, where they have perfected complex systems for managing and using resources in a sustainable way, often involving religious perspectives on the mountains (Bernbaum, 1990). Mountain ecosystems also provide key services for human populations, such as the water used for consumption and irrigation in valleys and lowlands. The loss of biological diversity and of the sound models developed for the sustainable use of biological resources may also have wide impacts on non-mountain ecosystems.

Recent changes in agricultural technologies and practices have profoundly affected mountain ecosystems. While the green revolution is unquestionably bringing real benefits to many regions, a few problems have arisen:

Increased yield often requires capital inputs (fertilizers, pesticides) which only the wealthiest farmers can afford without mortgaging their land to urban moneylenders; this has resulted in changes in land tenure that have marginalized and concentrated large traditional populations in low productivity and fragile ecosystems;

The genetic diversity of crops is being reduced, as the "miracle crops" are not so narrowly adapted to the microclimatic conditions which make each mountain valley unique;

The variety of crops grown by each farmer is being reduced mono-cultural systems have resulted in the simplification of mountain ecosystems and in losing highly nutritive or resistant crop varieties, and in a gradual impoverishment of the local soils and increased nutrition related diseases;

The replacement of productive systems associated with forest cover by monocultures has caused wide deforestation (e.g. new coffee varieties that replaced those cultivated under shade).

Rapid urbanization in some mountainous areas have also had impacts on their biological and cultural characteristics, such as the loss of highly productive lands; pollution of streams, rivers, lakes and soils; reduction of key ecosystems such as mountain wetlands; extinction of endemic species; and erosion.

The past few centuries have been politically tumultuous for many mountainous regions, as boundaries have changed and great nations have been formed. Even today, national sovereignty is far from secure and many remote areas remain in dispute; in some of these areas, such as Kashmir, the Balkans, and parts of Central Asia, wildlife and forests have suffered greatly.

In the process of nation building, villagers in remote areas who didn't even know they belonged to a nation soon learned a new language, joined their nation's army, and became involved in development projects designed by the central government. Surpluses which, when they were produced at an, used to be redistributed locally were instead used to pay taxes or otherwise contribute to the central economy. Local self-sufficiency at a subsistence level has been replaced by national interdependence at a somewhat higher level of productivity, which has often required that resources including forests, wildlife, and soils be used at an increased rate and that higher inputs of energy be consumed.

Schools, improved medical care, transport, radio and television, a common language, hydroelectricity, and other influences have brought even the most remote areas into the nation, in both an economic and an ecological sense. What were once locally self-sufficient and sustainable human ecosystems has become part of much larger national and global human ecosystems whose productivity is impressive but whose long-term sustainability is far from proven (Thompson, Warburton, and Hatley, 1986).

Traditional ways of life avowed the Viuage people to live in reasonable equilibrium with their environment, and to earn a reasonable living in doing so, though not without great hardship. Modern influences are undereniably making them wealthier and enabling the population to increase through improved medical care, security, food supply, and opportunities for migration. However, these influences are also encouraging landuse practices which are

unsustainable, especially deforestation, use of unsuitable land for agriculture, and over hunting.

The mid20th century period of nation building necessarily involved strengthening central governments. But the late20th century period of building ecologically and economically viable nations will require more sensitive and productive relations with local people and local ecosystems.

In short, the need is for new cultural means of controlling overexploitation of forests, land and wildlife. These cultural means need to be based on ecological, political and economic reality. It is clear that any conservation measure in mountain regions must be part of the cultural fabric if it is to make its necessary contribution to human welfare (McNeely, Thorsell, and Chalise, 1985).

Numerous definitions of mountain problems exist, along with sufficient guidelines for improving environmental management (see, for example, Stone, 1992; Poore, 1992; Eckholm, 1975; Negi, 1982; Cool, 1978; Jest, 1978; Lall and Moddie, 1981; IUCN, 1980; Schaller, 1977; Dasmann and Poore, 1979; Dasmann, Milton, and Freeman, 1973; plus dozens of reports from governments, UN agencies, and bilateral development agencies). Adequate information exists to enable a far more harmonious balance between man and nature in the mountains.

What has been lacking has been the political will of many governments to mobilize the resources human, financial, cultural, and moral to ensure the integration of ecological principles with economic development. The more powerful government departments tend to be those which are producing income for the national coffers, and they often have a vested interest in maximizing short-term gains even at the cost of long-term environmental degradation. (It should be pointed out that this problem is not unique to mountains, but that the environmental conditions in mountains are so critical that urgent, even radical, action is especially required here.)

### **3. Ten Key Principles for Conserving Cultural and Biological Diversity in the Mountains**

As the international community has become more aware of the importance of mountains for conserving biological and cultural diversity, new possibilities for supporting work in mountains have become available. At the United Nations Conference on Environment and Development, held in Rio de Janeiro in June 1992, some 157 countries signed the Convention on Biological Diversity. The Convention entered into force at the end of 1993 and now has over 110 State Parties. Article 20, on financial resources, calls for special consideration to be given to the most environmentally vulnerable developing countries, and specifically mentions mountainous areas in this regard. This specific mention of

mountains is especially promising, because the Convention itself contains a number of elements which are broadly applicable to the concerns outlined above (Box 1). Agenda 21, the global action plan adopted at Rio, also makes specific reference to fragile ecosystems, which include mountains.

The following principles are designed to help integrate conservation with development in mountain cultures, leading to enhanced benefits to the community, the nation, and the world:

### **1. Build upon the foundations of the local culture**

Very often, cultural elements are already available for contributing to conservation. Any laws or regulations emanating from central governments should be adapted to take advantage of local predispositions, as in the case of the Sherpa *shingnawa*. Make use of traditional cultural approaches to species conservation, and try to rekindle these where possible. Cultural diversity parallels ecological diversity, and local traditional adaptations are often the most environmentally sound.

### **2. Link government development programmer with conservation**

Development programmes such as road building, urban planning, construction of schools and health centres, agricultural development, hydroelectric facilities, improved communications, and other desired developments should have environmental and social components specific environmental programmes which address main courses of habitat degradation, such as energy substitution projects, are also required. If basic change in the pattern of living of traditional subsistence farming and glazing communities in the hills are to be facilitated, attractive and meaningful economic alternatives must be made available to hill people. Tourism, if carefully planned and controlled, can provide one such alternative and has already led to a great increase in Sherpa income (though this is not without problems, as discussed above). Also, the development of sound technologies for the use of these ecosystems should be a priority where mountains are at the centre of the country's development.

### **3. Develop incentives for the conservation and sustainable use of mountains**

These include: water fees and compensation schemes for the conservation of watersheds; tax exemptions for the maintenance of forest cover; special loans and fiscal incentives for productive activities that promote sustainability; and programmes for social development and compensation for populations located near protected areas.

### **4. Give priority to small-scale local development**

Mega projects, such as major dams, may be attractive to donor agencies but they are unlikely to bring widely dispersed benefits. It may be far better to concentrate at the village level, with customized development projects which can enhance productivity of the best soils and provide local sources of energy; such development can be coupled with strong regulations to reduce human impact on steep slopes and wildlife.

#### **5. Encourage bioregional planning**

Given the existing relationship between mountains, valleys and lowlands, land-use and natural resource management planning should be at a regional scale, to harmonize agricultural uses, protected areas, urban settlements and industry. Land tenure schemes should be developed in accordance to these plans.

#### **6. Give local people responsibility**

Local development priorities should be debated in village and district councils, and development projects should be at least partially funded locally. Long-term cultural stability in the past has shown that local people are fully able and competent to enforce regulations for the benefit of their community. In some areas it would be possible to establish management units under the control of local village councils; and local people should serve on the advisory board of each protected area. A key point is that local responsibility should follow local institutional patterns, and that it is better to strengthen local institutions than to create new ones.

#### **7. Examine the options for protection of species and ecosystems**

In some cases, species can be best protected by simply providing a game guard in the highest village, without any declaration of a protected area. And even when a protected area is required, many levels of protection and permissible human uses may be appropriate to specific local conditions. The preparation of management plans for protected areas need not be a specialized task requiring major outside expertise; but each protected area should have a management plan, and the plan is most likely to be effective if it is developed in close collaboration with the local people.

#### **8. Have the courage to enforce restrictions**

Once it has been agreed with the local people that certain restrictions (which may be those which existed when the local culture was still intact) are desirable, the regulations need to be strictly and equitably enforced. There is no need to apologies for any restrictions that may be necessary; people have always had to live with restrictions on their behaviour, and local people know that letting people destroy a protection forest because "they have always been

able to cut trees" is destructive to the community at large. However, enforcement should, whenever possible, be administered by local people, and at least a portion of any fines should go back to the village.

#### **9. Build conservation into the evolving new national cultures**

Traditional people throughout the world have developed ways and means of conservation which are interwoven into their cultural fabric. As nations are built, literacy becomes widespread, mass media become more effective, and new cultures are formed; conservation needs to become part of every possible section of the national development process and thereby become part of the new national culture rather than just a discrete responsibility of a wildlife or national parks department.

#### **10. Go with diversity**

Mountain peoples have long recognized that diversity is the key to their survival, using a wide range of means to wrest a living from a reluctant environment. Mixed systems, transhumance, terraces, agroforestry, local varieties, hunting and fishing, and the forestry/agriculture/wilderness interface are essential to mountain cultures. This diversity needs to be maintained as a matter of highest importance. What works in one place won't necessarily work in the next valley, and small countries have different imperatives than large ones. A series of local adaptations based on local cultural diversity is required, not a "universal elixir" to solve all conservation problems.

#### **4. Five Strategic Actions to Conserve Biological and Cultural Diversity in the Mountains**

In order to put these broad principles into action. I would like to conclude by making a few specific recommendations for integrating human concerns into conservation in mountain regions.

1. Each nation should review its protected area and species management policies and legislation to ensure that human concerns are being appropriately dealt with, and that conservation is integrated into other development concerns. National biodiversity strategies, as called for under Article 6 of the Convention on Biological Diversity, can be an effective means of coming to grips with the problems of integrating people, conservation, and development.

2. Research on traditional means of conservation needs to be carried out as a very high priority, before these cultural elements are washed away with the tide of modernism. Universities could be enlisted in this effort. The traditional means of conservation also need to be put into forms which would be useful to development planners and to protected area managers; workshops should be



held to train resource managers to be sensitive to cultural means of conservation and to collaborate productively with local people.

3. Countries should develop national tourism policies which promote appropriate behaviour by tourists, promote equitable distribution of the benefits of tourism, and control the negative aspects of tourism. Trekkers and expedition members should be made aware of acceptable norms of behaviour, following the example of "The Kathmandu Declaration" of the International Union of Alpine Associations. Organize training workshops on development and management of wildlife recreation for tourism development corporations, national parks, and tourist offices.

4. Countries should develop economic and social incentives for the conservation and sustainable use of mountain ecosystems, and remove "perverse incentives" such as certain agricultural policies, that result in environmental degradation. This may require promoting awareness on the part of the urban public and government officials that what is happening in the remote or close but overlooked mountain environments is of direct interest to their own wellbeing. Such awareness may well be a prerequisite for mobilizing the resources needed to address the environmental problems of the mountains.

5. Countries should develop and package sound and convincing arguments which demonstrate that protecting critical natural areas helps support food production outside these areas, through such means as watershed protection, soil formation, microclimate amelioration, genetic resources, and animal husbandry on marginal lands.

These broad strategic actions can be converted into specific projects which can address a number of the most important concerns voiced at the Earth Summit in Rio, including technology transfer, poverty, biodiversity, forests, agriculture, and trade. The Commission on Sustainable Development, established by the Earth Summit, is examining these issues on a regular basis, and the preparation of indicators of sustainable development in mountains could be a priority for CSD work. Further, a special focus on mountains would be entirely possible in the context of the Convention on Biological Diversity, especially because of the great relevance of mountains for implementing key provisions of the Convention. If requested by governments, the Global Environment Facility would be available to fund activities in mountain areas along the lines suggested above.

## 5. CONCLUSIONS

The papers at this Consultation have provided further information on the importance of cultural and biological diversity in mountain regions. Such areas have in the past served as refugia from changes in the lowlands, providing a stock of both cultural and biological riches which could subsequently

recolonises the lowlands when conditions became more appropriate. As the spread of industrial civilization threatens to cover virtually the entire world, perhaps some mountains will be the last refuge of people living in a reasonable balance with their land and resources. The kinds of principles and actions outlined in this paper will help enable the mountains to serve as "Holocene refugia" from which a more holistic and environmentally sound way of life might be developed.

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## **REFERENCES**

Berkes, F. (ed.) 1989. **Common Property Resources: Ecology and Community-Based Sustainable Development**. Belhaven Press, London.

Bernbaum, Edwin. 1990. **Sacred Mountains of the World**. Sierra Club, San Francisco.

Cool, John. 1978. Stability and survival: The Himalayan challenge. pp. 2132 in IUCN, **The Use of High Mountains of the World**. Dept. of Lands and Survey, New Zealand. 223 pp.

Dasmann, R.F., J.P. Milton, and P. Freeman. 1973. **Ecological Principles for Economic Development**. John Wiley, London. 252 pp.

Dasmann, R.F. and D. Poore. 1979. **Ecological Guidelines for Balanced Land Use, Conservation and Development in High Mountains**. IUCN, Gland, Switzerland. 40 PP. ,

Davis, S.D., V.H. Heywood, and A.C. Hamilton (ads.). 1994. **Centres of Plant Diversity: A Guide and Strategy for Their Conservation**. WWF and IUCN, Cambridge, UK.

Eckholm, Eric. P. 1975. The deterioration of mountain environments. **Science** 189:764770.

FurerHaimendorf von, Christoph. 1964. **The Sherpas of Nepal**. John Murray, London. 297 pp.

Glowka, Lyle, Francoise Burhenne, Hugh Synge, Jeffrey A McNeely, and Lothar Gundling. 1994. **Guide to the Convention on Biological Diversity**. IUCN, Cambridge.

Groombridge, B. (ed.). 1992. **Global Biodiversity: Status of the Earth's Living Resources**. WCMC, Cambridge.

Hamilton, L.S., J.O. Juvik, and F.N. Scatena. 1993. **Tropical Montane Cloud Forests**. EastWest Center, Honolulu.

IUCN. 1980. **World Conservation Strategy**. IUCN, WWF, UNEP, Gland, Switzerland.

Jeffries, Bruce. 1984. The Sherpas of Sagarmatha: The effects of a national park on the local people. pp.4738 In Jeffrey A. McNeely and Kenton R. Miller (ads.) **National Parks, Conservation, and Development: The role of protected areas in sustaining society**. Washington D.C., Smithsonian Institution Press.

Jest, Corneille. 1978. The Himalayas: Their rational use and conservation. pp. 3341 in IUCN, **The Use of High Mountains of the World**. Dept. of Lands and Survey, New Zealand. 233 pp.

Ill, J.S. and A.D. Moddie (eds.). 1981. **The Himalaya: Aspects of Change**. Oxford University Press, Delhi. 481 pp.

McNeely, J.A., J.W. Thorsell, and S.R. Chalise. 1995. **People and Protected Areas in the HinduKush Himalaya**. King Mahendra Trust, Kathmandu.

Negi, S.S. 1982. **Environmental Problems in the Himalaya**. Bishen Singh Mahendra Pal Singh, Debra Dun, India. 188 pp.

Poore, Duncan. 1992. **Guidelines for Mountain Protected Areas**. IUCN, Gland.

Schaller, George, G. 1977. **Mountain Monarchs: Wild Sheep and Goats in the Himalaya**. University of Chicago Press. 425 pp.

Stone, P.B. (ed.). 1992. **The State of the World's Mountains**. Zed Books, London.

Thompson, M., M. Warburton, and T. Hatley. 1986. **Uncertainty on a Himalayan Scale**. Ethnographica, London.

## Box 1: Key Elements in the Convention on Biological Diversity

### Major Principles

- Biodiversity has intrinsic value and is a common concern of humanity
- Governments have sovereignty over their biodiversity
- States are responsible for conserving their biodiversity and using their biological resources in a sustainable manner
- Causes of significant reduction of biodiversity should be attacked at their source
- The fundamental requirement for the conservation of biodiversity is the in situ conservation of natural habitats and the maintenance of viable populations of species in their natural surroundings. Ex situ measures, preferably in the country of origin, also have an important role to play
- Many indigenous and local communities with traditional lifestyles have a close and traditional dependence on biological resources and need to share equitably in the benefits arising from biodiversity
- International cooperation is an important part of implementing the Convention

### Major Measures

Contracting parties agree to:

- Develop national biodiversity strategies, plans, and programmes
- Identify and monitor important components of biodiversity
- Establish systems of protected areas, manage biological resources, rehabilitate degraded ecosystems, regulate risks of living modified organisms, control alien species, protect threatened species
- Establish facilities for ex situ conservation of plants, animals and micro-organisms and adopt measures for the recovery, rehabilitation, and reintroduction of threatened species
- Implement measures for sustainable use, including use of economic and social incentives.
- Establish programmes for training, education, and research; and promote access to relevant technology
- Facilitate access to genetic resources, on mutually agreed terms and under prior informed consent of

Party providing such resources

- Promote access to relevant technology
- Promote technical and scientific cooperation, including exchange of information relating to biodiversity
- Provide funds to developing countries to help implement these measures
- Promote technical and scientific cooperation, including exchange of information relating to biodiversity, and provide funds to developing countries to help implement these measures

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### Notes to readers

This is a draft paper presented at the International NGO Consultation on the Mountain Agenda, Peru. 22- 27 February 1995.

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