Chapter 1

Introduction

THE MOUNTAIN MALAISE
Quest For an Integrated Development

JACK D. IVES

Over the last two decades there has been a rapid growth in awareness that all is not well in the mountain regions of the world. Since about ten percent of the world's population depend directly on the use of mountain resources for their well-being, and upwards of forty percent indirectly, for water, hydro-electricity, timber, mineral resources, recreation, and flood control, it is necessary to examine this growing concern about mountain resource management and to try to determine what new directions, if any, are needed.

As responses to the earliest expressions of concern in the late 1950s and 1960s, a number of initiatives were taken by international, multi-national, national, and local organizations, and individuals. These included: establishment of *UNESCO's Project 6:* study of the impacts of human activities on mountain ecosystems, as one of the fourteen components of the Man and the Biosphere (MAB) Programme; the 1974 Munich Conference on Development of Mountain Environments, sponsored by the German Foundation for International Development; IUCN's conference on the Management of High Mountain Resources, held in Christchurch, New Zealand, in 1976; the Council of Europe's Conference on The Future of the Alps; the establishment of the United Nations University project on Highland-Lowland Interactive Systems, in 1978; the founding of the International Mountain Society in 1980, and its quarterly journal *Mountain Research and Development*, in 1981; the inauguration of the International Centre for Integrated Mountain Development

(ICIMOD) in Kathmandu, in December 1983, under the aegis of UNESCO, the German Foundation for International Development, the Swiss Association for Technical Aid, and the national governments of the Himalayan-Hindu Kush region; and many others, too numerous to mention.

Two publications, however, Eric Eckholm's *Losing Ground* (1976) and John Lall's *The Himalaya: Aspects of Change* (1981), and especially the former, have had a popular impact of world-wide significance. Eckholm, with support from Dr. Maurice Strong and *World Watch*, produced a challenging literary and emotional appeal to the effect that the world's mountains, and especially the Himalaya, were facing imminent catastrophe. This well-written and highly readable *tour de force*, recently reinforced by Sandra Nichols' spectacular motion picture *The Fragile Mountain*, has become standard news media fare, to such an extent that we have almost come to expect the collapse of Nepal and much of the Himalayan system by AD 2000, with devastating consequences for the teeming millions of the Indo-Gangetic Plain.

It is perhaps appropriate to reiterate the collective concerns that have found expression through the initiatives enumerated above, and to evaluate them in the light of current knowledge and experience. While it is necessary to differentiate between temperate latitude mountains, located primarily in the Industrialized Countries, and the tropical and sub-tropical mountains of the Developing Countries, I cannot do better than paraphrase Eckholm for an outline of the concerns expressed for the latter, and more specifically, to narrow down the description to the Himalaya and Nepal.

The Himalaya-Ganges-Brahmaputra system can be categorized as one of the world's largest highland-lowland interactive system. A number of assumptions have been reiterated so often that they are now largely accepted as fact and, in turn, have had major impacts on the decision-making process and upon development-project design. Enumerated briefly, these are: (1) uncontrolled population growth in the Himalaya induces deforestation as demands for fuelwood and subsistence agricultural land increase; (2) deforestation leads to soil erosion and landsliding, and disrupts the normal hydrological cycle; (3) this leads to more disastrous flooding with massive siltation in the wet season, and lower water levels in the dry season; (4) the increased sediment load of the Ganges and Brahmaputra is causing an island to form in the Bay of Bengal.

This so-called vicious circle, since loss of agricultural land in the

mountains leads to another round of deforestation, has become an intellectually satisfying concept; as a working hypothesis it seems so reasonable that it is not surprising that it is accepted as fact. One interesting component of this "fact" is that it is the growing demand for fuelwood, induced by the population growth, that is the cause of deforestation. As the labour of walking greater distances from the hearth or village to cut fuel increases with the receding forest perimeter a critical threshold is reached whereby the available human energy becomes progressively overtaxed and an increasing quantity of animal dung is used for fuel. This creates another vicious circle within the limits of the first: terrace soils, deprived of natural fertilizer — the animal dung now being used for fuel — induce lower crop yields, and the weakened soil structure augments the incidence of landslides. Thus more trees are cut on increasingly steeper, and marginal, slopes to make room for more agricultural terraces to feed the growing subsistence farming population. Thus it follows from this scenario that there is a progressive shift from *potential instability* to massive *actual instability* and, in face of these irreversible destructive processes, out-migration increases, which adds to the already heavy pressure on the resource base of the Terai.

The scenario developed above is given more moment when the usually quoted figures for progressive deforestation in Nepal are considered. Thus, Nepal is said to have lost more than half its forest cover between 1950 and 1980, and little will remain by 2000. Extensive mountain desertification and increased calamitous downstream effects, therefore, appear unavoidable.

For the temperate-latitude mountains of the Industrialized countries a quite different pattern emerges and it is instructive to draw a careful distinction. Using the Alps as an example, it is generally understood that the immediate cause of environmental degradation is population growth and increase in affluence of people living *outside* the mountains. This has led, especially since 1950, to rapidly increasing demands for the development of mountain resources: minerals, water, fossil fuels, timber, and especially for recreation, with an overwhelming emphasis on winter sports. Tourism disrupts the remaining traditional cultures *within* the mountains. Thus local depopulation occurs in areas not competitive in the development of two-season tourism–(or not competitive agriculturally, for a variety of reasons), with ensuing collapse of mountain agro-ecosystems. And depopulation and land abandonment are usually followed by a significant increase in soil erosion until a new stability is achieved with establishment of shrub and forest

cover. Tourism, in effect, promotes *redistribution* of population *within* the mountains, as the necessary infrastructure develops, and encourages an even larger influx of tourists and progressively increasing pressures on the mountain environments.

While there are many regional differences, resulting from a variety of factors (especially between Europe, North America, the Southern Alps, and the Southern Andes), these generalizations are broadly representative of world-scale developments. The most important exceptions are the expansion of tourism within mountain regions of the Developing Countries and the exploitation of resources of the tropical and sub-tropical mountains and hills for the benefit of communities located *outside* of them. Such exploitation can be generated within the region (for example, commercial timber corporations in India), or from outside the region (for example, forest products and mineral extraction by industrial corporations in the USA and Japan).

It is also important to bear in mind the innumerable exceptions on the local scale and the dangers of imposing Euro-centric concepts and values. For instance, it can be argued that the development of tourism in Sagarmatha National Park has significantly enhanced the standard of living of the Khumbu Sherpas of Nepal, and the former farmers of Canton Vallis, Switzerland, may not regard the enormous growth of tourist infrastructure on Riederalp, or at Saas Fo, as anything less than highly profitable *and* sustainable, at least within their own lifetimes. These two examples are introduced to demonstrate that different groups within mountain societies will have different, and perhaps conflicting, value judgements in specific cases of mountain development: the problem of long-term sustainability, over several generations, however, remains.

Several variations on the themes briefly discussed have appeared again and again in the literature and in the popular press over the last ten or fifteen years. In fact, it was stated informally during the ICIMOD inauguration in December 1983 that many, if not most, of the presentations by the invited delegates were merely repetitions of what had been raised in Munich ten years earlier. And while the themes and their variations are generally accepted as truisms, it is necessary to ask if they are true, and if so, how true?

Thus, let me deal with the first theme. This I would like to categorize as "The Theory of Himalayan-Indo-Gangetic Plains Environmental Degradation." I would like to argue that this widely accepted theory may be based, at least in part, upon a degree of myth — a quarter-century of emotion and repetition of first

impressions — and I am at fault myself as much as anyone else. Is it really correct to assume that deforestation in the mountains causes soil erosion and landslides, with direct impacts all the way downstream to the Bay of Bengal? and to base development plans directly upon such a facile assumption?

We must first ask what are the causes of deforestation. This obviously has a simple answer, but it is the more complex set of answers that must be sought. Fuelwood demands of subsistence farmers and pressure to farm more marginal and steeper land to produce food for local consumption to feed a rapidly increasing population are two oft-cited causes. But why is the population growing so rapidly? what are the patterns of local and regional migration? and what can be done to ameliorate these massive socio-economic and political pressures? Next we must examine the linkage between deforestation and soil erosion. What are the rates of soil erosion: (i) under different cover types and land-use strategies; (ii) at different altitudes and on different substrates; (iii) what are the point sources of sediment transfer and how far downstream from these point sources can the effects of siltation be detected? It seems to me that we really do not know whether Indo-Gangetic Plain disruptions are caused by sedimentation derived from the high mountains, the middle hills, the outer ranges, the Terai, or the main floodplain itself. At least we cannot rank these five major potential source areas with any degree of confidence. It is a much larger problem to differentiate between so-called "natural" and "man-made" causes, but this also must be recognized if effective (and costly) counter-measures are to be contemplated.

These questions can be answered, but I think the continued perpetration of large scale development schemes without answers must be regarded as *folly*, if not *irresponsibility*. To tackle such an issue will require a constructive and integrated approach, integrated in the sense of "interdisciplinary", but also in the sense of inter-agency, multi-national, and inter-personal co-operation. An obvious starting point would be the construction of a research design — a model, in today's favoured parlance — to test the assumptions that we tend to accept as facts. This in turn should lead to identification of additional data needs, data collection and analysis, and refinement of the model. Five years of carefully construed effort should be enough to provide a much more rigorous input into assessment of development projects. Perhaps more importantly, it should enable us to confirm, modify, elaborate, or replace, the theory of Himalayan-Indo-Gangetic Plains Degradation.

I am very conscious of the feeling that it may be considered preposterous for any individual to present such a statement. In an attempt to justify my position, therefore, let me refer to the detailed field study made in the Kakani area on the edge of the Kathmandu Valley. This study has been performed under the sponsorship of the Nepal National Committee for the Man and the Biosphere (MAB) Programme, the United Nations University, and UNESCO, between 1979 and the present day. Since the research team, albeit with limited resources, set out to link socio-economic, natural science, hazards mapping, and village-level environmental perceptual studies, and since we had the chance of revisiting field sites over a five-year period, certain advantages accrued to us. Our initial response to the large amount of landsliding and soil erosion was comparable to that of earlier workers and one-time visits of experts; in effect, we mirrored the writings of Eckholm and others. It appeared that the Kakani area was on the brink of catastrophe! What becomes apparent in the longer term is that there exist traditional strategies at the village level for response to the landslide hazard. Areas that I photographed in 1978 and 1979 as unstable landslide scars are today well-tended and highly productive wet and dry agricultural terraces. When the village-level reclamation efforts are deducted from the land loss estimates that are often derived from one-time visits, the rate of environmental degradation is seen to be much less than that initially assumed. This does not imply that we can afford the luxury of complacency, but it does mean that there is a little more time, and room for more hope, and hope is an invaluable commodity.

Our experience in the Kakani area also led to the realization that the existing destabilizing pressures on the local people must be taken into account. These include aspects of land tenure, rent, and tax structure, which collectively may be a major cause of the on-going deforestation. As a small-scale example, it appears that a subsistence farmer may be tempted to continue to cultivate increasingly unstable terraces, rather than leave them fallow, because he fears that fallow land will be repossessed by the Government for reforestation. Thus local actions are influenced by "outside" forces, or perceptions of them, and decisions are made in contradiction to the traditional strategies built up over many generations.

Another related issue: accelerating rates of deforestation are often ascribed to the growing need for fuelwood. Yet, as an example of how unreliable our "data base" is, a recent IIASA study revealed that existing "facts" on per capita fuel consumption vary by a *factor*

national economy, have been initiated without data collection on sediment transfer in the upper stream basins. But in addition, current pressure on land, from a rapidly expanding highland population, is significantly affecting high-mountain vegetation cover in a way that must be suspected of increasing the potential for acceleration of current rates of soil erosion and sediment transfer. This relates to the Paute project in terms of useful lifetime of the storage reservoir and to the Pastaza project, which has no reservoir, in terms of cavitation damage to the turbines.

The second example is a little more esoteric but no less interesting. The growth of Quito, at 2,800 m above sea level, has led to a shortage of water and to a serious lowering of the water-table. Population continues to grow and, as a response to the increasingly pressing problem, a large water-diversion scheme is being funded. This project will tap the headstreams of rivers to the north of the city and divert them southward, at considerable expense and not a little environmental disruption.

The main aquifer supplying Quito is believed to be recharged largely from rain and snowmelt in the neighbouring highlands which support paramos and sub-paramos vegetation. One of the most important areas is the Cotopaxi highland.

Extensive areas of the Cotopaxi highland (Cotopaxi National Park) are being converted to pine plantations (*P. radiata*) at the expense of the natural sub-paramos vegetation. It has been hypothesized that the pine plantations, because of greatly increased evapo-transpiration, may be causing a serious lowering of the water-table.

It could be argued that the two development projects (pine plantation and water diversion) are in conflict because the decision makers never asked the fundamental questions nor acquired the appropriate data upon which to base rational decisions. It is conceivable that elimination of pine plantations from Cotopaxi would not only reduce, or even overturn, the need for an expensive water-diversion project, but would result in a much more aesthetically attractive and ecologically appropriate national park. And the much-needed timber could be obtained from further destruction of the tropical rain forest, or, better, from pine plantation establishment in more appropriate localities.

The foregoing discussion is hypothetical and deliberately argumentative. Clearly, a full cost-benefit analysis is required. Minimum data needed to undertake such an analysis include precipitation data, evapo-transpiration data for pine plantations and

sub-paramos vegetation and determination of rates of ground-water recharge and sub-surface flow. Should the more conservation-oriented approach prove practical, then an unnecessary environmental disturbance and the wastage of funds would be averted. Should the actual, current development schemes prove the only feasible alternative, then at least the growing numbers of skeptics who are complaining about irresponsible squandering of public money may recognize the need for rational decision making and international development aid.

My intention is not to be divisive and to provoke negative development agency response. The broad problem of development wisdom is a complex one that affects us all. The examples are introduced because together we can reflect on them and devise a more effective approach. One component of the such an approach might be the ensuring of independent and politically neutral assessments of development proposals.

Development projects in themselves, however, whether, or not they are coupled with innovative research, require the whole-hearted support of the people who live in the *target area* if they are to succeed. This pre-supposes that the needs and priority rights of the indigenous mountain peoples, together with those living in possible downstream impact areas, must be recognized and integrated into the process of resource development. In this context the lessons to be learned from the *Chipko Movement* and related indigenous peoples' movements are enormous. We would do well to turn to the final chapter in Singh's previous book: *Himalayas. Mountains and Men* (1983), contributed by Chandi Prasad Bhatt, entitled *Eco-development: People's Movement.*

What then is integrated mountain development and why has so little progress been made? The first question can be answered quite simply. Integrated mountain development is a process whereby optimum use of mountain resources can be sustained over several generations in the context of available technology. Certain conditions, however, must be met: these include preservation of the genepool; augmentation of the well-being of the local people; controlled and acceptable downstream effects. The answer to the second question is more difficult, but in part relates to the current lack of data and understanding of landscape and socio-economic dynamics, and to the fact that several of the conditions required for optimum use are, or are perceived to be, mutually incompatible. Another component is the low level of co-ordination amongst development agencies; which in some instances approaches the

destructive extreme of inter-agency competition.

In conclusion, the last decade can be described as a period of awakening and of dissemination of information on world-wide mountain environmental degradation. This process has been necessary and, while the speculations of pending disaster are probably accurate in a general sense, it is now time for scientists, developers, politicians, and mountain peoples to co-ordinate their efforts. The broad assumptions must be challenged and supported by reliable data or modified, or abandoned, depending upon the analysis of those data. This second stage will not just happen of its own volition. The political strength must be forged at all levels so that an integrated mountain research design can be constructed. This in turn must be related to the needs of all levels of decision-makers who control, in one way or another, how mountain resources are used. Only then will we begin to realize an integrated mountain development process.