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Mountain Tourism and Environment in Nepal

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PREFACE

Tourism has the potential to bring about changes in mountain environments which are fragile and vulnerable to irreversible damage. Mountain communities in the Himalayas are even more vulnerable to various sociocultural impacts and economic disorders resulting from tourism, while at the same time the mountain environment and culture create a unique resource for tourism development. Environmental management then becomes the central theme for using this resource for development, in general, and for tourism in particular.

Present trends in tourism are oriented towards increasing tourist volume. As a result, certain destinations are crowded while other potential areas, in part due to their remoteness, have remained neglected by national development processes. Trekking tourism could, therefore, be seen as a potential factor for the creation of improved facilities and infrastructures for development. In addition the local economy could also be strengthened. Benefits from tourism become sustainable if environmental management capabilities are in place.

The present study, focussed on mountain tourism for local development, examines the main issues involved in tourism and mountain environment. The objectives of this study are (1) to review, on the basis of secondary information and selected field visits, the environmental impact of tourism on mountain environments in general (and the Nepalese mountain environment in particular) and synthesise the main issues involved in tourism and mountain environment; (2) to develop a preliminary environmental carrying capacity framework (including indicators of environmental health) that can act as a policy and programme guide in dealing with the negative environmental consequences of tourism in mountain environments; and (3) to provide a participatory environmental monitoring framework of relevance to mountain communities and related institutional arrangements for facilitating environmental management in tourist areas.

The study is largely based on secondary information and the previous field experiences of the author. Inputs from the first Review Meeting, held on 10 - 13 August, 1994, in Pokhara, have been very valuable in revising the report. This report attempts to review the tourism development pattern in the Nepal Himalayas, to provide a framework for assessing carrying capacity, to prescribe communicable and simple indicators for environmental impact assessment, and to define an institutional set up for environmental monitoring.

In the present paper, Dr. T.B. Shrestha, a noted plant ecologist, describes the implications of tourism on the environment through an analysis of the processes that have been taking place in the Nepalese mountains. On behalf of ICIMOD, Dr. Pitamber Sharma is the Project Coordinator as well as the technical editor of these papers.

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Mountain Tourism in Nepal

Mountain tourism in Nepal began in 1952 when the first ascent over a 8,000m peak was accomplished by Maurice Herzog on Mt. Annapurna I (8,091m). Another historic event involved the ascent of the highest peak on the planet, Mt. Sagarmatha or Mt. Everest (8,848m), by Tenzing Norgey and Edmund Hillary in 1953, and it received wide publicity and increased the attraction for the Nepalese mountains throughout the world. However, even after a period of 10 years, the number of tourists visiting Nepal was limited. It was just over 6,000 in 1962. The number grew almost nine-fold in the ten years from 1962 to 1972 (Indian tourists not accounted for). Since then, with a few exceptions, the trend has been one of growth (Table 1, Figures 1a and 1b).

Current estimates show that the growth rate was just over six per cent between 1976 and 1982. While the number of tourists visiting Nepal continues to grow, there has not been an encouraging growth in tourism spending. The growth in spending in US Dollars has remained more or less constant or has even declined (Banskota 1994). Nepal is thus receiving more and more tourists, but she has to bear a higher and higher environmental cost for each of her guests. The government plans to raise the number of tourists to one million by the year 2,000 A.D. The volume itself is not so large compared to European destinations. Salzburg, (area 8,000sq. km.), for example, hosts over 1.5 million tourists in a year (Uitz 1993). Although the tourist volume in Nepal is still low and is growing steadily, the overcrowding effects at mountaineering base camps and popular trek camps are more pronounced and much publicised. Regular visitors like Sir Edmund Hillary recommended that Everest be closed for a number of years in order to give it some rest. According to him, "*changes can happen in a relatively short period. In forty years, I have seen the transformation of the remote Khumbu area on the southern slopes of Mt. Everest. In 1951, the Khumbu was a place of great beauty, with 3,000 tough and hardy Sherpas living a remarkably full and cooperative life despite their rigorous environment. Now it has become largely a tourist area with 12,000 foreigners streaming in each year, leaving their litter and tempting the Sherpas to break their traditional forestry customs and sell hundreds of loads of firewood for luxury fires*" (Hillary in Kemf 1993).

Although Nepal is well-known as a mountain tourist destination, large areas are not directly affected by tourism. Of the total land area of 147,181sq. km., about two thirds is occupied by hills and mountains with a congregate panoply of over 1,300 peaks and pinnacles including the world's highest mountain (Gurung 1990). The potential for opening up new areas is limited, mainly because of transport and accommodation facilities. Signs of overcrowding and visible strains on carrying capacity in certain destinations are often the outcomes of negligence on the part of trekking or mountaineering groups and the ineffective management structure of the government against the poverty stricken conditions of local inhabitants.

Although the magnet of mountain tourism in Nepal is Mt. Everest and other high peaks, the stepping stone for all visitors still remains the capital city, Kathmandu. Its natural greenery was described as "the wildest dreams of Kew" (Kipling, quoted by D.D. Bhatt 1964). It was linked with the outside world by an airport in 1954 and by a road to India in 1956. Kathmandu was also known as a temple city where there were more temples than houses and more deities than people. In recent years, the city has developed into an ill-reputed centre of environmental degradation. The touristic value of Kathmandu appears to be on the decline. Air pollution, water pollution, and garbage have severally inhibited the capacity to absorb tourists in Kathmandu.

Table 1: Tourist Growth by Decades

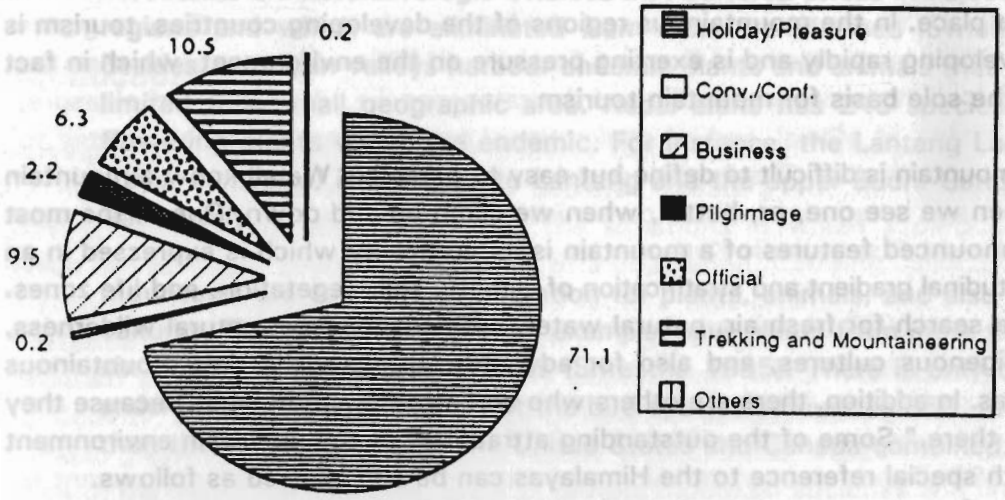
Year	No. of Tourist
1962	6,179
1972	52,930
1982	175,448
1992	334,353

Source: Nepal Tourism Statistics 1992, HMG

Tourism Attractions in the Mountain Environment

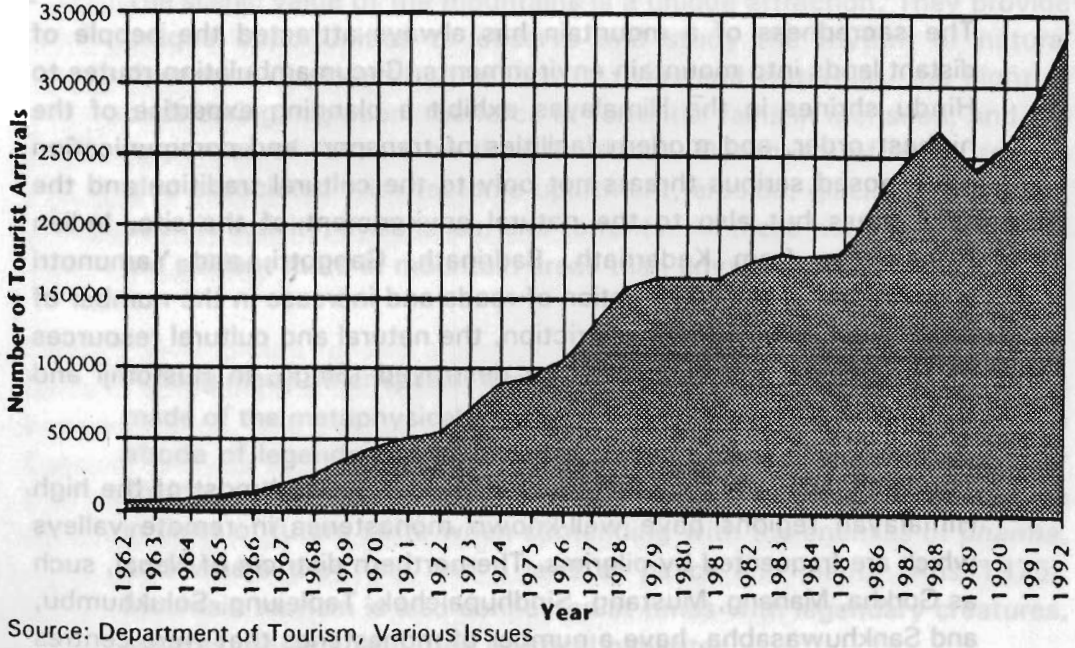
Mountains are important to all mankind since the fate of mountain ecosystems affects half the world's people. It has been estimated that about 10 per cent of the world's population depends on mountain resources (Keating 1993). It also means that the mountains depend on those 10 per cent to provide stability, to combat pollution, to preserve biodiversity and wilderness, and to safeguard human traditions and cultures. UNCED's Agenda 21, Chapter 13,

Figure 1a: Tourist arrival percentage by purpose of visit, 1992



Source: Nepal Tourism Statistics, 1992

Figure 1b: Tourist Arrivals 1962 - 1992



Source: Department of Tourism, Various Issues

identified tourism as one of the key activities for providing alternative livelihood opportunities to mountain people in the process of attaining sustainable mountain development. The pressure of the 21st century is more active than the pressures from geomorphological processes that created mountains in the first place. In the mountainous regions of the developing countries, tourism is developing rapidly and is exerting pressure on the environment, which in fact is the sole basis for mountain tourism.

A mountain is difficult to define but easy to perceive. We all know a mountain when we see one, or, better, when we climb up and down. One of the most pronounced features of a mountain is its verticality which is expressed in an altitudinal gradient and stratification of climate, soil, vegetation, and life zones. The search for fresh air, natural water, scenic landscape, natural wilderness, indigenous cultures, and also for adventure brings visitors to mountainous areas. In addition, there are others who come to the mountains "because they are there." Some of the outstanding attractions of the mountain environment with special reference to the Himalayas can be summarised as follows.

- Mountains have a mystic aura, not only for explorers, scholars, and mountain climbers, but also for the general public. One of the prime interests of a tourist is to expose himself/herself to a different environment and culture. This inherent passion, which is largely driven by curiosity, is generally satisfied by mountain tourism.

- The sacredness of a mountain has always attracted the people of distant lands into mountain environments. Circumambulation routes to Hindu shrines in the Himalayas exhibit a planning expertise of the highest order, and modern facilities of transport and communication have posed serious threats not only to the cultural tradition and the sacredness but also to the natural environment of the site. Indian experiences from Kedarnath, Badrinath, Gangotri, and Yamunotri suggest that, if the construction of roads and increase in the number of pilgrims continue without restriction, the natural and cultural resources of the region will eventually be destroyed (Singh, in Rustomji and Ramble 1990).

  The Himalayas are also the abode of Buddhism and most of the high Himalayan regions have well-known monasteries in remote valleys which are frequented by pilgrims. The northern districts of Nepal, such as Gorkha, Manang, Mustang, Sindhupalchok, Taplejung, Solukhumbu, and Sankhuwasabha, have a number of monasteries that were centres

of pilgrimage and which are now being seen as centres of tourist attraction. This is especially pronounced in the context of Mustang.

- Mountains are natural *refugia* of biota that suffered stress in adjoining regions and which are eliminated from more transformed lowlands. Besides, mountain valleys harbour endemic plants and animals that are limited to a small geographic area. Nepal alone has 246 species of flowering plants which are endemic. For instance, the Lantang Larch *(Larix himalaica)* is confined to Lantang and the upper Budhi Gandaki Valley only.

- Mountains are corridors of migration for plants, animals, and also for cultures. The Nepal Himalayas, for example, have plants from more than six phyto-geographical provinces (Shrestha 1985). There is only one endemic bird (Spiny Babbler) but the bird species amount to 850, more than the species extant in the United States and Canada combined.

Thus, touristic objectives of experiencing nature in terms of wildlife and wild plants are easily met in the mountain environment. Meanwhile, educational tourism based on biophysical diversity presents an attractive option in the tourist trade.

- The scenic value of the mountains is a unique attraction. They provide unique opportunities to observe and study the rhythm of natural dynamics displayed by the flow of rivers and waterfalls, the flight of birds during migration, the force of torrential rains in monsoon, and the responses of farmers on their farmlands. Dynamism of landscapes is also associated with tectonic upliftment, erosion, glacial movements, seismic activity, avalanches, and torrents. All these natural phenomena are evident more in mountain areas than anywhere else.

- Among many other special qualities of the mountains, mention is often made of the metaphysical aspects of the mountain environment as the abode of legends and lores, including the real existence of the many "hidden valleys" of Padmasambhava where the faithful will take refuge in times of future strife when contending with the enemies of *dharma*, and where they will find a land of peace and plenty (Aris 1975). Mountain tourism is also connected at times with legendary creatures, such as the *yeti*, and their mystical habitats.

Tourist Types

Tourists visit mountain areas for diverse reasons, and they come from various countries and continents. However, in the context of carrying capacity, it is convenient to categorise tourists on the basis of their purpose. Six categories recognised by the National Tourism Statistics (1992) will be taken here as the basis for further elaboration. Four of the categories, i.e., i) holiday and pleasure, ii) business, iii) official, and iv) conventions/ conferences, are mainly limited to Kathmandu Valley. The "trekking and mountaineering" and a fair share of the pilgrimage categories will fall purely into mountain tourism. However, almost all tourists first arrive in Kathmandu.

In the year 1992, the share of trekking and mountaineering in the total tourist arrivals in Nepal was just 10.5 per cent. However, the number of trekking permits issued for individual trekkers, agency-handled trekkers, and mountaineers amounted to 72,368 or 21.5 per cent of the total tourist arrivals in 1992. The impact of trekking and mountaineering on the environment is bound to be considerable in comparison to other types such as holiday/pleasure, business, and so on. Banskota and Upadhyay (1991) define "rural tourists" as those visiting the hill and mountain regions. Those who arrange for their own support staff and food have been termed Free and Independent Trekkers (FITS) and those handled by trekking and travel agencies have been termed Agency Organised Trekkers (AGTS). The FITS exert indirect pressure on the environment, whereas their impact on culture is more direct. They depend almost entirely on the availability of food and accommodation facilities in the area they visit. The AGTS on the other hand exert direct pressure on the environment (because of the demand for extra fuel to support a large staff) and cause garbage problems at the campsites. The mountaineering teams are more support intensive and cause great damage to campsites, especially at high elevations.

A Simplified Framework For Assessing Carrying Capacity In Mountain Tourism

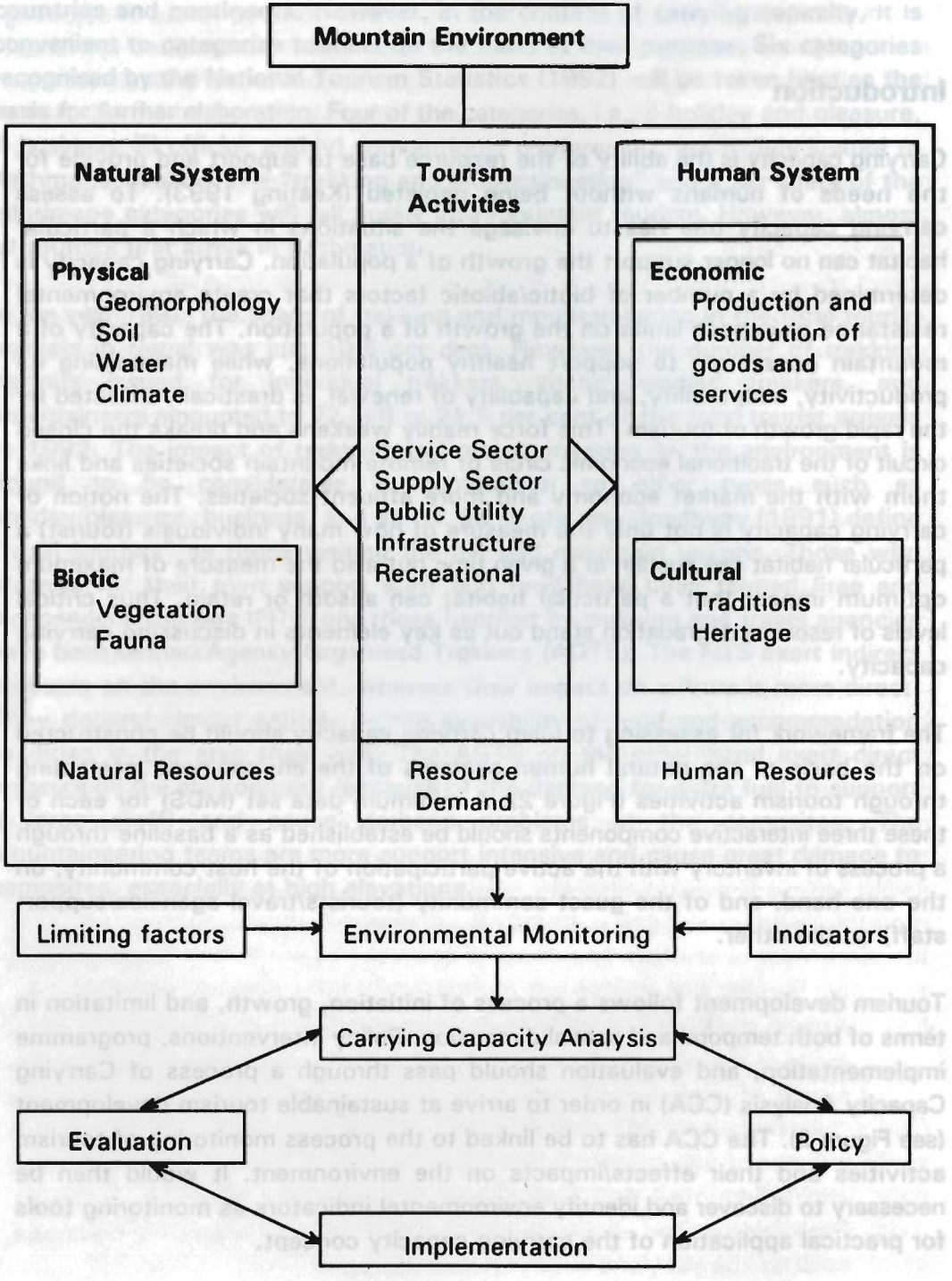
Introduction

Carrying capacity is the ability of the resource base to support and provide for the needs of humans without being depleted (Keating 1993). To assess carrying capacity one has to envisage the situations in which a particular habitat can no longer support the growth of a population. Carrying capacity is determined by a number of biotic/abiotic factors that create environmental resistance or impose limits on the growth of a population. The capacity of a mountain ecosystem to support healthy populations, while maintaining its productivity, adaptability, and capability of renewal, is drastically affected by the rapid growth of tourism. This force readily weakens and breaks the closed circuit of the traditional economic circle of remote mountain societies and links them with the market economy and more affluent societies. The notion of carrying capacity is not only the measure of how many individuals (tourist) a particular habitat can sustain at a given time but also the measure of maximum optimum impact that a particular habitat can absorb or retain. Thus critical levels of resource degradation stand out as key elements in discussing carrying capacity.

The framework for assessing tourism carrying capacity should be constructed on the basis of the natural human systems of the environment interacting through tourism activities (Figure 2). A minimum data set (MDS) for each of these three interactive components should be established as a baseline through a process of inventory with the active participation of the host community, on the one hand, and of the guest community (tourists/travel agencies/support staff) on the other.

Tourism development follows a process of initiation, growth, and limitation in terms of both temporal and spatial dimension. Policy interventions, programme implementation, and evaluation should pass through a process of Carrying Capacity Analysis (CCA) in order to arrive at sustainable tourism development (see Figure 2). The CCA has to be linked to the process monitoring of tourism activities and their effects/impacts on the environment. It would then be necessary to discover and identify environmental indicators as monitoring tools for practical application of the carrying capacity concept.

Figure 2: A Framework for Environmental Carrying Capacity Analysis in Mountain Tourism



Tourism Activities and Their Impact on the Environment

The relationship between tourism and the environment is complex and multifaceted. The range of recreational activities in mountain tourism, such as mountaineering, trekking, hiking, exploration, professional hunting, sight-seeing, horse riding, rafting adventure sports, and recreation through cultural heritage are closely linked to the environment; other activities arising from tourist facility components, such as support and service facilities, public utilities, and infrastructure, exert pressures on the environment, influencing its carrying capacity.

The tourist function of a mountain environment is dependent on the natural system and the accompanying human system. Biophysical assets of the natural environment and the cultural heritage of the socioeconomic environment have proved to be the main attractions for mountain tourism. The framework for environmental monitoring should therefore have a strong bearing upon those two aspects of the environment.

Promotion of tourism in a mountain area quickly creates a lot of demands relating to tourist facilities. The main activities identified by the ESCAP studies (1992) begin to operate and interact with both the natural and the human systems of a mountain environment (see Figure 2). Service sector facilities, such as accommodation, campsites, lodges, tea-houses, and restaurants, exert pressure on natural resources as well as on human resources. Support sector facilities have not yet emerged as a prominent factor in mountain tourism compared to their role in the impact on coastal destinations. Public utilities/amenities in terms of water supply, sanitation, solid waste disposal, communications, electricity and power, and health services are gradually being considered for various tourist destinations. For want of even basic amenities such as toilets, safe drinking water, telecommunications, and general sanitation in the villages, there is an ever-increasing pressure on the environment because of pollution arising from tourist activities. Tourism can also have positive impacts.

Tourism development has become the cause as well as the effect for improved trails and bridges in certain remote areas. Furthermore, there has been an increasing demand for airstrips and air services in remote mountain areas. Infrastructural development impacts both on the biophysical as well as on the socioeconomic system of the environment. Also, the overall resource demand of tourism draws from both the natural as well as the human resources.

Most of the environmental impacts are associated with the loss of natural vegetation; destruction of flora and fauna; and deformation of natural landscapes, cultural landscapes, and pastoral land. Impacts on the human system have been recorded in terms of degradation of historic sites, religio-cultural monuments, and heritage sites; loss of arts and artifacts; and loss of traditional values and virtues.

Tourism development and its associated activities have created negative effects to a certain degree, but some of the pertinent benefits, such as the generation of employment, national income and wealth, and gaining hard currency are quite essential for the overall development of Nepal where the comparative advantage of mountain tourism is very high. Besides, tourism has increased the self-confidence of the mountain population in the global perspective (Boers and Bosch 1994).

Tourist and Host Population Interaction

The growth pattern in tourist volume cannot be captured in the natural growth forms of a population (biological organisms), but the stress to the environment and the resistance created by it may be observed, or even measured.

Since tourism is an expression of externality in the local economy (Gurung 1990), it is expressed in different forms of interaction between the two groups, i.e., host (community) and guest (tourist) populations. The following types of interaction (Figure 3) may therefore take place as has been predicted for two biological species (Odum 1971).

Neutralism

Neither population is affected by association with the other. This phenomenon is generally observed in newly-opened areas which are frequented by self- sufficient organised groups. The cases of upper Mustang, Dolpa, and the Manaslu circuit, where local communities are still insulated from tourism development, come close to this situation. This was perhaps the initial phase of tourism development in other mountainous remote areas some 30 - 40 years ago.

Figure 3: The theoretical interaction types between two groups

Neutralism	Competition	Amensalism
Neither effects the other	Negative interaction	One inhibited and the other not affected
I	II	III

Mutualism	Proto-cooperation	Commensalism
Interaction favourable to both and obligatory	Interaction favourable to both and not obligatory	One benefitted and the other not affected
VI	V	IV

Source: Adopted from Odum 1971

Competition

Mutual inhibition competition: This situation emerges when an area is opened to tourism and local communities are neither consulted nor accommodated in the process. Declaring an area a national park, without the consent of the affected population, leads to a situation in which local people are displaced or are put into distress due to pressures from the tourism sector as well as from government authorities and military personnel assigned to guard the park. The establishment of Rara National Park, Lantang National Park, Sagarmatha National Park, etc, initially created a mutual inhibition competition between visitors (tourists and park authorities) and the local population resident within the park boundaries.

Resource Use Competition: Competition between resident populations and establishments catering for tourists has been a phenomenon commonly observed in most tourist destinations. Massive extraction of firewood from natural areas competes with the demand created by tourists vis-a-vis demand from local inhabitants. It has been estimated that a group of a dozen trekkers consumes as much fuel per day as it takes to keep a Nepalese household warm and fed for 10 - 12 days (Lama 1992).

Amensalism

This is a phenomenon in which one population is inhibited and the other remains unaffected. Longer association of local youth's with incoming tourists and trekkers has been inhibiting the maintenance and growth of traditional knowledge and skill of most tourist destinations. It has been observed that most Sherpa youths have already forgotten the use of mountain herbs in medicine. Loss and degradation of indigenous knowledge has to be viewed as a serious threat to the carrying capacity of mountainous areas in Nepal.

Commensalism

This association of host and tourist allows one population to be benefitted, but the other is not affected. Exploitation of the host population by outsiders for the sale of information is not an uncommon practice in remote areas of mountainous Nepal. Tourists who come as explorers, scientists, researchers, or even tourism promoters are immensely benefitted through the association but the host party is least affected afterwards. The story of "Honey Hunters in Nepal" (Vallie and Summers 1988) and several other stories exhibit a strong flavour of commensalism.

Proto-cooperation

It is a phenomenon in which both of the associating populations are benefitted but relations are not obligatory. The concept of conservation-based tourism or tourism-based conservation as promulgated by the ACAP (Annapurna Conservation Area Project) and other endeavours such as the creation of the Makalu-Barun National Park and Conservation Area (Shrestha et al. 1990) may be examples of this process. This association does not develop automatically but evolves.

Mutualism

Tourist destinations, such as Pokhara, Namche Bazaar, Dhunche, etc, have grown to a situation in which the growth and survival of both populations, i.e., tourists and local residents, are dependent on their association and interaction. However, it should be emphasised here that the hosts would need guests more than the guests need the hosts. To a larger extent, mutualism would be the ultimate stage of tourism growth in which the existence or the survival of one is dependent upon the other. This kind of dependency leads to a vulnerable situation of self deterioration or self destruction for the local populace if the

tourist industry changes its course in response to various factors, *inter alia,* environmental degradation such as national or regional disputes, wars, political crises, shifts in national policies, and so on.

Among the various interactions and impacts illustrated above, "Proto-cooperation" would be the ideal situation for mountain tourism. Tourism should be a favourable factor for mountain development, but it should not be an obligatory factor. Therefore, tourism pressure should be well within the absorptive capacity of the community and within the carrying capacity of the environment.

Parasitism and Predation

In the natural world this phenomenon is active in maintaining the ecological balance. In the context of tourism and local community association, this is rather an indirect phenomenon that is based on economic considerations. Much of it will be a matter of interpretation and it can turn into a sensitive issue.

Key Processess and Indicators in the Mountain Environment

The indicators of environmental stability have to be identified from among various dynamic processes that operate in the ecosystem, such as geomorphological processes, climatic features, weather patterns, vegetation successions, wildlife concentration, cultural landscapes and land use patterns, cultural practices, and tourism development trends. In order to understand these processes, there is a dire need for basic ecological research and also for a much fuller understanding of natural and human systems and processes than is currently available. Over the past years, there has been a remarkable amount of interest and attention focussed on the problems associated with losses in productivity of mountain farming systems, losses in biological diversity, deterioration of cultural assets, and also the possible large-scale alteration of the climate. The International Union of Biological Sciences (IUBS) initiated a collaborative programme of research on tropical mountain ecosystems under a programme entitled. "The Decade of the Tropics" in 1984 (Monasterio et al. 1985). ICIMOD also launched a programme of integrated mountain development in 1983. The International Mountain Society and the United Nations University started to publish research inputs in a journal of Mountain Research and Development. The Mountain Protected Areas' Network, formed after the consultation meeting at the Hawaii Volcanoes' National Parks in the autumn of 1991, is bringing together the prospects, problems, and issues of protected mountain areas around the world (Hamilton et al. 1993). The UNCED

Mountain Agenda has provided a more focussed approach for mountain development. Keeping with and drawing from those initiatives one should move on to identify specific indicators that reflect the overall conditions of the mountains and their capacity to sustain a resident population and visiting guests, i.e., the tourists.

Environmental Monitoring

The mountain environment is more complex than any other terrestrial environment. Various research outputs could produce a long list of possible environmental factors that would contribute towards monitoring. However, to be practical, it is necessary to discover and analyse certain factors that can be monitored easily. A mountain ecosystem is generally fragile and vulnerable to rapid deterioration due to modern exploitative forces such as tourism. Most mountain societies function in a more or less closed system depending upon subsistence agriculture and the traditional use of natural resources. After centuries of interaction with nature these societies have acquired an equilibrium with the natural environment. Outside interventions, such as tourism, introduce rapid changes to the ecological processes, and, in general, more resources are exploited than are naturally produced. Thus environmental monitoring is a key to any process of determining or analysing the carrying capacity of an ecosystem. Tourism development trends and their impact upon the environment should be carefully measured, monitored, and analysed.

Mountain societies and their cultures are the outcomes of a long history of interaction with the environment. Senses and sentiments of traditional societies are the keystones of environmental management. The time-tested knowledge of local people provides accurate and reliable means for environmental monitoring. The coming and going of migratory birds, or the appearance and disappearance of frogs and toads, festival cycles, and the agricultural calendar all are tied in with the agroclimatic dynamism of the environment. Therefore, monitoring the environment through the local people would be more direct and meaningful than playing with an enormous quantity of scientific data. Participatory monitoring creates a relevance to the fundamental agent of the ecosystem, i.e., the local people.

Modern advancement in natural sciences, social sciences, and technology has produced a hoard of tools to detect, measure, and analyse various elements of the environment. The advantage of new data-handling and data processing capabilities, particularly the Geographical Information System (GIS), Global Positioning System(GPS), and Remote Sensing Technology can be used in the

monitoring process. In the context of monitoring mountain tourism in the Himalayas, it should be emphasised that a set of limiting factors and a set of environmental indicators should be identified. The quantitative data of the limiting factors and the qualitative data of the indicators should contribute to the monitoring process.

Limiting Factors

The tourist population needs to be provided with certian essential facilities that are basic to their normal life and comfort, in addition to specific requirements to fulfill the purpose in visiting mountain environments. Basic requirements, such as space, energy, and services, tend to limit the number of tourists in a given situation. Of these, the weakest link in the ecological chain functions as the limiting factor. The maximum limiting effect is most obvious in environmental pollution, i.e., excessive amounts of garbage and solid waste. Thus, analysis of the limiting factor should dwell upon the "law" of the minimum as well as the "law" of the maximum, i.e., the limits of tolerance.

Key factors that limit the growth of tourism in the Nepalese mountains have been identified as (i) deforestation, i.e., extraction of biomass for energy, (ii) campsites, i.e., availability of minimum space, (iii) overcrowding, i.e., inadequacy of service facilities, or higher density of tourists and their activities, and (iv) problems of sanitation and solid waste disposal and management which pollute the environment (Clean Himalaya Colloquium 1991). Quantitative assessment of such factors would prove a useful tool for monitoring the environment vis-a-vis tourism development and growth. Some of these factors are discussed below.

Deforestation: This has become the central theme of discussions on the mountain environment. However, there are few convincing answers to the key questions, for example, how much fuelwood is consumed and how much biomass is produced? In the Himalayan Dilemma, Ives and Messerli (1989) concluded that attempts to determine fuelwood consumption are so clouded with uncertainty that any figure used as the basis of extrapolation into total national annual consumption are meaningless, and estimates of biomass production are even less reliable. Attempts to quantify tourist use of fuelwood or other energy resources are also quite uncertain. Government regulations do not allow tourists to burn firewood. Trekking agencies do carry kerosene for their trek groups. Advocates of kerosene use indicate that there's a minimal extra cost of US $ two to three per day if kerosene is used instead of firewood. Trekking tourists, apart from rucksack tourists, use two to three porters per

head and the porter head increases if kerosene is to be carried along the trek. The scenario of an organised trekkers' camp in a wilderness area consists of a small kitchen with a few kerosene stoves and a large number of small "*chulo*" scattered here and there. If the camp happens to be at altitudes higher than 3,000m, a few campfires will be lit to keep the ill-clothed porters warm. Some "*sahebs*" will then hang around the fireplace. In parts of the high Himalayan valleys, trekking camps are largely determined by the availability of free forest firewood for the armies of porters.

The Case of the Annapurna Region: Popular trek areas, such as the Annapurna-Deothali sanctuary, Langtang, and the Everest region, have developed distinct corridors of tourist movement. They are characterised by chains of tea-houses, hotels, and lodges. There have ben no assessments of energy requirements for these installations. Over 90 per cent of those tea-shops, lodges, and hotels are dependent on forest resources. Therefore, there have been significant visual changes in the vegetation of these sites. One of the often quoted cases is that of Ghodepani *Lekh* on the Jomsom trail.

Examples of the Annapurna Base camp, Ghodepani, the Thorung Phedi, and other high impact areas are very few and far between. In fact in the ACAP region, which is visited by a large number of mountain tourists, checks have not exhibited any significant impact on natural vegetation; rather tourism has highlighted the need for environmental protection. This has been further confirmed by Prof. J.F. Dobremez who revisited the Annapurna area in the spring of 1994 after 25 years. During his first visit in 1969 to prepare a vegetation map of the Annapurna-Dhaulagiri area, Dobremez (1976) had predicted that the area would be completely deforested in 25 years. After visiting the area in 1994, Dobremez confessed that lots of vegetation had regrown and that most mature forests were intact and wildlife improved (Talk given to Nepal Bot. Soc. April 1994). Mr. Karna Shakya and Dr. Linda Griffith made similar repeat visits to the Ghandrung section, i.e., Suikhet-Dhampus-Pothana-Rolkhs-Landrung-Ghandrung-Lumle-Suikhet in the late 1980s and looked into the tourism impact on forest resources. Their observations on forest resources concluded that the environment had not deteriorated -- "*beautiful Castanopsis, oak and rhododendron forests in Dhumpus and Pokhara have retained the same diversity of 10 years ago.*" Recently, an eminent ecologist from Austria, Dr. W. Holzner, visited the Jomsom-Muktinath area. He reported to this author that there were lots of lodges and other service centres for tourists, but that the actual state of the environment was not much affected in areas which are just a few kilometres away from the main trail (Personal Communication). There have apparently been a lot of preconceived notions

among various authors and visitors which exaggerate the situation based upon the conditions of some high impact areas. While such areas do need immediate attention and intervention, oversimplification and generalisation still stand out as risks for planners and managers.

In the ACAP region there are some 700 lodges which have signboards. This does not include farmhouse guest rooms which have great potential for absorbing more tourists. A little improvement in sanitation and cleanliness would suffice to attract more tourists in future. Any discussion on deforestation and fuelwood requirements/consumption due to tourism would not be complete without taking into account the consumption pattern of those lodges, tea-houses, and farmhouses.

The Case of Khumbu: A typical climbing expedition in Sagarmatha used a total of 8,000kg of firewood in two months (Gurung 1993) and much of it came from vegetation close to the tree line for which the regeneration capacity is very slow and sometimes lost forever. Although the National Park regulations do not allow the collection of wood from those park areas, the regulations have never been effective in the sub-alpine forests, such as those near Pangboche where yak-loads of juniper wood are transported to campsites.

If the trend for using firewood is not reverted, the carrying capacity of base campsites will not only reach upper limits soon, there will also be serious changes in the physical environment such as in the snow and ice regimes during winter. However, in some cases, i.e., the Namche-Kunde-Khumjung region, it has been illustrated that the areas have remained relatively unchanged between two photographic events. The first one was taken by Schneider in 1962 and the second by repeat photography by Byers in 1984 (Byers 1987). It is interesting to note that the areas have sustained local populations, park authorities and the army support, as well as the ever-increasing tourist population which had reached over 5,000 during 1983 and 1984. Since then the number of tourists has doubled (12,300 in 1992) and the number of shops, tea-shops, inns, and lodges has increased substantially. For example, 83 lodges existed and 8 were under construction during the spring of 1991. The first lodge came into being in 1971, construction of new lodges demands a great deal of timber, which is nowadays transported from the Jore-Salle-Lukla areas. Firewood, however, is being collected from a nearby forest. Thus, in spite of continued pressure on forest resources, there has been no decline in tourist numbers in the Everest area. Therefore, timber and firewood supplies must come from areas other than Namche-Khunde-Khumjung.

Solid Waste Management: Garbage along tourist trails and destinations has been one of the most reported issues in mountain tourism. Garbage dumps induced by tourism have high visibility and raise immediate concern from both the tourist community as well as from the host community. Public attention is rapidly directed towards pollution, because tourists coming from urban centres of the world are already "pollution beaten" people. It is easy to get evoke their senses and sentiments when media coverage includes catchy headings "Trekking in Wrecking Nepal", "World's highest garbage trail", "The toilet paper trails", "Everest, the highest garbage dump," and so on.

There has been no study to actually quantify the problem, in order to define the limits for use of campsites or trails. Campsites which are away from settlements, such as those at Lobuje, Sagarmatha base camp, Kyanjin (Langtang Valley), Thorung Phedi (Annapurna Circuit), and other base camps for mountaineering expeditions are under greater pressure from garbage. Ten years ago, in 1984, the Nepal Police Association Clean-up Expedition removed 16 tonnes of garbage from Sagarmatha (Everest) Base camp (Stevens 1989). There have been more than a dozen, national and international cleaning teams to Sagarmatha and they range from school and scout groups to fully-fledged mountaineering expeditions (Sherpa 1992). A 1991 survey by the Nepal Mountaineering Association estimated that 16,510kg of garbage had been left from 127 expeditions between 1952 and 1991 between camps two and five. Above the base camp at South Col, approximately 500 empty oxygen bottles have been left since the 1963 American Everest Expedition (Byers and Banskota 1993).

The clean-up expedition organised by the Everest Environmental Expedition in 1990 removed a tonne of trash from the Tibetan side (near Rongbuk Monastery) at the Base Camp (5,180m) and at Advance Base Camp (5,485m) on the main Rongbuk glacier. The clean-up cost was estimated at US$ 65,000. "*Taking into consideration the pressure on the environment*" of upper Khumbu, the Nepali Ministry of Tourism announced (to have been effective from Autumn 1992) that "*each mountaineering team to the Khumbu region will be required to carry back the garbage to their home countries*". Incinerable and biodegradable materials were to be brought down to base camp for disposal, recyclable materials (e.g., gas canisters, tins, jars, and plastic barrels) were to be handed over to the Waste Disposal and Management office in Kathmandu, while oxygen bottles, batteries, and other equipment were to be flown back home.

The WWF-supported "Sagarmatha Pollution Control Committee" launched a clean-up campaign in which local people participate to keep their environment

clean. An endowment fund has been created. This will certainly create a positive impact on promoting tourism. Similarly, experimental incinerators for high altitudes have been built on an experimental basis by a French team

Solid waste, especially faecal waste, is a factor that has a direct bearing on campsite hygiene. At higher altitudes, where the biodegradation rate is rather poor, pits become the only solution. Campsites would, however, need a well-managed faecal waste disposal system. At lower altitudes also, local inhabitants rarely have toilet facilities. This is the main reason that has prohibited local homes from taking tourists in. The carrying capacity of areas would increase tremendously if simple bathroom and toilet facilities were made available for village houses (Uitz 1993). In Salzburg, Austria, almost 40 per cent of the tourist beds offered are so-called private rooms in farmhouses. Thus, improving the quality of life at tourist destinations would enhance the carrying capacity.

Campsite Management: Campsites are major physical constraints for trekking and mountaineering, especially in areas that lie outside the main corridor. In most mountainous areas in Nepal, apart from the ACAP region, the Sagarmatha region, and the Langtang region, camping is the only mode of trekking since traditional villages do not have lodging facilities to meet the needs of modern tourists. Organised tours handled by trekking agencies therefore provide tents and services on open grounds, fallow farmlands, and also inside forests. The factors that determine the selection of a campsite include adequate camping grounds, water supplies, fuel and food supplies, especially for the accompanying porters, and, of course, areas for garbage disposal.

In open valleys and alpine meadows, campsites could be made available easily but in the narrow valleys, such as those in the upper Budhi Gandaki, campsites are limited. Crowding effects on campsites are a severe factor limiting the carrying capacity of an area. For example, the last camp area near Larkya La in the Manaslu Region can hardly support two teams. Therefore, there is a need for more camping grounds before more parties are permitted to trek.

The crowding effect in the Everest base camp area was pronounced in the Spring of 1992. The Base camp area was crowded with 268 climbers and their support staff. Twelve teams were granted permission to scale Everest. A total of 32 people successfully made their way to the summit (Guru-acharya 1993). Agony and mutual conflicts among the climbers remained the main reminiscences of their travel. The other campsite at Gokyo also suffers from overcrowding, and there is clear indication that the carrying capacity has been exceeded (Hutchinson 1987).

Some of the campsites in the Makalu area are constrained not only by restricted camping areas but also due to the lack of rock shelters and nearby herders' huts for the accompanying porters. The campsites on the Manaslu Trail are very narrow and can hardly accommodate two teams of five tents each at most of the camping sites. Thus local people are converting their cornfields into campsites.

Campsite problems on the Imjaje peak (an Icelandic peak, 6,160m) have been studied by the Nepal Mountaineering Association. This peak is climbed by 150 teams a year, i.e., over a 1,000 climbers set foot on this peak. The garbage problem and the crowding problem are exerting pressure, limiting the number of visitors (NMA 1994).

Thus the carrying capacity of a campsite is determined by

- available camp ground,
- water supply,
- fuel/food supplies for local porters,
- capacity to recycle biodegradable garbage, and
- garbage and waste disposal management.

An assessment of the "Preferred Rate of Tourism Development" (Table 2) indicated that international visitors do not like to encourage more tourists because environmental impacts are obvious and the main product is under threat (Gurung 1993). This implies that an increase in tourist number is not desirable without improving the current management system and infrastructure. The local respondents however preferred to attract more tourists on the grounds that tourism has created more jobs and more business for a population who had remained marginalised and whose economy was based on subsistence farming.

Table 2: Preferred Rate of Tourism Development

Respondents	Responses			
	Attract More	Leave as it is	Reduce	No response
Visitors	19.1	65.2	11.3	4.3
Guides	59	14.5	6	20.5
Managers	54.5	36.4	9.1	0

Source: G.S. Gurung: The Role of Tourist Guides and Their Training Needs: A Case Study in Nepal. A thesis submitted to Lincoln University 1993.

Environmental Indicators

Tourism-related activities influence the local community and their environment directly. Monitoring variables should include the pattern of resource use and the rate of consumption Pressures on common resources, such as forests, water, grazing land, and wilderness areas, could be quantified to measure the impact of tourism. However, as a first step one needs to inventorise those resources in terms of both qualitative characteristics and quantitative stock. This should further be complemented by estimates of consumption rate at a given time. The rate of consumption/the rate of depletion of resources in nature need to be monitored for any tourist area in question. The rate of natural regeneration, or the healing process, should also be monitored to determine the carrying capacity of the ecosystem.

The interaction, between tourist activities and the community, results in certain expressions of change. Such changes are often associated with the behavioural patterns of the local people in the use of languages, dresses and customs, employment preferences, traditional methods/technology, and other local resources. Societal structures and demographic characteristics are also subjected to change as a result of tourism. Therefore baseline data have to be established for sociocultural characterisation of the tourist area as a reference point.

Tourism exerts immediate effect on the economic environment of a place. Demands generated due to tourism on the supply of goods and services become evident in various economic variables such as external investments, changes in price levels, and a more organised market economy. In many tourist areas it has been experienced that a subsistence economy gradually transforms itself into a market economy. Trends of change and the pace of change would indicate how a society would sustain the growth of tourism. Data for environmental monitoring should naturally begin from a baseline study supported by previous studies and research. The baseline study should have a broad base to actually characterise all the key aspects of an environment. Follow-up monitoring could, however, be trimmed down to a few key elements from critical factors, in order to develop a surveillance system.

Research data on mountain ecosystems are generally available on the basis of short-term exploratory studies. There is a dire need for time series' data on the physical environment and socioeconomic processes. An enormous amount of data could be generated. In a Nepalese situation, creating a flood of data is neither possible nor desirable. The existing modern paradigms based on larger

data sets would lead to more confusion. Due to tourism, the biophysical diversity of the ecosystem and the sociocultural diversity of the inhabitants exhibit spontaneous changes. Therefore it might be possible to identify simple indicators of key processes in the ecosystem. These indicators are to be sought in the fragile land system, steep slope ecosystems, and stressed economies. In searching for simple indicators it may become possible to identify a limited amount of critical data and a few key processes. It must be borne in mind that such indicators of the key processes should have local relevance in terms of communications. In other words, local people, whether or not formally educated, should be able to perceive them. It is in this context that the following indicators from the natural systems are highlighted.

Communicable Indicators

Changes are also expressed in an environment as a result of indirect pressures from tourism. Loss of biological species, change in species' composition of a vegetation type, change in agricultural cropping pattern and crop quality, change in land use system, and change in certain aspects of human behaviour would be visible impacts of touristic pressures. These indicators are often qualitative expressions of quantitative changes. There are a number of natural indicators that characterise ecological zones in terms of natural vegetation in a pristine condition, i.e., the baseline situation and changes in flora and fauna brought about by human pressure. Increased human pressure on natural resources often results from external factors such as tourism.

Modern technology has provided various scientific tools for environmental analysis. Space science and remote sensing, computer technology, and advancement in various branches of science and technology are available to analyse an environment. Methods of investigation and their results hardly find access to action when they are not interfaced with the people from the environment in question. In the Nepalese context, the economic base of the rural community in the mountains is one of the weakest in the world and the educational base is still weaker. Therefore it is important to find ways and means that would be communicable and acceptable to the rural masses. The rural people of mountainous Nepal are themselves the repository of a great treasure of environmental knowledge. Their interaction with the environment is age-old and their traditional knowledge and wisdom can be a source of accurate information to manipulate/manage the environment. Communicable indicators therefore should have the following three basic features (i) local name (ethnic language), (ii) local measure of numbers/volume/weight, and (iii)

local occurrence. Communicable indicators may be identified through a participatory process of investigation on the environment.

Natural Indicators

Natural vegetation, the fauna, and flora may be used conveniently to determine human pressure on the environment. The natural gradation from mature forest to shrubland and thence to bare grasslands with more thorny bushes is easily observed in mountain environments. Similarly, the change from canopy birds and forest floor birds to berry-eating shrubland birds to grain-eating agricultural birds is observed in accordance with human influences. Presence or absence of wildlife is also a direct environmental indicator.

Most mountain tourism takes place in high Himalayan regions, in inner dry valleys, such as Langtang, and in trans-Himalayan arid zones such as Mustang and Dolpa. A convenient divide would therefore be desirable to identify the Himalayan region as trans-and-cis-Himalayan regions (see Figures 4 and 5).

The Trans-Himalayan Region

Arid and flat, dominated by steppe vegetation consisting of cushion plants and vast stretches of grassland, the economy of the Trans-Himalayas is livestock-based, mainly yaks and sheep. Firewood is the main limiting factor, but campsite space is not a problem. Increased tourism induces increased use of pack animals. Firewood comes largely from the underground woody roots of cushion plants. The only tree species is the poplar which is confined to riverine habitats. Animal dung is another source of cooking fuel. Tourism should be based on sufficient supplies of external fuel such as kerosene. Excessive extraction of root wood directly causes high rates of erosion, due to the wind.

Wildlife is rather rich. Undisturbed areas have snow leopards and blue sheep, mouse-hares and marmots are common. Snow pigeons, gray-headed shrikes, and variegated-laughing thrushes are indicator birds for the undisturbed environment. Crowds of tourists lead to the disappearance of those birds and animals. In very disturbed areas, tree sparrows, jungle crows, and choughs dominate the bird life.

Inner Valleys

Sparse rainfall and fewer clouds would allow high altitude cropping even at 4,000m. Valleys are U-shaped and provide extensive grazing grounds, mostly

Figure 4: Comparison of CIS - Himalayan and Trans-Himalayan Regions

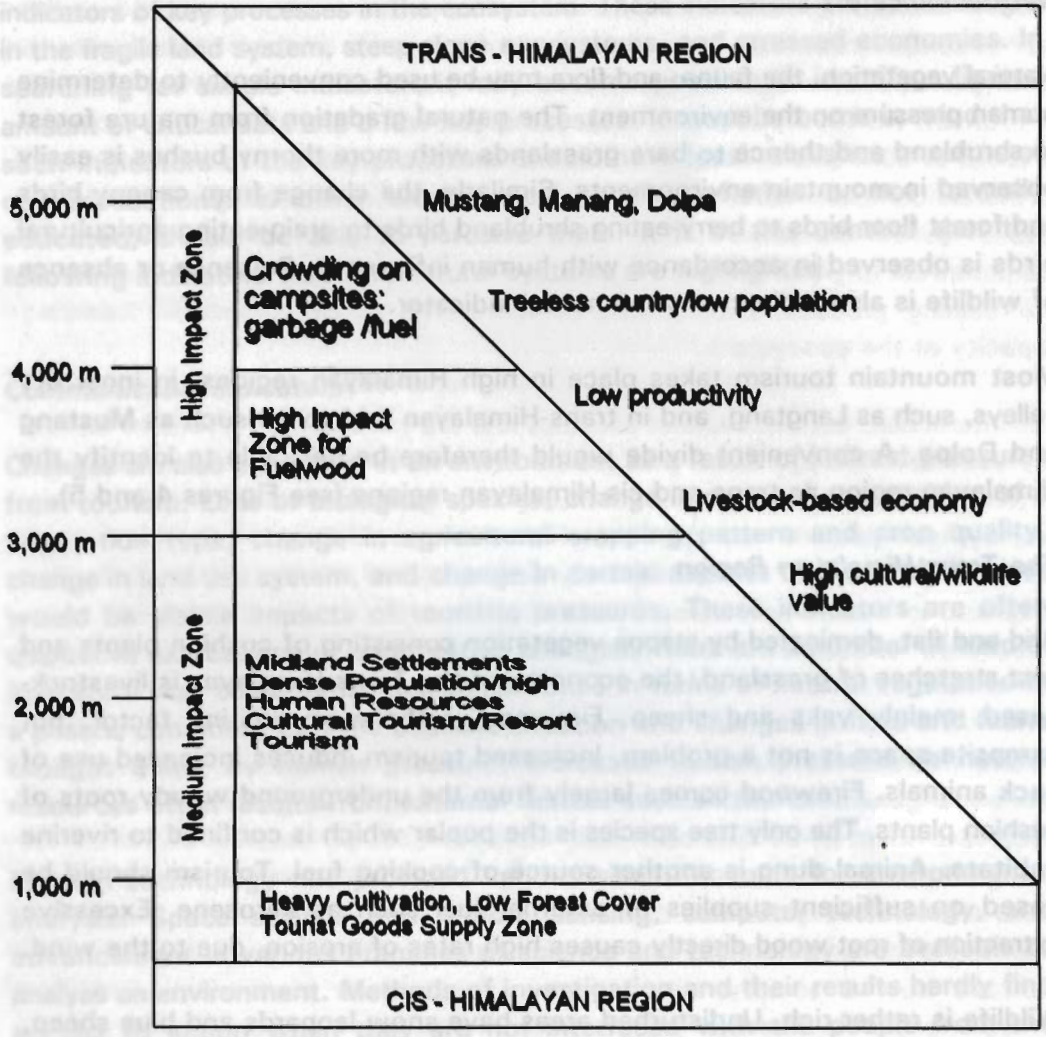


Figure 5: Trans-Himalayan birds and mammals as environmental indicators

Undisturbed Habitat	Disturbed Habitat
Birds	
Gray-Backed Shrike	Jungle Crow
Variegated Laughing Thrush	Raven
Snow Pigeon	Choughs
Tibetan Partridge	Tree Sparrow
Mammals	
Blue Sheep	
Snow Leopard	
Mouse-Hare	
Himalayan Marmot	
Weasel	

Source: H. S. Nepali

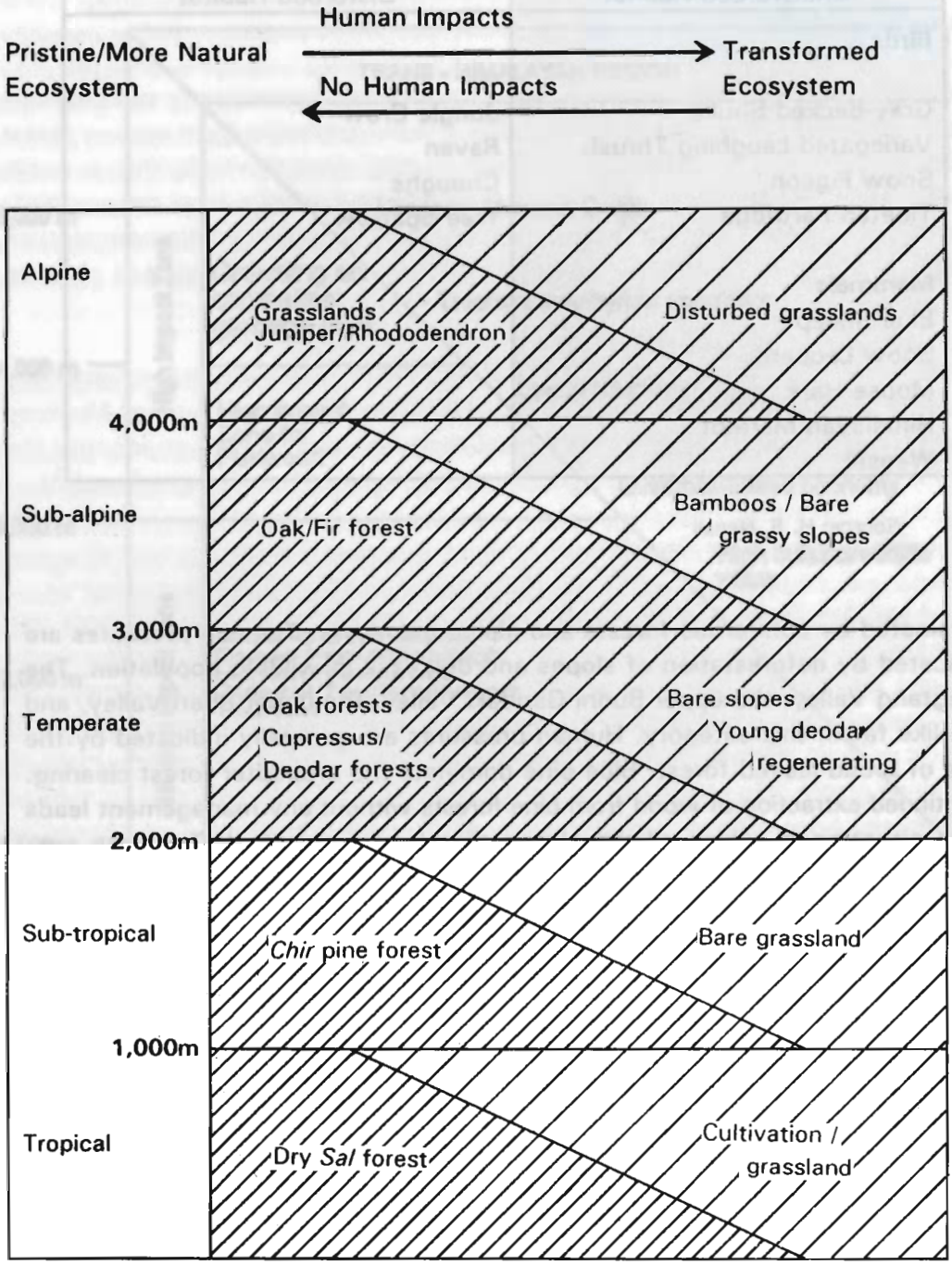
dominated by coniferous forests and alpine meadows. Tourism pressures are indicated by deforestation of slopes and decrease in wildlife population. The Langtang Valley, the upper Budhi Gandaki Valley, the upper Bheri Valley, and the like fall in this category. Human pressures are generally indicated by the loss of broad-leaved forest. Blue pine dominate the area after forest clearing. Continued extraction of wood from pine forests without any management leads to a situation in which all the slopes turn bare and naked. The area near Pansing Village in the upper Budhi Gandaki is a good example of this.

Inner valleys are excellent refuges for birds and animals. Disturbances cause their disappearance. The Red Panda and the Assamese Monkey, for example, are good indicators of a healthy environment.

Cis-Himalayan Region

This region ranges from the tropical zone to the alpine and arctic zones along the vertical gradient of the mountain. The influence of monsoon is rather strong, especially in eastern and central Nepal. In north-west Nepal, e.g., in the Humla - Jumla area, the monsoon is weak and the regenerative capacity of vegetation is, therefore, very weak (Figure 6). Carrying capacity is therefore weaker than carrying capacities in eastern and central Nepal.

Figure 6: Vegetational Changes in the Jumla - Humla Region



Based upon: Stainton 1972; Dobremez 1976; Shrestha 1985

The effects of tourism are more pronounced at about 3,000m. The sub-alpine vegetation is highly impacted by tourism. Fuelwood supplies for high altitude trekkers and also for midland villages come from this zone. Thus, the sub-alpine zone is thinning out from most tourist destinations such as the Khumbu region, Annapurna region, and the Lantang region. Human pressure on natural vegetation and effects in different ecological zones are depicted in Figures seven and eight and described below.

i) Tropical Zone: Wilderness areas have *sal* forest and savanna grasslands. Tropical wildlife tourism exerts pressure on national parks. The pressure is indicated by changed land-use patterns around park peripheries, e.g., the Royal Chitwan National Park (RCNP), because of a high concentration of hotels and lodges, and disturbance to birds and wildlife and loss of wetlands. In the mountainous region, this zone is represented by hill *sal* forest. Disturbances to forests lead to high erosion, however, the tourism pressure in this zone is rather limited. A healthy environment is indicated by the presence of canopy birds and barking deer. Loss of forest habitat induces shrublands and berry-eating shrubland birds replace forest birds.

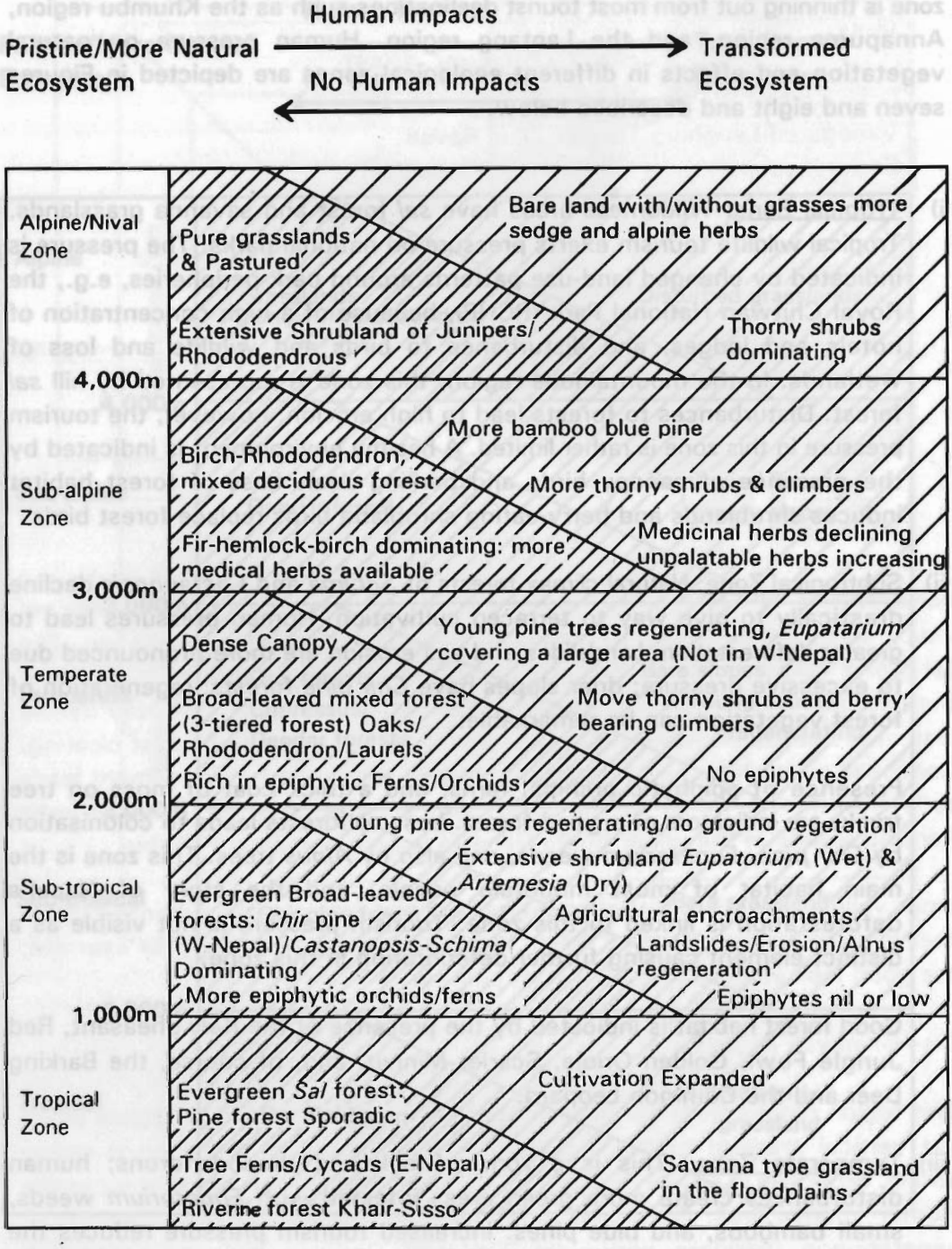
ii) Subtropical Zone: Natural climax forests of *Schima* and *Castanopsis* decline drastically to give way to terraced cultivation. Human pressures lead to greater deforestation. Landslides and soil erosion are more pronounced due to excessive pressure; drier slopes have *Chir pine* forests; regeneration of forest vegetation can be remarkable.

Presence of epiphytic orchids, ferns, and a thick coat of moss on tree trunks are indicators of a good forest. Loss of forests leads to colonisation by *Chir pine, Eupatorium* weeds, and also by *Alnus* trees. This zone is the main habitat of most mountain people, and the story of Nepal's deforestation is linked to this zone. Tourism pressure is not visible as a distinct element causing further deterioration in this zone.

Good forest habitat is indicated by the presence of the *Kalij* pheasant, Red Jungle Fowl, Golden Oriole, Scarlet Minivit, and, of course, the Barking Deer and the Common Leopard.

iii) Temperate Zone: This is a zone of oak and rhododendrons; human disturbances create more green areas infested with *Eupatorium* weeds, small bamboos, and blue pines. Increased tourism pressure reduces the canopy cover of the forest and induces forest degradation.

Figure 7: Vegetational Changes Caused by Human Impacts in the CIS-Himalayan Region (Eastern/Central Nepal)



Based upon: Stainton 1972; Dobremez 1976; Shrestha 1985

Figure 8: Birds and Mammals as Environmental Indicators in the South of the Main Himalayan Range (CIS-Himalayas)

	Pristine/Undisturbed Habitat	Disturbed Habitat	Village/Urban Situation
Alpine/Nival	**Birds** Snow Partridges Snow Cock Danphe (Pheasant Golden Eagle Alpine Accenter **Mammals** Mouse - Hare Snow Leopard Blue Sheep	Great Rose Finch Himalayan Griffin Bearded Vulture	
4,000m			
Sub-alpine	**Birds** Horned Tragopan (Danphe) Pheasant Blood Pheasant **Mammals** Musk Deer Barking Deer Mouse - Hare Wild Dog Himalayan Yellow-throated Martin	Laughing Thrushes Himalayan Green Finch Porcupine	Jungle Crow
3,000m			
Temperate	**Birds** Black-headed Sibia Nepal Cutia Scaly-bellied Wren Babbler Tailed Wren Babbler Common Hill-partridge **Mammals** Himalayan Black Bear Barking Deer Common Deer Red Panda Wild Dog	Nepal Parrot-bill Indian Blue-chat Peking Robin Crested Serpent Eagle White-necked Stork Spiny Babbler	Jungle Crow Upland Pipit
2,000m			
Sub-tropical	**Birds** Kalij Pheasant Red Jungle Fowl, Golden Oriole Great Horned Owl **Mammals** Barking Deer Common Leopard Langur Monkey	Black Partridge Shrikes Bush Chat White-checked (Bulbul) Drongos Jungle Cat Rodents (Mice/Rats) Hare	House-Sparrow House Crow Drongos Quails Paddy-field Pipit Munia Mynas

H.S. Nepali

A very few parts of the interior midlands, such as the lower Barun Valley, have pristine forests which consist of three distinct tiers, i.e., the first tree canopy, the second canopy, and the ground cover of bushes and shrubs. Epiphytic orchids are in plenty. Some case studies, such as those of the Jugal Himal (Schmidt 1990) and in Salme village, Trisuli Valley (Wiart 1983), have clearly indicated that truly undisturbed forests are not found in their study area. The actual process of deforestation is not prevailing and bio-mass production is sufficient to meet community needs. Tourist campers have, however, transformed such areas into more open and bushy habitats. Road access, such as that of Milka *Danda* (Hile-Vasantapur area in the Arun Access Road), has contributed to the total loss of forests in the temperate zone.

The pristine condition is indicated by the presence of birds that inhabit shrubs in the dense forest, e.g., Scaly-bellied Wren Babbler, Chestnut-headed Ground Warbler, Olive Ground Warbler, Tailed Wren Warbler, and so on. The birds residing in mature forests are Black-headed Sibia, Red-tailed Minla, Nepal Cutia, and so on. The Himalayan Black Bear with its juvenile, i.e., the "Tree Bear" are found in the forests. Barking Deer and Ghoral are common. Human disturbances cause them to move away. Tourist camps and heavily used trails disturb the occurrence of these birds and animals. Heavy impact forest edges host a large number of berry-eating birds such as Indian Blue Chat, Nepal Parrot Bill, Black Chinned Babbler, etc. More disturbed conditions are indicated by a beautiful little bird, the Peking Robin. When the land is heavily degraded, wildlife and birds virtually disappear.

iv) Sub-alpine: This is a zone of conifers and birches; agricultural lands are limited to small patches of potatoes and wheat cultivation. This zone has become the main source of firewood supply to trekking parties and mountaineering teams. Pressures from increased livestock are more intensive; environmental stress in this zone is observed in the lowering of the tree line and the growth of thorny shrubs and bamboos.

The upper part of this zone has a treeline vegetation of birch and rhododendron forests. At lower elevation, tall coniferous trees, i.e., fir and hemlock, dominate the forest. The subalpine zone is also rich in medicinal herbs. Human pressure reduces medicinal herbs and induces unpalatable plants and thorny shrubs. Occurrence of large patches of '*nigalo*' and '*malingo*' bamboos (*Arundinaria* spp) is the immediate indication of forest fires and overgrazing in the forest. The subalpine zone is generally subjected

to various pressures coming from excessive livestock grazing and firewood extraction for both tourist camps, lodges, and also local communities.

The presence of the Horned Tragopan (Monal), *Danphe* Pheasant, Fire-tailed Sunbird, Cross Bill, and Blood Pheasant are indicators of good wilderness conditions. The mammals found in this habitat are the Musk Deer, the Ghoral, Himalayan Thar, Himalayan Yellow-Throated Martin, and so on. When the quality of the environment deteriorates, a large number of Common Rose Finches are generally seen. Local people often name this bird "the bird of famine". Other birds, such as the White-throated Laughing Thrush and Himalayan Green Finch, also appear as a result of forest destruction.

v) Alpine Zone: This is a zone of dwarf junipers and rhododendron bushes. Grasslands and meadows are more colourful in late summer. Increased tourism creates excessive demands for firewood. Most base camps and high altitude lodges depend on these bushy vegetations for fuelwood. This results in eroded landscapes. The alpine zone is very susceptible to immediate degradation as soon as vegetation cover is removed. All tourist destinations in this zone need to practice meticulous environmental planning for the purpose of stability.

vi) Nival Zone: This is a zone of snow and ice without vegetation. Signs of negative impacts are overcrowding, garbage (including human waste), accumulation, trail congestion, etc.

Minimum Data Set for CCA

The growing research world-wide in the social and natural sciences tends to use increasingly sophisticated analytical techniques that require larger data sets which are severally lacking in mountain countries like Nepal. The challenges to sort out a set of simple indicators among the complex interaction of environmental factors have, therefore, to be addressed through the integration of traditional local knowledge with scientific facts. The use of sociological and ecological techniques are essential to arrive at a minimum data set for characterising a tourist area and to monitor it in order to assess carrying capacity.

No formula can satisfy the ecological, cultural, economic, and social diversities that characterise each region of a country. In a large number of rural

development-related research projects the Rapid Rural Appraisal (RRA) technique has been in use. It characteristically relies on small multidisciplinary teams that employ a range of methodological tools and techniques specifically selected to enhance understanding of rural conditions in their natural context, with particular emphasis on tapping knowledge through modern scientific expertise, but minimising prior assumptions (Kachondham 1992). More recently Rapid Assessment Procedures (RAP) have been developed as a technique (Scrimshaw and Gleason 1992) in parallel with RRA but focussed more on a rapid assessment of human behaviour. In the context of tourism development in mountain environment, the RRA and the RAP could be combined to generate useful information for carrying capacity analysis. These methods can be applied for obtaining information in a relatively short period of time using semi-structured interviews, focus group discussions, and direct observation.

The RRA and RAP methodologies are more inductive than deductive and the information base is rooted in the community and the environment. Participation with the community will create an awareness that they (the community) cannot dismiss - as they often do with government data. Such methodologies should establish a minimum data set for a baseline benchmark for regular monitoring and also for rapid holistic planning. Protocols outlining such an approach are presented in Table 3.

Table 3: (i) Minimum Data Set - for a Natural System

Variables	Source of Information	Minimum Information Required
Physical Geomorphological features.	Existing govt. agencies, published literature, and geological maps	Special focus on hazardous areas, epicentres, GLOF, slope stability, soil creep, landslide area, etc
Soil	Secondary information, community field observation/surveys	Productivity trends - erosion phenomenon - soil profile - soil biology: indicator species such as earthworm biomass.

Variables	Source of Information	Minimum Information Required
Water	Field observation, community information, government line agency	Water source catchment condition - drinking water supply system - water contamination - presence of fish, frogs, larvae in water bodies - flood incidence
Climate	Line agency information, community information, meteorological station, observation/survey	Rainfall/snowfall pattern and amount of rainfall Thunderstorm events Agroclimatic zonation Natural vegetation zones
Biological Vegetation/ flora	Government line agency and local forestry office, secondary information, community information, Observation/survey	Mature forest types, regenerating forests Pristine areas/forest, grassland types, local medicinal plants Local names of trees and fodder
Wildlife/ fauna	Government line agency and local office of Forestry. Secondary information, community information observation/survey	Common/rare birds and animals, endangered species' information
Agriculture	Local government offices, secondary information, community, observation/survey	Types of crops and their calendar Fruit trees: production and potential; Use of fertiliser/pesticides Poultry/livestock types Production/productivity on household basis Draft/transport animals

(ii) Minimum Data Set for a Human System

Variables	Source of information	Required Information
Sociocultural	Formal interviews, informal interviews, discussions with well-informed group or individuals, participant observation, focussed group discussion	Ethnic composition, local taboos, heritage sites/conditions, population structure, migration pattern, household amenities, construction type
Socioeconomy		Production system, source of cash income, economic status, economic infrastructure facilities, i.e., credit/banks

(iii) Minimum Data Set for Tourism Activities

Variables	Source of information	Required Information
Tourism facilities	Local community Local government offices Local leaders Business community observation	Service sector-accommodation, eating, etc Supporting sector-shopping, entertainment Events-cultural, sports, etc Public utilities Infrastructure (transport & communications)
Main activities	HMG line agency Local Government offices Trekking agencies Airlines Community Observation	Tourist seasons/volume National Park Mountaineering Trekking Hiking Rafting Nature study/exploration, etc

Eco-Tourism as a Means to Improve Tourist Carrying Capacity

The wilderness of nature and challenges offered by the high mountains bring tourists to Nepal. If the volume of tourists to natural area continues to grow rapidly, tourism itself will face serious problems in maintaining the very attractions that bring the tourist in the first place. The problem was identified more than 20 years ago by the Man and the Biosphere programme. The International Union of Alpinist Associations (UIAA), at its 44th general assembly, on 16 October 1982, also adopted the declaration on mountain activities, known as the "Kathmandu Declaration."

Articles of the Kathmandu Declaration

1. There is urgent need for effective protection of the mountain environment and landscape.
2. The flora, fauna, and natural resources of all kinds need immediate attention, care, and concern.
3. Actions designed to reduce the negative impact of man's activities on the mountains should be encouraged.
4. The cultural heritage and the dignity of the local population are inviolable.
5. All activities designed to restore and rehabilitate the mountain world' need to be encouraged.
6. Contacts between mountaineers of different regions and countries should be increasingly encouraged in the spirit of friendship, mutual respect, and peace.
7. Information and education for improving the relationship between man and his environment should be available for wider sections of society.
8. The use of appropriate technology for energy needs and proper disposal of waste in the mountain areas are matters of immediate concern.
9. The need for more international support – larger governmental as well as non-governmental – to the developing mountain countries, for instance, in matters of ecological conservation.
10. The need for widening access to mountain areas in order to promote their appreciation and study should be unfettered by political considerations.

The spirit of all these articles goes to form the concept of eco-tourism. The concept of eco-tourism provides an interface between ecological concerns and economic benefits. The Adventure Travel Society defines eco-tourism as "*environmentally responsible travel to experience the natural area and culture of a region while promoting conservation and economically contributing to local communities*" (Kachondham 1994). Ever since the establishment of ACAP by the KMTNC in 1986, the spirit of eco-tourism as a strategy for protecting nature and promoting economic development has been adopted for establishing new protected areas such as the Makalu-Barun National Park and Conservation Area. The Pacific Asia Travel Association (PATA) has provided a code for environmentally responsible tourism. The seventeen points of the code describe nothing but the concept and principles of eco-tourism.

It has been generally argued that "*Economics is the engine that powers the vehicle of Eco-tourism*". Eco-tourism, at the same time, is the generator of employment and income for rural and remote mountainous areas. Nepal has recently adopted a principle of ploughing back the park revenues to the local communities in the park area. However, the fees and royalties from mountaineering expeditions have not yet been committed for community development. James Pearson, Chairman of the Adventure Travel Society, captures the shortest definition for eco-tourism which says, "*if it pays, it stays*"(ATS 1994).

Mountain Tourism in Nepal is , by and large, nature tourism - tourists are motivated by the desire to view the splendours of nature and to experience nature itself in an unmodified state. Nature tourism should always be friendly to nature and the system within which it functions. Thus the concept of eco-tourism has emerged as a form of tourism in which environmental impact is minimal.

Nepal has already set aside over 11 per cent of her territory for 14 protected areas (Figure 11). This does not, however, include some of the most spectacular mountain regions such as those around Manaslu (seventh highest peak 8,163m), Dhaulagiri (8,167m), Ganesh Himal (7,429m), and Kanchanjangha (third highest peak 8,586m). The Api-saipal complex of mountains also have a great touristic value which is still unexplored. The Ministry of Tourism and Civil Aviation and also the Ministry of Forestry and Soil Conservation are looking for appropriate approaches to promote tourism as a tool for rural development and also as a resource for nature conservation. The IUCN reconnaissance survey of Manaslu, during the spring of 1993, revealed the fact that local communities ardently await increased tourism in the area. How much tourism and for whom are therefore questions of immediate concern before proceeding with a plan of action.

PATA Code for Environmentally Responsible Tourism

The PATA Code urges Association and Chapter members and their industry partners to -

- ADOPT the necessary practices to conserve the environment, including the use of renewable resources in a sustainable manner and the conservation of non-renewable resources;
- CONTRIBUTE to the conservation of any habitat of flora and fauna, and of any site whether natural or cultural, which may be affected by tourism;
- ENCOURAGE relevant authorities to identify areas worthy of conservation and to determine the level of development, if any, which would ensure those areas are conserved;
- ENSURE that environmental assessment becomes an integral step in the consideration of any site for a tourism project;
- COMPLY with all international conventions in relation to the environment;
- COMPLY with all national, state, and local laws in relation to the environment;
- ENCOURAGE those involved in tourism to comply with local, regional, and national planning policies and to participate in the planning process;
- PROVIDE the opportunity for the wider community to take part in discussions and consultations on tourism planning issues insofar as they affect the tourism industry and the community;
- ACKNOWLEDGE responsibility for the environmental impacts of all tourism-related projects and activities and undertake all necessary responsible, remedial, and corrective actions;
- ENCOURAGE regular environmental audits of practices throughout the tourism industry and encourage necessary changes to those practices;
- FOSTER environmentally responsible practices, including waste management, recycling, and energy use;
- FOSTER, in both management and staff of all tourism-related projects and activities, an awareness of environmental and conservation principles;
- SUPPORT the inclusion of professional conservation principles in tourism education, training, and planning;
- ENCOURAGE an understanding by all those involved in tourism of each community's customs, cultural values, beliefs and traditions, and how they relate to the environment;
- ENHANCE the appreciation and understanding by tourists of the environment through the provision of accurate information and appropriate interpretation; and
- ESTABLISH detailed environmental policies and/or guidelines for the various sectors of the tourism industry.

Institutional Framework for Environmental Monitoring

General

The tourism industry has received a good deal of attention in Nepal. The past few years have shown signs of change in attitude and perception towards the interrelationship between tourism and environment. Environment being the basic resource for mountain tourism, there is a growing concern about the conservation of nature, including pollution control. The natural linkages between tourism development, environmental management, and community development are not, however, reflected in existing institutional structures. Power and control over environmental issues are spread thinly over a number of government ministries but none of these have created an effective institutional set up for assessment, analysis, and action over environmental issues. Environmental Impact Assessment (EIA) guidelines for industry, forestry, and roads are being prepared by the IUCN under the aegis of the National Planning Commission. The need for EIA procedures in the tourism sector is greatly felt.

Existing Institutions

The existing institutional set up for tourism development is not geared to monitoring and regulating the environmental impacts of tourism. There is a problem of overlapping jurisdictions among various agencies as regards the revenue raised from tourism. For example, trekking permits are issued by the Immigration Department, mountaineering permits are issued by two agencies, the Ministry of Tourism and Civil Aviation (for peaks of over 6,000m) and Nepal Mountaineering Association (for peaks up to 6,000m), permits for the protected areas are issued by the wardens under the Department of National Parks and Wildlife Conservation, and the permits for Annapurna Conservation Area are issued by the King Mahendra Trust for Nature Conservation. Entry visas are of course granted by the Royal Nepalese Embassies/Consulates around the world and by the Immigration authorities on arrival. For want of a "one window" arrangement, tourists and their travel agencies easily run into confusion and various hassles. The Nepal Environmental Policy and Action Plan (NEPAP 1993) has proposed the establishment of a task force to assess ways of improving the current system of issuing permits and revenue sharing. In theory, His Majesty's

Government of Nepal is committed to establishing environmental units in all relevant agencies. However, at present, the Ministry of Tourism and Civil Aviation, with its Department of Tourism; the Home Ministry; with its Department of Immigration; and the Ministry of Education and Culture, with its Department of Archaeology do not have any institutional arrangements to monitor the impacts of tourism. The Department of National Parks and Wildlife Conservation has not yet developed a monitoring system for its protected areas, although mitigative actions are launched now and then.

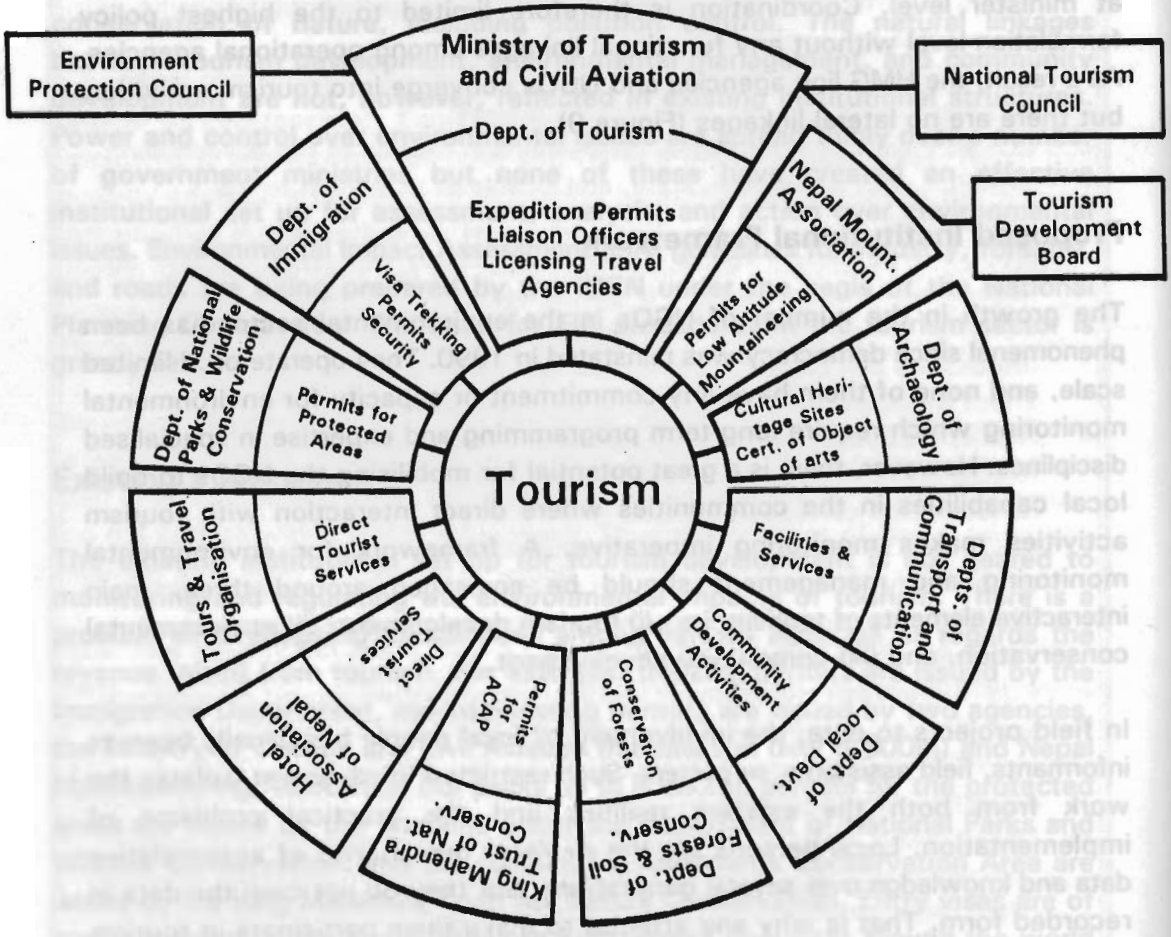
His Majesty's Government set up an Environmental Protection Council in 1992. It is chaired by the Prime Minister and most of the ministries are represented at minister level. Coordination is therefore limited to the highest policy formulation level without any functional linkages among operational agencies. As a result, the HMG line agencies and NGOs converge into tourism activities, but there are no lateral linkages (Figure 9).

Proposed Institutional Framework

The growth in the number of NGOs in the environmental sector has been phenomenal since democracy was reinstated in 1990. They operate on a limited scale, and none of them have any commitment or capacity for environmental monitoring which require long-term programming and expertise in specialised disciplines. However, there is a great potential for mobilising the NGOs to build local capabilities in the communities where direct interaction with tourism activities makes monitoring imperative. A framework for environmental monitoring and management should be envisaged around three, main interactive elements of tourism, i.e., (i) tourism development, (ii) environmental conservation, and (iii) community development.

In field projects to date, the involvement of local people has usually been as informants, field assistants, or porters. Such restricted involvement isolates the work from both the existing realities and the practical problems of implementation. Local persons are the *de facto* repositories of accumulative data and knowledge over several generations, but they do not own the data in recorded form. That is why any attempt to make them participate in tourism development should ensure that the community owns the data in a more organised form. Community involvement in the analytical process sometimes appears beyond the capacity of local villagers and is too time consuming for officials and professionals. Conceptually, an appropriate approach is participatory discussion as outlined in the previous section under the minimum

Figure 9: Existing Institutional Structure in Tourism in Nepal



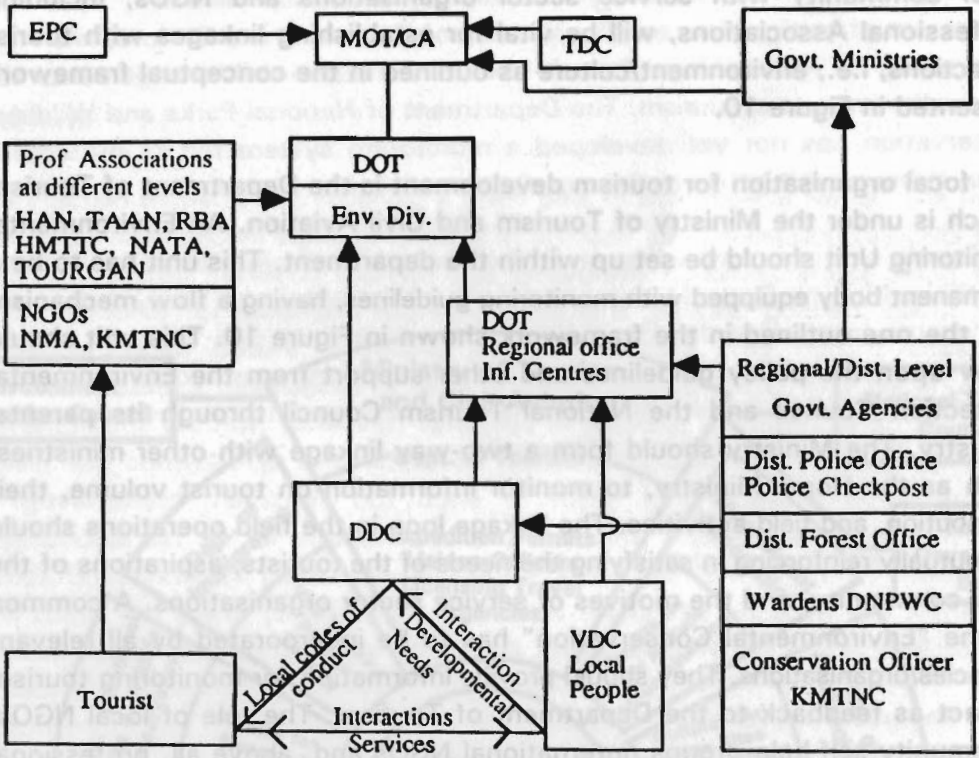
data set. Community participation in environmental monitoring should be the responsibility of the District Development Committee (DDC). The linkages of the local community with service sector organisations and NGOs, including Professional Associations, will be vital for establishing linkages with tourist attractions, i.e., environment/culture as outlined in the conceptual framework presented in Figure 10.

The focal organisation for tourism development is the Department of Tourism which is under the Ministry of Tourism and Civil Aviation. An Environmental Monitoring Unit should be set up within the department. This unit has to be a permanent body equipped with monitoring guidelines, having a flow mechanism like the one outlined in the framework shown in Figure 10. This unit should draw upon the policy guidelines and other support from the Environmental Protection Council and the National Tourism Council through its parental ministry. The Ministry should form a two-way linkage with other ministries, such as the Home Ministry, to monitor information on tourist volume, their distribution, and field activities. The linkage loop in the field operations should be mutually reinforcing in satisfying the needs of the tourists, aspirations of the local community, and the motives of service sector organisations. A common theme "Environmental Conservation" has to be incorporated by all relevant agencies/organisations. They should provide information for monitoring tourism impact as feedback to the Department of Tourism. The role of local NGOs, community self-help groups, international NGOs and, above all, professional associations/organisations in the Travel/Tour trade should play an effective role in providing monitoring information.

The District Development Act of 2048 B.S. (1991) has provided for the District Development Council (DDC) to formulate district-level programmes of different government and semi-government agencies in the district with the approval of the District Council. It is also mandated to coordinate the district programmes of different NGOs and to supervise and give directives to the Village Development Committees (VDCs). The DDC has four Plan Formulation Committees (PFC) which are supposed to facilitate the coordination and integration of plans prepared by different agencies. The committees are chaired by a DDC Member and each one has a member-secretary from a government line agency. The four committees may be described as below.

i) Agriculture; Agricultural District Officer as member-secretary
ii) Public works; Member-secretary from the Ministry of Housing and Physical Planning

Figure 10: Institutional Framework for Environmental Monitoring



HAN	Hotel Association of Nepal
TAAN	Trekking Agents Association of Nepal
HMTTC	Hotel Management and Tourism Training Centre
TOURGAN	Tourist Guide Association of Nepal
NATA	Nepal Association of Travel Agents
RBA	Restaurant and Bar Association
NMA	Nepal Mountaineering Association
NGO	Non-Government Organisation
EPC	Environmental Protection Council
MOT/CA	Ministry of Tourism and Civil Aviation
DOT	Department of Tourism
TDC	Tourism Development Council
DDC	District Development Committee
VDC	Village Development Committee
DNPWC	Department of National Parks and Wildlife Conservation
KMTNC	King Mahendra Trust for Nature Conservation

iii) Industry, Forestry and Environment; District Forest Officer as Member-Secretary
iv) Health and Social Welfare; Public Health Chief as Member-Secretary

District-level tourism development activities should largely include environmental protection, safeguarding cultural heritage, expansion of tourist facilities, protection and promotion of community forestry, and local participation in central level activities. The DDC is required to develop a District Development Plan. Monitoring the environmental impacts of tourism should be one of the important activities for the districts that serve as tourist destinations or fall en route. As outlined in Figure 10, the DDC should act as a key store in the monitoring process and it would pass information on to the Regional Offices/Information Centre of the Department of Tourism. The DDC should also have a direct linkage with the Department in case regional offices are not established.

The Department of Tourism should also draw upon the monitoring information from professional associates having direct linkage with tourism activities. Some of the prominent ones are the Nepal Association of Travel Agents (NATA), Hotel Association of Nepal (HAN), Trekking Agents Association of Nepal (TAAN), Hotel Management and Tourism Training Centre (HMTTC), Nepal Mountaineering Association, Nepal Association of Rafting Agents (NARA), Tourist Guide Association of Nepal (TOURGAN), Restaurant and Bar Association (RBA), and the Tara Gaon Development Board.

Regional/District Level Government agencies, such as the District Police Office, Police Check Posts, District Forest Office, National Parks' Office, and the Conservation Area Office could input to the DDC and Tourism Regional Office at field level or the respective ministries at central level. Various government ministries should pass on to the Ministry of Tourism and Civil Aviation matters related to tourism development and environmental impacts. The Ministry of Tourism would derive policy guidelines from the Environmental Protection Council (EPC) and the Tourism Development Council (TDC) for developing and implementing tourism development plans.

Conclusion

The major factors in estimating carrying capacity are (a) environmental, (b) social, and (c) managerial. The volume of tourists in Nepal is very small compared to the European Alps or the Japanese Alps. The Tateyama Mountains in Japan, for example, receive 1.6 million people and 600,000 of them climb them (T.C. Pohkarel, mimeographed address notes). These are mind boggling figures compared to Nepal's tourist volume of just over 300,000. Of them, about 40,000 visit the Annapurna area and about 13,000 visit the Khumbu area. Congestion, overcrowding, and high garbage pollution levels are all too common comments on Nepal's mountain tourism. The carrying capacity of these destinations remains low for want of management. Not even the national parks, including the World Heritage Site, Sagarmatha (Everest) National Park, follows a management plan. The ACAP, with management input from KMTNC, attracts and absorbs more visitors without much hue and cry. Thus, it is evident that, with a plan in place and management in order, the carrying capacity of Nepal's mountains will remain at a higher level than that currently prevailing.

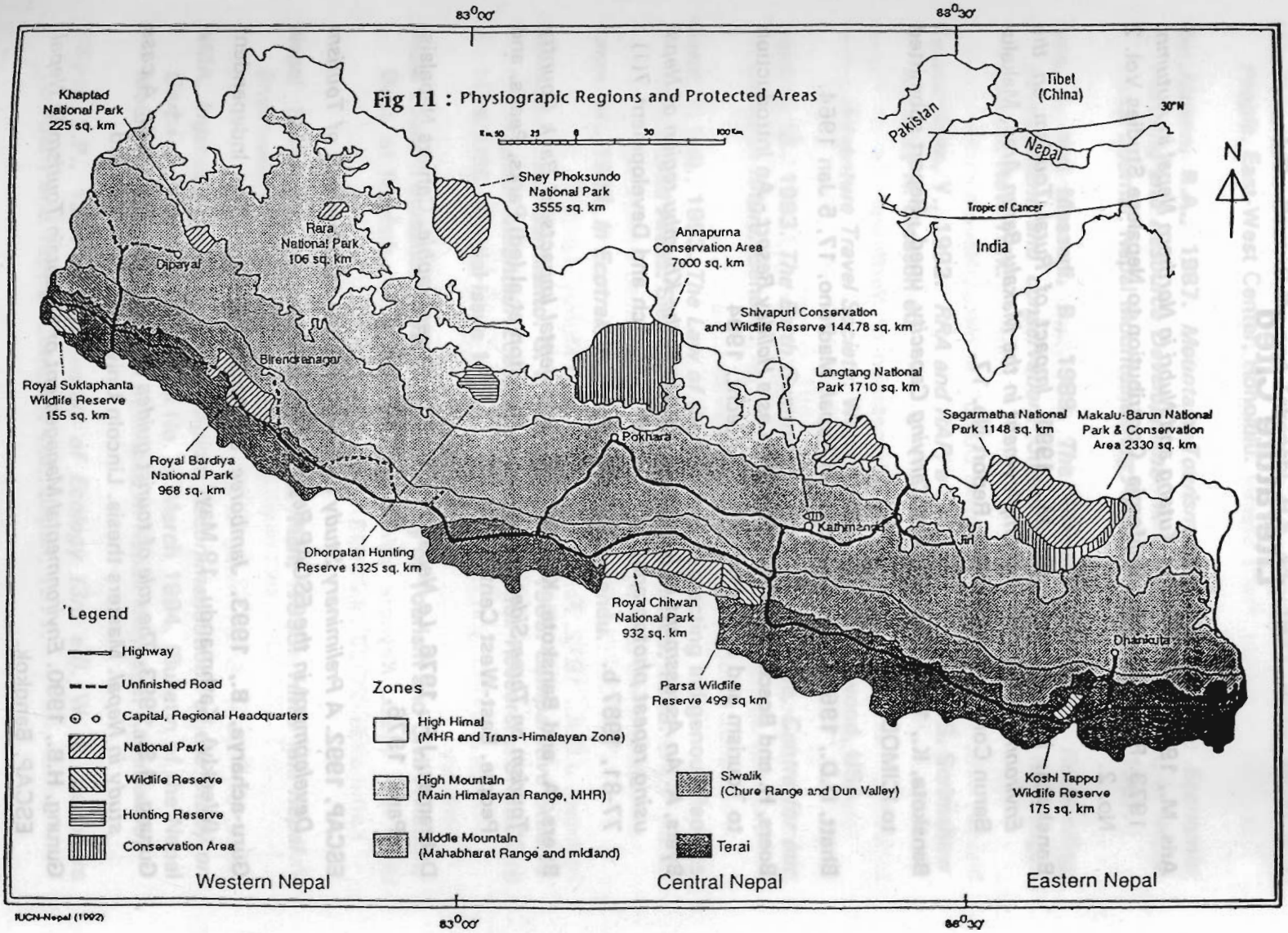


Fig 11 : Physiograpic Regions and Protected Areas
83°00'
83°30'
Khaptad National Park 225 sq. km
Rara National Park 106 sq. km
Shey Phoksundo National Park 3555 sq. km
Annapurna Conservation Area 7000 sq. km
Shivapuri Conservation and Wildlife Reserve 144.78 sq. km
Langtang National Park 1710 sq. km
Sagarmatha National Park 1148 sq. km
Makalu-Barun National Park & Conservation Area 2330 sq. km
Royal Suklaphanta Wildlife Reserve 155 sq. km
Royal Bardiya National Park 968 sq. km
Dhorpatan Hunting Reserve 1325 sq. km
Royal Chitwan National Park 932 sq. km
Parsa Wildlife Reserve 499 sq km
Koshi Tappu Wildlife Reserve 175 sq. km
Dipayal
Birendranagar
Pokhara
Kathmandu
Jiri
Dhankuta
Tibet (China)
Pakistan
Nepal
India
Tropic of Cancer
30°N
N
Legend
Highway
Unfinished Road
Capital, Regional Headquarters
National Park
Wildlife Reserve
Hunting Reserve
Conservation Area
Zones
High Himal (MHR and Trans-Himalayan Zone)
High Mountain (Main Himalayan Range, MHR)
Middle Mountain (Mahabharat Range and midland)
Siwalik (Chure Range and Dun Valley)
Terai
Western Nepal
Central Nepal
Eastern Nepal
IUCN-Nepal (1992)

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ICIMOD

ICIMOD is the first international centre in the field of mountain development. Founded out of widespread recognition of environmental degradation of mountain habitats and the increasing poverty of mountain communities, ICIMOD is concerned with the search for more effective development responses to promote the sustained well being of mountain people.

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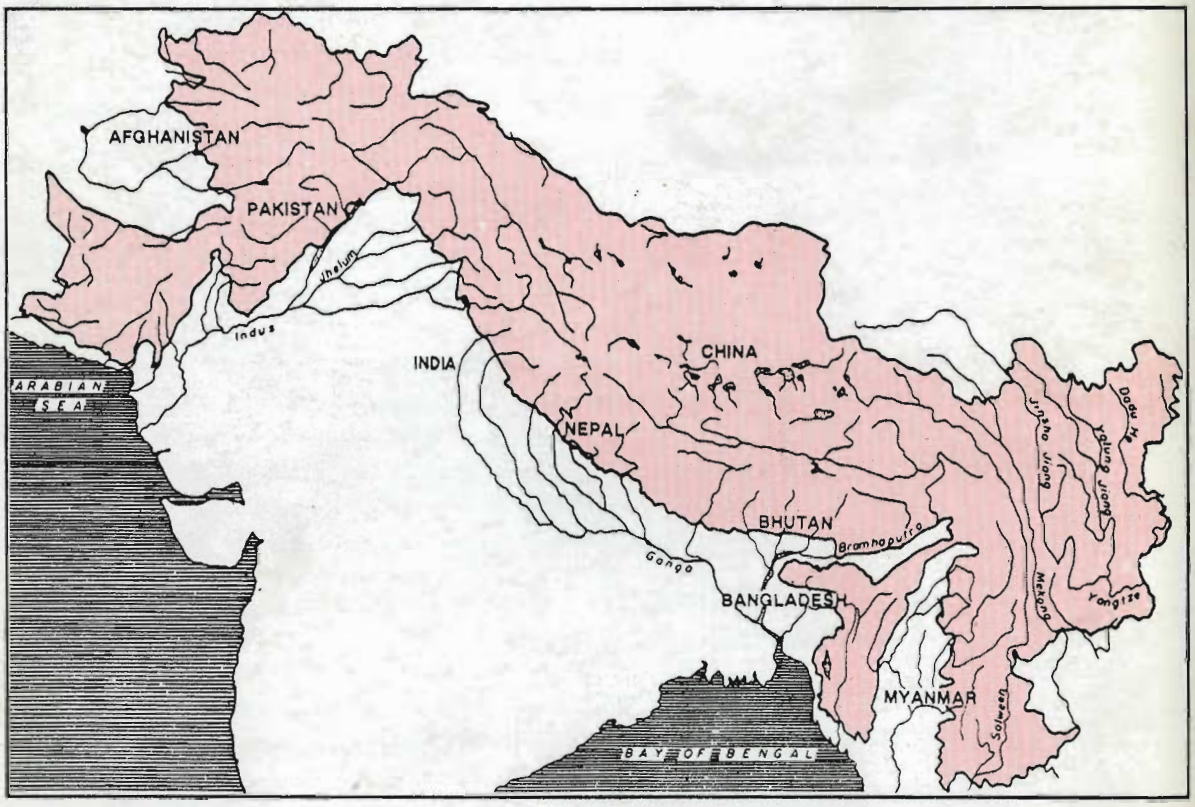
- ☐ Afghanistan
- ☐ Bhutan
- ☐ India
- ☐ Nepal
- ☐ Bangladesh
- ☐ China
- ☐ Myanmar
- ☐ Pakistan



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