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Considerations for Management Planning of SAGARMATHA NATIONAL PARK

a world heritage site

Lhakpa N. Sherpa
CONSIDERATIONS FOR
MANAGEMENT PLANNING
OF
SAGARMATHA NATIONAL PARK

A DISSERTATION
SUBMITTED IN PARTIAL FULFILMENT
OF THE REQUIREMENTS FOR THE DIPLOMA
IN
PARKS AND RECREATION
LINCOLN COLLEGE
UNIVERSITY OF CANTERBURY

BY
LHAKPA N SHERPA

LINCOLN COLLEGE
1979
ACKNOWLEDGEMENTS

I wish to acknowledge my indebtedness to P.J. Devlin for providing guidance; to the Mt Cook National Park Ranger Staff for their kind support and encouragement, especially to Rangers M. Heine and C. Stewart for grammatical corrections; to J. Herbison for the cover painting.

I am also most grateful to P.H.C. Lucas and Dr Benecke for providing information; to G. Nicholls for photographs and information; to B. Jefferies for photographs; to D.J. Shaw and H.B. Smith, Lincoln College, for grammatical corrections, and to the many others who have contributed towards the completion of this project.
Although "Considerations for management planning of Sagarmatha National Park" has been prepared primarily as a dissertation for the completion of Diploma in Parks and Recreation, this particular subject has been chosen to contribute towards Nepal's conservation programme.

This dissertation consists of recommendations and supporting information, rather than policy statements. Thus, it should provide guidelines for management planning rather than to serve as a proper management plan for Sagarmatha National Park.

My interest in nature conservation and training in National Park management has made me aware of urgent need for conservation measures in the Khumbu Region. I appreciate His Majesty's Government's concern over the conservation problems of the Khumbu region, and strongly support the idea of protecting the environment of the region under National Park status.

As an inhabitant of the Khumbu region, I am also aware of the needs of the local people, and I share their concern over possible effects of National Park legislation on their life-style.

This unique position has compelled me to explore in depth, the possible impacts of my recommendations on the conservation programme and on present human needs. This, I hope, has contributed towards making balanced recommendations in order to minimize the conservation and use conflicts in the Khumbu region.
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CHAPTER 1

CONSERVATION PROBLEMS AND OPPORTUNITIES IN NEPAL

1.1 International Origins and Development of National Park Concept

The National Park idea was initiated in 1872 in Yellowstone, Wyoming, U.S.A. Gradually the idea has been adopted by many nations of the world and is now becoming almost worldwide.

Today almost every nation has established National Parks and Reserves of one kind or another. These National Parks vary greatly from one another in their naturalness, degree of protection and stages of development. The motivation for establishment of Parks and Reserves also differs from one nation to another.

In order to avoid confusion about what qualities a National Park should possess, the tenth General Assembly of International Union for Conservation of Nature and Natural Resources (IUCN) introduced the following criteria for National Parks in 1969.

"A National Park is a relatively large area (1) where one or several ecosystems are not materially altered by human exploitation and occupation, where plant and animal species, geomorphological sites and habitats are of special scientific, educative and recreative interest or which contain natural landscape of great beauty; (2) and where the highest competent authority of the country has taken steps to prevent or to eliminate as soon as possible exploitation or occupation in the whole area and to enforce effectively the respect of ecological, geomorphological or aesthetic features which have led to its establishment and (3) where visitors are allowed to enter, under special conditions, for inspirational, educative, cultural and recreative purposes" (Foster 1973).

These criteria are found to be strongly biased toward preservation and the scientific, recreative and educational were not recognised. The restrictive nature
of the criteria also tends to limit the opportunities of establishing many National Parks since there are not many areas left in the world which are sufficiently wild to satisfy these criteria.

"Because of this the International Commission for National Parks (ICNP) at IUCN's 11th General Assembly held in Banff, Canada, in 1972, agreed to continue to accept the IUCN's definition but with the modification that National Parks could include zones having as their primary function the protection of man's cultural heritage" (Foster 1973).

Among many nations who adopted the National Park concept, Nepal is one of the recent founders of National Parks. Most of Nepal's National Parks, especially Sagarmatha (Mt Everest) National Park, have great potential for protection of man's cultural heritage.

1.2 The Establishment of Nepal's National Parks

Nepal had taken the first tentative steps towards nature conservation in the late nineteen-fifties when His Majesty’s Government's attention was drawn towards the diminishing wildlife by such eminent conservationists as the late E.P. Gee. However, definite plans and programmes for conservation were formulated only when H.M.G. sought the help of International agencies – Food and Agricultural Organisation (FAO), World Wildlife Fund (WWF), Smithsonian Society, etc. Lately the Australian and New Zealand Governments came forward with help in the establishment of National Parks and Wildlife Reserves (Nepal Nature Conservation Society 1977).

Nepal's first National Park was established when His Late Majesty King Mahendra bequeathed the Royal hunting ground at Chitwan to be turned into the Royal Chitwan National Park. The late King Mahendra was a keen nature lover. To carry out His Late Majesty's wish to conserve nature and natural beauties for the wellbeing of mankind, His Majesty King Birendra Bir Bikram Shah Deva passed the "National Parks and Wildlife Conservation Act 2029 (1972) which facilitated the setting up of the National Parks and Wildlife Conservation Office of His Majesty's Department of Forests."
National Parks & Wildlife Reserves of Nepal

- Sukla Phanta Wildlife Reserve
- Kamal National Park
- Shepard Wildlife Reserve
- Narayani Wildlife Reserve
- Chitwan National Park
- Langtan National Park
- Sagarmatha National Park
- Kosi Tappu Wildlife Reserve

Figure 1
The National Parks and Wildlife Conservation Office is the office responsible for development, administration and management of National Parks and Wildlife Reserves throughout the Kingdom in co-operation with various international conservation agencies such as United Nations Development Programme and FAO.

Since the establishment of Royal Chitwan National Park in 1972, His Majesty's Government has established three Himalayan National Parks and five Wildlife Reserves in various parts of the country, covering an area more than 38,649 km², almost 3% of the total area of Nepal.

1.3 A Checklist of National Parks and Reserves of Nepal

National Parks:

(1) Royal Chitwan National Park
   This was the first officially constituted National Park of Nepal. It is the last remaining habitat of the one-horned rhinoceros (Rhinoceros unicornis), and includes 36 other species of mammals and more than 250 bird species. This Park is located in the Lowlands of Terai in southern Nepal, covering an area of 543 km².

(2) Sagarmatha National Park
   It is located in the Khumbu region and is 1228.8 km² in area. The major features of this Park are its mountains, including Mt Sagarmatha (Mt Everest) and the culture of the Sherpa people.

(3) Langtang National Park
   This is another mountain National Park of Nepal with a total area of 1228 km². It was established mainly for its scenic value and was gazetted in 1976.

(4) Rara National Park
   Rara National Park is located in North-west Nepal. It has a total area of only 103 km² and includes the largest lake in Nepal.
<table>
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1.4 The Difficulties Associated with the Establishment of Parks and Reserves

There are many areas which possess considerable potential to become National Parks or equivalent Reserves due to their scientific, scenic, recreational and cultural values. However, setting up National Parks and Reserves in a developing nation such as Nepal requires a lot of effort due to the various social and economic constraints. Horray (1972) recognised four basic conditions which are essential for effective creation of Parks and Reserves. They are:

(i) A firm political will on the part of the countries' leaders;

(ii) A trend in public opinion which demands support or at least accepts this official will;

(iii) The mobilization of funds required to bring this will into fruition;

(iv) The intervention of an administration in the widest sense, having the necessary effectiveness and competence to translate this will into action.

In Nepal most of the above-mentioned conditions are met or could be met, except for the public support and acceptance of conservation programmes which is still weak.

There may exist other constraints which may inhibit the establishment and perpetuation of National Parks and Reserves in Nepal. Some of the more obvious constraints are as follows:
(a) **Availability of Suitable Land Resources**

Some nations are more fortunate than others in this respect. Young countries such as New Zealand, with a small population and large tracts of virgin landscape, have the greatest opportunity to establish National Parks which are relatively unspoilt and natural. With proper management and ample finance, it is possible to protect these Parks in their natural condition with minimal further deterioration by human influences.

Nepal, on the other hand, has a total population of more than 12 million spread over a total land area of 140,637 km². The population is dense and the demand for land is extremely high.

Dingboche, an agricultural area at an altitude of 4350 m in a high Himalayan valley shows the intensive utilisation of a hostile environment.

Even the most hostile environments such as the hot tropical jungles of Terai and the frozen slopes of the Himalayas are not without human settlements. Therefore, it is difficult to acquire land for the purposes of establishing National Parks and Reserves without encroaching on other...
people's living space or influencing their way of life. Because of the human inhabitation, the opportunity for preserving representative samples of undisturbed natural features are limited.

(b) Economic Pressure

One of the main reasons for having National Parks in Nepal is stated as to promote international tourism to gain economic and monetary advantages. But "tourism can be in conflict with nature conservation, particularly when the presence of tourism and what it implies is detrimental to nature and natural resources" (Bodowski 1977).

Increasing numbers and densities of visitors and increasing pressure for accommodation for tourism are threatening some of the most meaningful natural and historic resources of the world's National Parks and equivalent reserves (Foster 1973).

Since tourism is one of the biggest industries and an important source of foreign exchange, it is difficult and probably unwise not to derive economic advantages from it. The work of nature conservation and preservation itself requires large sums of money. However, unless tourism is strictly controlled and monitored, overdevelopment of a tourist industry may have negative side effects, some of which may be intangible, yet of great significance to social, cultural and environmental considerations.

(c) Population Pressure

The National Parks and Reserves of Nepal have a large number of people living inside their boundaries who are dependent on the resources within their boundaries for survival. The influence of man on these areas may have been continuous for centuries and is a current and future reality with which management must contend. Displacement of these populations may not be economically feasible or socially justifiable. The overseas examples of such actions have been highly unsuccessful. Thus, in principle, the integration of the ways of life of the Park inhabitants into the
National Park system seems to be the better alternative. It is already recognised by experts in the field of National Parks and most importantly by His Majesty's Government that the traditional ways of life of the people, their cultivated landscape and architecture in some of the existing National Parks of Nepal are of high anthropological, scenic and aesthetic values. Therefore, these cultural aspects of the Parks require the full protection of National Parks.

Mani Rimdu festival at Tengboche monastery. An important religious festival for the Sherpa people also provides an interesting cultural attraction to the tourist.

Unfortunately, the inclusion of human populations in National Parks will pose considerable management and administrative difficulties. The ways of life of the people are subject to rapid change. The increase in population places increasing demands on the natural resources of the Park which creates conservation/use conflicts. With this type of Park, application of resource management techniques are not sufficient because people's needs have to be considered first.
(d) **Lack of Public Interest**

Horray (1970) has expressed the view that unlike economically advanced countries, public opinion and support for conservation is much harder to get in poorer nations, because the majority of the population consist of economically weak people having little interest in conservation of species or ecosystems. This view is also supported by Maslow's theory of human motivation, which says that man's basic needs are arranged in order of importance. Unless the lower-level needs are gratified, man will not have the drive to pursue higher ones. The needs in order of importance to individuals are:

\[ 
\begin{align*} 
1 & \text{Physiological needs} \\
2 & \text{Safety needs} \\
3 & \text{Love and belonging needs} \\
4 & \text{Esteem needs} \\
5 & \text{Self-actualisation needs} \\
6 & \text{The desires to know and understand} 
\end{align*} 
\]

Man's desire to have National Parks and natural areas, appreciation of their aesthetic and natural beauties, his desire to learn and know more about nature and natural ecosystems falls into the category of higher-level needs (e.g. self-actualisation and cognitive). Therefore, people show little support and interest in conservation in Nepal because they are busy trying to fulfil their lower basic needs (e.g. food, shelter and safety). In order to gain their support and cooperation the Park must contribute towards fulfilling their lower-level needs. Conservation education may be another means by which their support can be gained.

(e) **Availability of Finance**

Availability of finance for running National Parks is a major problem even in richer nations. Nepal has been receiving generous financial and technical assistance from
international organisations and bilateral aid programmes for establishment of its National Parks and Reserve systems. However, this is only the beginning. The main future responsibility of administering and maintaining these Parks in perpetuity falls on the country itself. Therefore, a guaranteed source of finance for future administration and maintenance must be ensured prior to establishment of any more Parks and Reserves.

The costs associated with setting up and running of National Parks and Reserves are vast and can be calculated in monetary terms. But the benefits are mostly intangible and often indirect. It is not easy to measure these benefits in monetary terms, since it is difficult to put prices (money) on benefits such as public wellbeing, recreation, aesthetic values and preservation. It is difficult to make investment analysis in terms that everybody can understand. Therefore, getting allocation of sufficient funds for conservation programmes becomes a problem.

Tourism may act as an important justification for having National Parks and obtaining funds for establishment. However, the reliability of the tourist industry cannot be guaranteed.

Despite the various constraints, the Nepal Government is making rapid progress in developing its National Parks and Reserve systems. It reflects the considerable interest and dedication of His Majesty’s Government in the preservation of the cultural and natural heritage of the world.

If it was not for the clear-sighted leadership of His Late Majesty King Mahendra, His Majesty King Birendra and the keen personal interest shown by H.R.H. Prince Gyanendra, the financial and technical assistance provided by international conservation organisations, bilateral aid programmes offered by nations such as Australia and New Zealand, and finally the dedication on the part of the staff of the National Park and Wildlife Conservation office, Nepal would have lost some of her most valuable natural and cultural assets. The loss would not only be Nepal’s. "National Parks and Wildlife Reserves are more than the natural and cultural heritage of one nation — they are the birthright of all
mankind". They affect the world as a whole.

The need for conservation measures is acute in Nepal. Launching nationwide conservation programmes requires major effort. The reasons will be further highlighted in the subsequent chapters with some possible solutions.

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"Nepal's National Park and Wildlife Reserves" P.3.
CHAPTER 2

INTRODUCTION TO SAGARMATHA NATIONAL PARK

2.1 Location

Sagarmatha National Park lies on the lap of the Himalayas in the North-Eastern region of Nepal. It is located at 27°00 North latitude and 86°00 East longitude and lies within Solu-Khumbu district of Sagarmatha zone.

2.2 Size

Sagarmatha National Park occupies approximately 1228.8 km² of the Himalayan landscape. It includes the whole area, previously known as Khumbu.

2.3 Altitude

The altitude of Sagarmatha National Park ranges from 2800 m at Monjo to 8848 m at the top of Sagarmatha (Mt Everest).

2.4 Boundary

The northern boundary of Sagarmatha National Park follows the Nepal/China border extending from Nangpa La eastwards along the ridges of Cho Oyu, Gyachung Khang, Pumori, Sagarmatha and meets Lhotse Shar.

The eastern boundary runs from Lhotse Shar along the ridges of Pethangtse, Cho Palu and Mingbo La.

In the south the boundary runs from Mingbo La along the ridges of Khang Taiga, Tram Sorku and follows the course of Monjo Khola which meets with Dudh Kosai. From the junction of Dudh Kosai and Monjo Khola, it continues westwards along the ridges of Kongde Ri, Teng Kangpoche and Fighergo Shar.

The western boundary runs from Fighergo Shar northwards along Tashi Lapcha Pass and the ridges of Langmoche Ri.

Hence, the name Khumbu is often used as a synonym for Sagarmatha National Park throughout this text.
Dingjung Ri, Pangbug Ri to meet Nangpa La (see map in Appendix).

2.5 Access

Sagarmatha National Park is only accessible by foot or air.

(a) Pedestrian Access

Sagarmatha National Park is surrounded by mountains which form a strong physical barrier. Therefore, accessible entry points are limited. There are only three main access routes. Among them, the most important one is from the southern side of the Park through the lower Dudh Kosi Gorge which links Khumbu with the rest of Nepal. This route is heavily used by both human and animal traffic and is accessible all the year round.

The next important access point is Nangpa La, a 5791 m high pass which links Khumbu with the Tibetan Autonomous Region of the People's Republic of China. In the past this access was popularly used by both Nepali and Tibetan traders. Its significance has declined in recent years due to major political changes in Tibet. This pass is still used by Sherpa traders for limited trading purposes. But it is strictly prohibited for foreign visitors. It remains closed during winter due to extreme snow and ice conditions.

Tashi Lapcha Pass on the west links Khumbu with its neighbouring Rolwaling Valley. This route has only limited use to the local people but is frequently used by tourists. The access is restricted mainly due to hazardous conditions of snow and ice and falling debris. It is not accessible to everyone even during its best conditions. Some mountaineering experience, good clothing and footwear are essential.

(b) Air Access

Air access into the area was first established in 1964 when the Himalayan Trust built an air-strip for short take-off and landing aircraft at Lukla. This air-strip is located in the lower Dudh Kosi Valley about 10 km south of the southern boundary of the Park at an altitude of 2600 m.

Another air-strip of a similar type was built at
Shyongboche, at an altitude of 3760 m in 1972 by a Japanese company to serve the Everest View Hotel. This air-strip is located inside the Park boundary.

2.6 Human Population

The Park has a total population of almost 3000 residents, living in scattered villages along the glacial terraces and river valleys of the Dudh Kosi and its tributaries. The population consists mostly of Sherpa people plus a few Tibetan refugees and people from other parts of Nepal who work for the Government offices.

2.7 Land Ownership and Use Pattern

Land areas of the Khumbu region are for the most part rugged and unproductive. The more fertile and stable flat areas along glacial and river terraces are used by the local people for residential and agricultural purposes. These areas are divided into individual fields by using stone walls and are privately owned by individuals.
There is no system of zoning. The residential houses are built in association with agricultural land. The fields are unsuitable for extensive cropping due to unfavourable climatic conditions and low soil fertility. They are used during the warmer season for growing crops and hay, and remain frozen during most of the winter. The main food crops grown in Khumbu are potatoes, buckwheat, barley and turnips.

Thame (3800 m), a permanent Sherpa village in its monsoon greenery.

The remaining unoccupied land consists of steep slopes, forested areas, alpine grassland, glaciers and other infertile surfaces. These areas are collectively used by the whole community for grazing and other communal purposes, e.g. the collection of soil, rock, firewood, grass and animal manure.
2.8 **Domestic Animals**

Animal husbandry is one of the oldest occupations of the local people. The traditional Sherpa way of life is largely dependent on animals and animal products. Yak and Nak, common cattle, sheep, goats and horses are the domestic animals reared by the Sherpa people. Cross-breeds are also produced by crossing Yak and Nak with Tibetan dwarf cattle.

Most Sherpas own livestock, but only a few are full-time herdsmen, keeping large herds of animals. Livestock plays a vital role in the local economy. It provides local communities with wool fibre, protein and most importantly, manure for agriculture. Yaks and cross-breeds are also used for ploughing and transportation purposes.

Yaks and Naks, the most important domestic animal in the Sherpa economy.

The comparison of animal censuses, carried out by Heimendorf in 1957 and Bjonness in 1978, show that the livestock population of Khumbu in 1978 was about the same as it was in 1957. However, there was a boom and crash period in the early 1960's caused by a sudden influx of livestock.
brought in by the Tibetan refugees.

The static rate of growth in the animal population of the Khumbu region over the last two decades may have been due to limited supporting capacity of the environment as well as the development of tourist industries which attracted the people away from animal husbandry.
CHAPTER 3

BASIC PHYSICAL BIOLOGICAL AND
HISTORICAL DATA

"Gathering information on resources and values of
an area is always an essential first step leading to the
establishment of a Park" (Linn 1976). Detailed informa-
tion on physical, biological and historical resources of
the Park is an essential requirement for development of
proper planning, good management and interpretation of the
resources of the Park. Hence, the following basic
information on natural resources of the Park has been put
together from various sources.

3.1 Topography

"The physiography of Sagarmatha National Park is
determined by the great Himalayan Ranges, its glaciers and
criver valleys. It is enclosed to the north by massifs of
Sagarmatha and Cho Oyu with their subsidiary peaks and
glaciers, and to the east and west by lesser but still for-
midable ranges rising 6000 to 7000 m and extending at
roughly right angles to the main divide" (Lucas 1974).

The major mountain peaks in the area are Sagarmatha
(8848 m), Lhotse (8501 m), Lhotse Shar (8363 m), Cho Oyu
(8153 m), Gyachung Kang (7922 m), Nuptse (7873 m), Pumori
(7455 m), Ama Dablam (6856 m), Tam Serku (6808 m), Khang
Taiga (6685 m), and Tawoche (6542 m).

These mountain peaks enclose the Khumbu Valley which
consists of three smaller river valleys - Dudh Kosi, Bote
Kosi and Imja Khola Valley, which all join together to form
the Dudh Kosi River.

The upper valleys of Khumbu have U-shaped profiles
from past glacial action while the lower valleys are very
steep-sided and V-shaped in profile due to stream erosion.
3.2 Drainage Systems

(a) Glaciers

There are glaciers of various sizes at the head of the valleys and sub-valleys of the Khumbu Region. The most significant ones are Khumbu Glacier, Lhotse Glacier, Imja Glacier, Ngozumba Glacier and Nangpa Glacier.

These glaciers are not very large owing to low amounts of precipitation and absence of large névé basins to act as catchment areas for snow and ice. These glaciers are mainly nourished by summer avalanches from the steep mountain slopes.

According to Hagen (1963), there are no glacial cirques to be found below the altitude of 3000 m. The lowest terminal moraine in the Dudh Kosi Valley extends as far as Chaunri Kharka, about 8 km south of Sagarmatha National Park boundary.

Khumbu Glacier

Most Himalayan glaciers are in retreat. Their rate of movement varies considerably. "Khumbu Glacier, according to Fritz Miller, moves only about 50 metres per year while some other Himalayan glaciers are known to move 10 km
in two months" (Hagen 1962).

(b) **Rivers**

The main river systems of Nepal e.g. Koshi, Gandaki, Karnali and Mahakali, originated before the rise of the Himalayas. It is believed that the Himalayas uplifted so slowly that these rivers had no difficulty in continuing to flow through their channels. The rise of the Himalayan chain and the eroding action of the rivers together developed deep transverse gorges. The deep gorge along the lower course of the Dudh Kosi is an example of this kind.

It is interesting to note that, although Dudhi Kosi and its tributaries, Bhote Kosi and Imja Khola are fed by melting glaciers and have their origin entirely within the Khumbu Valley, geologist Hagen (1962) suspects that the valley of Ra Chu which flows northwards from the slope of Cho Oyu might have been the form or upper course of the Bhote Kosi. The Nangpa Valley as far as Thame village has no physical connection with its present glaciers or river. Also Nangpa Pass is more a level crossing than an actual pass. Therefore, the possibility exists that formerly a much more important river might have flowed down through Nangpa Valley.

Because of their glacial origin, the summer and winter levels of the rivers of the Khumbu do not vary greatly. However, a sudden rise in the level could occur during the monsoon due to bursting of the glacial lakes in the upper catchment area. This type of sudden flooding has caused severe devastation in the past.

### 3.3 Geological History and Soils

The Himalayan mountain ranges are the youngest chain of mountains in the world.

It is generally accepted by geologists that the area which constitutes the Himalayas, was once the bed of the Tethys Sea, which stretched along the southern edge of the Eurasian land mass encircling the earth. Slowly, through the late Cretaceous Age, the Indian tectonic plate moved northward, following the breakup of the great southern continent, Gondwanaland. During the Eocene, some 60 million years ago,
collision took place. The rate of convergence between the two continental plates was thereafter reduced, but large-scale tectonic movement continues. The result was crustal shortening and deformation within the Continental lithosphere which, in its final stages some 10 to 20 million years ago, produced the Himalayas.

The backbone of the Himalayan system is formed by the Great Himalayas which rise to their maximum height in the Khumbu region. The Himalayas have risen at least 1371 m since the middle Pleistocene, about 1½ million years ago, an occurrence witnessed by early man.

Scientists are of the opinion that the Himalayas are still rising. This rise is evidenced by the upheaval of younger river terraces.

Generally, the Himalayan soils are infertile. They are thin and poor on steeper slopes but on cultivated areas soils may be improved artificially by the addition of organic material. From the observation of the vegetation types, soils are likely to be acidic in nature.

3.4 Climate

The Khumbu Valley is encircled by high Himalayan ranges which offer unique types of climatic conditions. The conditions may be described as something between that of the central hilly region of Nepal in the south and the arid Tibetan plateau to the north, having cool wet summers and cold dry and mostly sunny winters.

In summer, the principal mountain peaks to the south, e.g. Karyalung, Kongde, Khang Taiga and Tram Serku form a barrier which forces the warm moisture-bearing monsoon air to rise. In the process, most of its precipitation is discharged on the southern slopes of this range. The Khumbu Valley, therefore, receives less rainfall than valleys of the lower mountain region of Nepal.
Some moisture bearing air still gets into the Khumbu Valley through the Dudh Kosi Gorge and other low gaps along the ranges, but soon confronts the Sagarmatha and Cho Oyu massifs and drops all its moisture in the Khumbu Valley. The Sagarmatha and Cho Oyu massifs also obstruct the passage of cold continental air from the north. Hence, while the Tibetan plateau on the other side of the range experiences arid conditions, the Khumbu Valley has lush vegetation growth.

The winter rain and snowfall in the Himalayan ranges is caused by depressions advancing from the west which become weaker as they advance towards the east. Thus, the effect of these depressions are not so obvious in the eastern Himalayas. The Khumbu Valley, therefore, does not get heavy snow falls.

3.5 Vegetation

The Himalayan vegetation is broadly classified into four groups, mainly based on altitude and rainfall. The groups are tropical, sub-tropical, temperate and alpine.
The local variation in relief and climate causes considerable difference in the composition of the vegetation within each group.

The vegetation of Sagarmatha National Park falls into the temperate and alpine categories.

The temperate forests are known to extend from about 3048 m to 3657 m and contain conifers and broad-leaved temperate trees. The plant species found in temperate regions of Sagarmatha National Park are Blue Pine (*Pinus excelsa*), Hemlock (*Tsuga dumosa*), Oak (*Quercus semicarpifolia*) and Bamboo.

The alpine zone extends from about 3657 m to 4572 m. The major forest trees in this zone may consist of Silver Fir (*Abies spectabilis*), Silver Birch (*Betula utilis*), Tree Juniper (*Juniperus recurva*), Rhododendron sp. (*Rhododendron campanulatum*, *R. campylocarpum*, *R. anthopogon*, *R. lepidotum* and *R. nivale*), and Shrub Juniper (*Juniperus wallichiana*).

Irises, a common flower during monsoon in the Khumbu region.
3.6 *Wildlife*

There are only a few species of mammals found in Sagarmatha National Park. The human interference, e.g. competition from domestic animals and loss of forest habitat, may have been responsible for the low density of mammal population in the Khumbu region. The larger mammals known to be found in the Khumbu region are: snow leopard (*Panthera uncia*), black bear (*Selenarctos thibetanus*), red panda (*Ailurus fulgens*), wolf (*Canis lupus*), Himalayan tahr (*Hemitragus jemlahicus*), musk deer (*Moschus moschiferus*), blue sheep (*Pseudois nayaur*), goral (*Nemorhaedus goral*), langur (*Presbytis entellus*) and Himalayan mouse hare (*Ochotona roylei*).

Park staff removing a dead musk deer from poacher's trap.
Among these mammals, blue sheep, goral and serow may have disappeared from the area. Musk deer and snow leopard are still found in the Park, but are becoming rare. The tahr population has dropped over the last decade. Tahr and musk deer are illegally hunted for meat and extraction of musk pod respectively. The wolf is the only animal whose control is encouraged by the Sherpa people, because they prey on domestic animals.

However, Khumbu is relatively rich in birdlife. The birds are not harmed by the local people directly, but their population may be affected indirectly by the activities of man.
CHAPTER 4

REASONS FOR THE ESTABLISHMENT OF
SAGARMATHA NATIONAL PARK

The reasons put forward by Blower (1971) are as follows:

(a) As the highest point on the earth's surface, Mt Sagarmatha (Everest) and its surrounds are of major significance not only to Nepal, but to the whole world, and its status as a National Park would bring international prestige and support to the country.

(b) The Khumbu region is already an important tourist area and its importance does not show any signs of decline. The scenic and wilderness value, which are its major attraction, must be protected from further exploitation and ill-judged commercial development. This can only be safeguarded through positive management based on sound conservation principles.

(c) The dwindling forests of Khumbu are not only of aesthetic value but are vital for the people of Khumbu as a source of fuel and building materials. The forests also play an important role in conservation of soil and water, and they harbour much of the wildlife.

(d) As an ecological unit in the highest region of the world, the Dudh Kosi drainage system is of much scientific value and offers a unique research field to scientists throughout the world.

(e) The area is of major religious and cultural significance in Nepal since it abounds in holy places like Tengboche and also is the homeland of Sherpas whose way of life is unique compared with other high altitude dwellers.
Tengboche Monastery, a major religious centre and a popular attraction of the Khumbu region.
CHAPTER 5
EVOLUTION AND DEVELOPMENT OF
SAGARMATHA NATIONAL PARK

5.1 Mt Sagarmatha Becomes a Major Visitor Attraction

Since its discovery in 1852, Mt Everest has become well known to the world as the highest mountain on the earth. Its uniqueness as the highest point on earth was enhanced by the grandeur of the Khumbu Valley with its flora and fauna and the unique human culture.

Until 1950, Nepal was under the rule of the Rana Prime Ministers who adopted the policy of isolation. Thus, the country was closed to the outside world and Khumbu was rarely visited by foreign visitors.

After the 1950 political revolution, the last Rana Prime Minister was forced to yield and the King was restored to his position of authority in 1951. Nepal was finally opened to foreign visitors.

The climbing expeditions to Mt Everest, previously led through Tibet, were now led through Nepal. After several attempts by various expeditions through the Khumbu Valley, the world's highest mountain was finally conquered by Edmund Hillary and Tenzing Sherpa in 1953. The ascent of Everest attracted large numbers of climbers, explorers and trekkers to the Khumbu region. Hence Mt Everest, with its beautiful Khumbu Valley and its local inhabitants, became one of the main factors in making the country known to the outside world.

5.2 Environmental Degradation in the Khumbu Valley

"The early visitors to the Khumbu Valley found majestic mountains rising from well-forested valleys, rich in wildlife and abounding in colourful plant communities" (Mishra 1973). Much of the majesty has been lost despite the continuing conservation practices carried out by the local people. The fragile mountain ecosystem was gradually degrading under the pressure of increasing human and animal populations.
Namche Village (3440 m). Note the expansion of housing development on the steeper slopes causing soil erosion.

This problem became severe with the sudden influx of Tibetan refugees and their grazing animals, after the Chinese takeover of Tibet in 1959. The human and animal carrying capacity of Khumbu was exceeded. The over-grazing of alpine grassland led to soil erosion and massive death of stock. The excessive use of forest for firewood led to the permanent loss of forest in some areas, and severe depletion in others. In recent years, this delicate Himalayan ecosystem was brought under further pressure by uncontrolled and rapidly increasing tourism and commercial development which has little respect for the environment.

The rapid rate of social and political changes has also had some adverse effect not only on the natural environment of Khumbu but also on the human society. Some people hold the view that there have been more changes in Khumbu in the last 25 years than there has been in the previous 250 years. Unless this massive rate of change is controlled through positive measures, ecological disaster, irrational economic
development, exploitation of resources, environmental pollution, social upheavals and cultural deterioration are all inevitable. This will not only endanger the biological life of the area but also would spoil one of the greatest tourist attractions of Nepal, causing enormous aesthetic and economic losses to the country. Hence, Blower (1972) and Mishra (1973) have strongly stressed the need for National Park status for the Khumbu region to ensure conservation and to increase the country's revenue from tourism.

5.3 Steps Toward Initiating the Park

In 1972, J.H. Blower, a wildlife conservation adviser of F.A.O., put forward an outline of a project proposal with a comprehensive justification for the establishment of a National Park in the Khumbu Valley.

In May of 1973, a conservation committee was formed under the Chairmanship of H.R.H. Prince Gyanendra. In the first committee meeting, the Chairman directed H.R. Mishra (an ecologist) to make a field investigation of the possibilities of establishing a National Park in the Khumbu Valley. The points emphasized in the Royal directive were as follows (Mishra 1973):

(a) Selection of the Park boundary so as to ensure optimum protection of flora and fauna of the region; and enclosing Mt Everest inside the Park.

(b) To investigate the tourist utility of the area.

(c) To suggest the necessary development work required within the framework of a nature conservation programme.

(d) To estimate the cost required for staff and for development proposals.

(e) To study the feasibility of involving local people in conservation programmes.

A report based on a field investigation carried out between May and June of 1973 was presented by Mishra.

In the same year (1973), H.R.H. Prince Gyanendra attended the World Congress of the World Wildlife Fund in
Bonn and made the following announcement:

"Since it was first discovered in 1852, Mt Everest has been attributed special status as highest mountain in the world. We sincerely believe that this region and its surrounding in the grandeur of the Khumbu Valley are of major significance not only to us but to the whole world as an ecological, cultural and geographical treasure, which we hope should provide peace and tranquility and to be a significant contribution to a better world heritage".

Sunset on Sagarmatha and Lhotse Massif.

A decision in principle to establish a National Park in the Khumbu region was subsequently made and His Majesty's Government of Nepal decided to approach the New Zealand Government to assist with its establishment.

New Zealand's experience in mountain Park management and Sir Edmund Hillary's continued association with the people of Khumbu were favourable factors which contributed towards obtaining the New Zealand Government's assistance.
5.4 **New Zealand Co-operation**

A three-man mission led by P.H.C. Lucas was sent to Nepal in May 1974 by the New Zealand Government to assess and make recommendations to the Nepalese Government on the proposal to establish the Sagarmatha National Park. They were also required to make recommendations to the Ministry of Foreign Affairs (N.Z.) as to the precise nature of any future N.Z. participation in the project (Lucas et al., 1974).

In Nepal, the New Zealand mission, together with Mishra and Bolton (ecologists), made a group field inspection of the proposed National Park area. Meetings and discussions were held in various places with the local people.

A report was prepared by the group and presented to the Minister of Forests, the Foreign Aid Division and the National Parks and Wildlife Conservation Office of His Majesty's Government. The recommendations made in the report were accepted by His Majesty's Government. Co-operation between the New Zealand and Nepalese Governments in the field of nature conservation, as recommended in the report presented by the New Zealand mission in association with Mishra and Bolton, began.

Nepalese National Park personnel were sent to New Zealand to receive training in both administrative and practical aspects of Park management under bilateral aid programmes. The New Zealand Government appointed G. Nicholls, formerly Supervisor of National Parks in New Zealand, as the first project manager. He left New Zealand in May 1975 on a two-year assignment to assist the Nepal Government in the establishment of Sagarmatha National Park. The National Park and Wildlife Conservation Office of Nepal, with the consent of the Minister of Forests, appointed and dispatched a Warden Officer and two Assistant Wardens and other staff to Khumbu in the same year. A temporary office was established in Khumjung which later was shifted permanently to Namche.

During 1976/77, the Sagarmatha National Park Office of His Majesty's Government, together with the New Zealand Project Manager, completed most of the construction work on staff accommodation and the development of visitor facilities was initiated. Transplanting of indigenous seedlings was
carried out on an experimental basis. The Park was formally gazetted on 19th July 1976.

Gordon Nicholls (the first New Zealand Project Manager) building a shed near the Park Headquarters on Mendel Pu Hill.

Gordon Nicholls returned to New Zealand in 1977 after the successful completion of his two-year term. He was succeeded by B. Jefferies in 1977, followed by P. Croft in 1979.

Sagarmatha National Park is also due to be added to the World Heritage site list. With the recommendation of P.H.C. Lucas, a member of I.U.C.N., the official procedure is underway to designate Sagarmatha as a World Heritage site.
AIMS AND OBJECTIVES OF SAGARMATHA NATIONAL PARK

It would seem desirable that the aims and objectives of the Park be as follows:

1. To ensure the continued existence of the Sherpa people in the Khumbu region; to encourage their participation in conservation programmes; to prevent any further deterioration in the natural and cultural environments of the Park through the application of proper management and conservation techniques so that Sagarmatha can be an example of an area where man is living in harmony with his environment.

2. As far as possible to conserve native flora and fauna, natural and cultural landscapes of the Park without depriving the pre-existing rights and privileges enjoyed by the Park inhabitants.

3. To maintain a balanced relationship between conservation and tourism. Thus, while natural and cultural assets are conserved as far as possible in their original state, people can continue to derive physical, aesthetic, cultural, scientific and educational benefits from these assets. At the same time the country can derive the economic benefit of the increased number of visitors.

4. To determine the human (locals and visitors) and domestic animal carrying capacities with reference to the natural resources of the Park and maintain them within desirable limits.
CHAPTER 7
LAND USE ZONING AND CLASSIFICATION CONCEPT

7.1 Historical Background of Land Use in Khumbu

Human settlement began in the Khumbu region with the arrival of the ancestors of Sherpa people about 400 years ago. The early settlers were pastoral people with a semi-nomadic way of life. Hence, the land areas were primarily used for pastoral purposes.

A typical high altitude pastoral hut built out of stones with minimum use of timber.

The pastoral nomads practised a system of seasonal migration and shifted from place to place with their livestock, seeking better climate and fodder conditions. They did not own any fixed property such as house and land. Their property consisted of what they could carry and drive in front of them. The impact of these nomads on the environment was probably minimal because both man and stock populations were
within the carrying capacity of the land. The migratory habits of the populations also helped to equalize the pressure on the resources over a wider area.

With the use of more intensive agricultural crops, e.g. potato and buckwheat, people began to occupy fields and build houses for shelter and storage of agricultural products. The ownership of fixed assets led to the adoption of a more sedentary way of life. The pastoral nomads began to practise both pastoral and cropping cultures. Thus two land use types emerged in Khumbu.

Khumjung-Khunde Village (3780 m), a major human settlement area.

The practice of agriculture and consequent adoption of a fixed base residence had both social and environmental implications. It improved the living conditions of the people and increased the local population owing to the availability of surplus food. Forested land areas were cleared for agricultural use and trees were cut for the construction of houses and shelters. The aggregation of
human and animal populations around the major villages placed localised pressure on the surrounding areas.

7.2 **Need for Land Use Control Practices**

The cropping and pastoral uses have been two dominant land use types in the Khumbu region for several centuries. These uses have induced some environmental changes e.g. gradual loss of vegetation and wildlife. These changes were slow and more or less in balance with nature's ability to maintain. Land and forest resources were abundant, and a low population density, the absence of modern technology and other natural and cultural factors have prevented the rapid exploitation of resources. There were no conflicts associated with different land uses. Hence, the need for land use zoning and control measures did not arise. The land was treated as a commons; open for free occupation and exploitation, but people did not compete for private ownership of the commons. This was mainly because land had limited value (economic). There was no other way of deriving economic advantages from the land except by cultivation. The demand for land for cultivation was low due to the unproductive nature of the environment and man's limited ability to till land.

This situation has changed in recent years. The increase in local population has placed additional demand on land since more land has to be cultivated to support extra numbers. The areas previously regarded as unsuitable are cultivated ignoring the natural limitations of the land.

Tourist developments have introduced commercial interests in the area which have placed considerable pressure on the unoccupied land areas. Public and private lands are invested for the purpose of developing tourist facilities which is a major cause of deforestation because it needs timber for construction and firewood.

Further pressure has been added by occupation of land areas by Government and private organisations for various purposes.

Realising the increasing demand and potential commercial values of the land, people are attempting to occupy communal
land areas under private ownership. This random occupation and development of land without reference to planning procedures can lead to land uses which could result in unfavourable future social and environmental consequences.

Unless the trend is checked through proper land use planning and control measures, the remaining open spaces of Khumbu, vital for public uses, e.g. recreation, grazing, collecting and wildlife protection are in danger of diminishing.

The agricultural and forested areas are also in danger of getting engulfed by residential and other major developments. Hence, it is important that the concepts of land classification and zoning are introduced to protect different areas of land for different uses. The classification and zoning should be carried out according to the inherent qualities and desirable uses of the land. Each type of designation should have separate management policies constructed by qualified planners in consultation with Park managers and representatives of the local people.

The policy documents must be flexible so that they can be reviewed and checked for necessary readjustments and modification to meet the needs of the changing circumstances.

To meet the need of the local people, to allow for the demands of the tourists, and to provide recognition and protection of features which satisfy the National Park criteria, the Sagarmatha National Park could be zones under the following six different land use types:

I. Human settlement zone
II. Agricultural zone
III. Pastoral zone
IV. Natural landscape areas
V. Special areas
VI. Wilderness zone

7.3 Descriptions of Different Land Use Zones and Policy Recommendations

I. HUMAN SETTLEMENT ZONE - This is an area primarily set aside for residential purposes. All the permanent villages enclosed within the Park boundary should be included
Recommendations:
(a) All the existing major Sherpa villages, e.g. Namche, Khunjung, Khunde, Thame, Phortse, Pangboche etc., which are used as permanent bases by the locals must be designated as Human Settlement Zones.
(b) These zones should primarily be under the administration of Local Government, i.e., Village Panchayat.
(c) A set of village planning regulations must be produced and implemented. These regulations should aim for elimination of bad land use practices, protection of the environment, improving health and sanitation, preventing undesirable development and overcrowding and reducing conflicts.
(d) Open spaces should be provided in appropriate locations within the village to provide for community uses, e.g., sports, social gatherings and other community purposes.
(e) When determining the boundary of a Human Settlement zone, sufficient buffer should be allowed for future expansion and extension of the village.

II. AGRICULTURAL ZONE - Agriculture zones are stable areas of land which are arable and suitable for production of local crops. Hence, all the summer and winter settlement areas of Khumbu which have significant agricultural value should be included under this classification.

Recommendations:
(a) Agricultural zones must be retained primarily for production of crops for human and animal consumption.
(b) Agricultural development should be encouraged but dense housing and development not related to agriculture may be discouraged.
(c) Grazing animals may be excluded from this zone during the cropping season, if they are damaging crops or incompatible with the rotational grazing system.
III. PASTORAL ZONE - Pastoral zones are areas of land reserved for the purpose of grazing. These zones should be unoccupied by forests, agricultural lands and residential housing.

**Recommendations**

(a) All pastoral areas should be free of private ownership, and the National Park should maintain control over it.

(b) Permanent occupation of land within this zone may not be permitted. However, temporary habitation associated with pastoralism should be allowed.

(c) Prospecting and mining should not be permitted unless they are part of the traditional rights of the local inhabitants.

IV. NATURAL LANDSCAPE AREAS - This zone includes areas to be maintained predominantly in their natural state. However, local people may obtain their livelihood through means that do not involve extensive cultivation or other major modification of vegetation and wildlife.

**Recommendations:**

(a) The major forest stands of Khumbu must be protected under this designation for the purpose of biological conservation, aesthetics and sustained production of plant material (e.g. dead wood and leaves) essential for agricultural and domestic use of the people.

(b) Needs of the Park inhabitants should be recognised and the existing collecting rights should be protected. Periodical bans on collection and limitation on quantity obtained could be imposed if necessary.

(c) Grazing may be restricted in this zone if it is detrimental to the natural features. However, limited grazing may need to be introduced periodically to minimize the fire risk.

(d) Lighting fires, trapping, killing and removal of any native wildlife species, and cutting green trees should not be allowed without permission of the National Park Office.
V. SPECIAL AREAS — An area possessing rare native plants or animals, or significant biological, geological, archaeological and historic features which require strict protection and management should be classified as a special area.

Recommendation:
The degree of protection and development work required on a special area will depend on the nature of the feature to be protected.

VI. WILDERNESS ZONE — An area whose character is the result of an interplay of purely natural processes, large enough and so situated as to be unaffected except in minor ways by processes which occur in non-wilderness areas around it.

Recommendations:
(a) The areas occupied by mountains and glaciers on the upper regions of Khumbu are natural and unaffected by man's activities. Hence, they should be designated as wilderness areas.
(b) Grazing and collecting may not be allowed if it reduces the wilderness qualities.
(c) Access should be by foot only and development facilities should be restricted.
CHAPTER 8

RESOURCE MANAGEMENT

8.1 What is a Natural Resource?

A natural resource may be anything in nature which may have some use to man. Hence, it is a reflection of values and appraisal of man and is likely to change over time and vary from culture to culture.

8.2 Wise Use of Resources

The list of what may be resources is long, but the amounts of various kinds of resources are limited relative to total wants and desires. The result is varying degrees of competition for use of resources which lead to exploitation, followed by depletion and complete exhaustion. The forest land and wildlife resources of the Khumbu region, for example, are limited resources. Their resources are also varied, e.g. economic, aesthetic, educational, recreational and spiritual. Preservation is also a use. Some uses are more appropriate than others because they are compatible. Incompatible uses create conflicts. In fact, many uses can be in conflict with other uses. For example, excessive commercialisation of forests will lead to aesthetic and long-term economic losses. Similarly, when preservation of forest and wildlife are overemphasized, the public will not be able to derive economic, aesthetic, educational and recreational benefits from them. This is where conservation measures become essential. Conservation is a means which ensures balanced use and hence, may reduce conflicts between optional uses. Forest conservation ensures continued survival of the forest stands which can be used for aesthetic, educational, recreational and even economic purposes to a certain extent. People can collect dry wood, leaves and timber for a long time without causing it to diminish if conservation principles are applied.
8.3 Importance of Nature Conservation in the Khumbu Region

It took many millions of years for plants to establish on the sterile surface of Khumbu which provided conditions suitable for the existence of animal life including man. Man has been in Khumbu for less than half-a-thousand years. Under his impact plant life already began to diminish. The rate of exploitation has exceeded nature's capacity to replace itself. Unless the trend is checked, forest resources would soon disappear and the consequences are not difficult to guess. The wildlife is already disappearing with the loss of habitat. Soil is diminishing with the loss of vegetation cover. Agricultural and pastoral land will soon lose its productivity. Consequently, man has to either abandon the area in search of alternative places where necessary resources are available or find an outside source from which these resources could be obtained to support their life-styles. If these alternatives are not found, man will perish due to lack of food and shelter.

If we are to avoid this tragic course, conservation measures must be introduced into the Khumbu region without delay to avoid excessive degradation of natural resources. Conservation is the only means which ensures sustained growth and existence of resources and at the same time allows the use of these resources for human benefit.

8.4 Sherpa People have a Responsibility to Support Conservation

Conservation is defined as the rational use of the earth's resources to achieve the highest quality of living for mankind. Natural resources are not only important for raising standards of living and improving quality of life, but are essential for the survival of all animal life including man. The Sherpa people thus have a major responsibility toward conservation of natural resources of the Khumbu region for their own benefit and the benefit of future generations. However, the rate of resource consumption can not be altered greatly since the Sherpas are already leading a comparatively non-consumptive way of life. Application of major restrict-
ions on the present pattern of resource use would affect their standard of living unless alternatives are provided.

8.5 Protection of Native Flora and Fauna

(a) Justifications

1. The existence of the native inhabitants of the Khumbu region depend on the native vegetation. Wood for fuel timber for housing, organic manure for agriculture, and fodder for domestic animals are derived from forests and grasslands. The trees and shrubs are also used for religious and cultural purposes. The forest of Khumbu has been severely depleted over the last several decades because human exploitation has exceeded natural regeneration. No effort has been made to replant trees. With much of the original forest cover having been destroyed, what is remaining must be conserved to allow regeneration.

2. The Khumbu Valley is admired by many visitors not only for its panoramic mountains and human culture, but also for its colourful alpine vegetation. Khumbu is also known as the 'home of rhododendrons'. If the native vegetation is not protected and is lost, the Khumbu region will lose one of its main characteristics and attractions.

3. The loss of vegetation in the northern Himalayan region has caused severe flooding problems in the plain lands of Terai. This has resulted in the loss of valuable agricultural and forestry lands and even human life. As a result, national and local government, community organizations and individuals have the responsibility to prevent these disasters through protection of vegetation on the upper slopes to retain soil and moisture.

4. The flora of the Khumbu Valley with its vertebrate and invertebrate fauna are not well researched and documented. It offers a wide scope for both amateur and professional scientists to carry out ecological studies and research programmes on high altitude flora and fauna.
5. The wildlife of the Khumbu region are of aesthetic, educational and cultural significance, and contain potential economic value. Unfortunately, they are disappearing rapidly due to habitat destruction and other human interference. Their protection would not be possible without conservation of forest habitats.

(b) Recommendations

1. Sagarmatha National Park has already placed restrictions on use of firewood by tourists. This is a significant step towards nature conservation in Khumbu, and will be appreciated by the local people and environmentally conscious visitors. To achieve the purpose of this regulation, it must be accompanied by an effective implementation programme.
2. The sale and purchase of firewood in the market should be controlled. The case of purchase through door-to-door sales leads to a lack of awareness of the over-exploitation in the forests. Only by restricting sales and encouraging individuals to collect their own fuel, can the waste be reduced.

3. The cutting of green trees diminishes the forest. Hence, it should be discouraged unless it is allowed by Park bylaw as part of the traditional rights of the people.

4. The traditional Sherpa forest and grassland conservation practices should be strengthened and brought back into practice with some modifications to suit the changing need. The public involvement and motivation are always better means of bringing success to conservation programmes than enforcement of rigid regulations.

5. The needs of the people should be given priority and public representatives should be consulted when making decisions regarding conservation, preservation and reservation activities which may affect the people.

6. The forest of Khumbu has been depleted to such an extent that more protection of the remaining stands will not fulfill the potential present and future demands for forest products. A reafforestation programme should be implemented both inside and outside the Park boundary.

7. Under human protection, the wildlife population could increase beyond a desirable level. Control programmes should be carried out when it is necessary to maintain the health of the species, the native environment, and to safeguard public health and safety.

8. Alternative forms of energy e.g. wind, power, methane gas, solar energy and hydro-electricity could be used to save native forest. However, it would be justified only if their social and environmental impact is low and production cost is minimal.

9. Man induced fire should be prevented to avoid destruction of natural vegetation and wildlife. Natural fire and even prescribed burning are encouraged in National Parks
around the world including Sequoia and Kings Canyon National Park, U.S.A. One of the reasons is to prevent heavy accumulation of plant litter on the forest floor which often alters the natural vegetation composition and also places greater risk in wiping out the entire forest by fire. This situation does not occur in Sagamatha National Park since dry leaves and wood are collected by man and grass is grazed by domestic animals which does not allow excessive accumulation of forest litter.

8.6 **Protection of Natural and Cultural Landscape**

The natural and cultural landscape of the Khumbu region are the result of interaction between man and the environment for several centuries. These landscapes developed in the absence of modern scientific and technological forces, are still primitive in character. They have their own distinctive and unique features of historical, cultural and scenic values, which are worth protecting.

Because of its human and animal population, Sagarmatha is not a park of natural wilderness with minimum human influence, where preservation may be the first priority. Thus, we must contend with the conservation of the existing natural and cultural landscape. The concept of including man-modified landscape in a National Park system has been achieving popularity in recent years. The British National Parks, for example, include private farmlands, modified pastures and villages.

Ron Locker, a New Zealand scientist, has put forward a proposition that the National Park system should not only include mountain wilderness, but also other representative examples of a country's landscapes, e.g. farmland, wetland, and coastal areas etc. He further suggested that 'the sensible treatment of such kinds should be to keep it as far as possible in its present ownership and productive use. Good farming would be encouraged while the scenic and natural features of the whole region would be safeguarded by strong planning and protection. Only the land needed for special reserves, or public recreation access, would be acquired, preferably not through compulsion. Thus people would not
be displaced' (Sierra Club Bull. 1976, p. 7).

Recommendation

I would strongly recommend that Sagarmatha National Park should follow the guidelines provided by the above statements to manage the natural and cultural assets of the Khumbu region.
An example of the cultural landscape of the Khumbu region.

8.7 **Timber Harvesting**

Timber is an extremely scarce resource in the Khumbu region due to the apparent lack of millable forest trees, and the expenses and difficulties associated with importing timber from outside the region. This scarcity has coincided with an increasing demand placed by the increasing population, affluence and recent pressures for tourist developments and its paraphernalia. Therefore, timber harvesting needs to be carefully controlled and managed to cater for the present and future demand.

Normally, timber harvesting would not be permitted in a National Park. But, Sagarmatha National Park should be an exception to this norm, because the local inhabitants are dependent on the forest resources of the Park. However, to maintain a sustained yield of the present forest resources, it is essential to have some degree of restriction and control on the rate of harvesting.
Recommendations

1. Timber harvesting rights within the National Park boundary should be exclusively to local inhabitants.

2. A permit, indicating the volume of timber to be obtained, locality, species and harvesting period and other essential details, must be obtained from the Sagarmatha National Park's Office before harvesting timber within the National Park boundary.

3. A timber harvesting permit would be issued only if the timber is required for personal use. The commercial use of harvested timber should be prohibited, unless it is obtained from outside the Park boundary or grown as production forestry.

4. Timber yield should be improved through management of the existing forested areas and re-afforestation of timber trees.

5. Timber harvesting may be excluded from areas of forest which are severely depleted, or reserved for purposes which conflict with timber harvesting such as catchment protection.

National Park development - a burden on local resources?
There are numerous examples from around the world of accidental or deliberate introduction of exotic plants and animal species into a new area by man. Most of these led to disastrous consequences even though introductions are carried out with the best of intentions, e.g. introduction of deer in New Zealand for sporting and economic purposes had devastating effects on native vegetation. The introduced plants and animal control programme in New Zealand's National Parks is costing the New Zealand Government millions of dollars, and the control operation is a continuing process.

The biological interaction and ecological processes are so complicated that it is difficult to say that these problems will not occur in Nepal's National Parks because of the environmental differences and presence of predator species.

An organism does not have to be large in size to cause ecological problems. Smaller pests and weeds are more difficult to control. Minute organisms are also potential disease carriers and could cause considerable biological and economic losses.

Recommendations

1. Introduction of any plant or animal species which are new to the area should be carried out with caution.

2. Exotic plant and animal may not be introduced in wilderness areas since wilderness quality depends on its originality.

3. Exotic animal and plant species may not be introduced in the pastoral zone, natural landscape area, and special areas if introduction of these species organisms threatens the existence of the native species and spoils the natural and cultural feature of the area.

4. Introduction and ownership of introduced plants and animal species which have social, economic and aesthetic importance to the local people should be allowed in the human settlement and agricultural zone.
5. Measures should be introduced to control harmful animals, e.g., wild cat and dogs which feed on birds and small mammals.

6.9 Mining in the National Park

Mining and prospecting can constitute one of the worst forms of exploitation of National Park resources. Most Park Authorities are obliged to oppose the mining activities to achieve the conservation goal.

However, some of the National Parks of Britain, United States and Finland are set aside by enclosing a human settlement area for protection of human culture and cultural landscape in the Park. The native people are encouraged to maintain their traditional lifestyles with the exclusion of technological exploitation and the provision of economic incentives, and special privileges. The special rights are granted to use Park resources in their traditional way.

Sagarmatha National Park is established for protection of nature as well as culture. Therefore, it seems desirable that local inhabitants should be allowed to carry out mining operations in their traditional ways. Since continuation of human culture is not possible without natural resources, resource protection should be equally emphasised.

Recommendations

1. Large-scale commercial mining and prospecting of mineral resources within the Park boundary by outside interest groups should be strictly prohibited.

2. People who are lawfully residing within the Park boundary should be permitted to mine minerals, remove soil, extract sand, gravel and rock etc. as it is essential for continuation of their way of life.

4. Where a lawful right to mine exists, both the miners and authorities who grant permission to mine should do all that they can to minimize environmental and visual impacts. Landscape restoration and maintenance of disturbed sites should be the responsibility of the miner and as such should be done to the satisfaction of the authority. All the conditions should be stipulated in the permit issued.
8.10 Collecting

Recommendations

1. Collection of natural objects should not be allowed in the wilderness zone to preserve the wilderness character and to enhance the wilderness quality and experience.

2. In the other zones, the needs of the people should be recognized and rights of collection should be granted. Excessive collection should be discouraged if it threatens to diminish the source.

   Restrictions can be placed on quantity, rate and frequency of collection to prevent excessive exploitation and to protect essential Park values; and at the same time to allow for social needs.

3. The non-residents of the Park may not be allowed to collect scarce natural resources unless authorised by an appropriate authority.
CHAPTER 9

PEOPLE MANAGEMENT

"We shall not begin to treat nature with respect unless we first learn to deal with our fellow man in ancient coin of social justice". Barry Commener (1972).

Generally, National Parks are established for the benefit of mankind. Individual's perception of benefit largely depends on their present needs and future aspirations, which in turn are influenced by factors such as education, income, social and cultural backgrounds. For some people, National Parks may be places to relax and recreate. For others, they may be a place to receive education and knowledge or where conservation or even economic factors may seem to be of paramount importance. Thus, when making decisions relating to the management and planning of National Parks, the interest of these different groups must be taken into consideration within the framework of the National Park concept.

For a National Park programme to be successful, it requires a combination of large public support and interests coupled with sound management and planning. In the case of Sagarmatha National Park, the public association with the Park is not limited to recreational, educational, conservation or economic use only. The Khumbu Valley is a home for almost three thousand people, beside being a recreational ground for thousands of visitors each year. Conservation in the Khumbu region will not be possible without some realization of the basic needs of those users. Thus for proper management of a Park, the manager must understand the needs, attitudes, motivation and behaviour of the users and know the causes behind over-exploitation of the Park resources as much as he needs to know about the resources requiring protection.

Since man and environment are interacting parts of a total system, the changes in human society have an impact on
the environment and vice versa. To know the causes behind the environmental changes, it is essential to examine the changes in the human society.

9.1 The Changes in the Sherpa Community and Their Impacts

The need for conservation in the Khumbu region has long been recognised by the local people. One has to only look into the traditional forest, cropland and pasture management practices to realise that the Sherpa people were aware of the mounting environmental problems of the Khumbu region. This awareness gave birth to various conservation traditions which have been greatly distorted in recent years due to the advent of various changes over a short period. The changes are as follows:

(a) The Impact of the Political Changes in Tibet

The sense of responsibility of the Sherpa people towards their environment has its root in Buddhism. The influence of this religion on the Sherpa community has been decreasing since the Chinese takeover of Tibet, which led to loss of religious contact. The invasion also caused a massive exodus of Tibetan refugees and their animals into the Khumbu Valley which disrupted the local conservation tradition and destroyed forests and grasslands. The trade between Tibet and Nepal, a major support for Sherpa economy, was affected. The loss of trading relations caused major economic hardship in the Sherpa community which placed more demands on the local resources.
The Sherpa people seeking protection from natural disasters by making offerings to the spirits dwelling in the rock.

(b) The Impact of Tourism

The growing tourism and mountaineering activities in the Khumbu region has direct and indirect impacts on the local environment. The direct impacts are over-use of forest and littering. The indirect impacts are caused by inducing changes in the Sherpa way of life, e.g. the improved standards of living and growing affluence in the Sherpa community is putting more demands on natural resources. Tourism also has negative influences on the human culture. Undesirable elements such as dishonesty, violence and crime are becoming more apparent due to the breakdown in social unity.

(c) The Effect of Changes in Administration and Control

In the past the Khumbu region was a politically isolated area not influenced by the central government control. The Sherpas of Khumbu developed their own system of maintaining social and environmental stability. Law and order was maintained by the Pembu (Village Chief), the Nawa (forest and
cropland guard) and the Chorumpa (a person nominated to control crowds in community gatherings). The power and functions of these personnel were lost when the Government posted Administrators and Police Forces to keep law and order in Khumbu around the 1960's. The change brought many improvements in the Sherpa community but not in the field of conservation. They failed to support the local conservation practices which led to exploitation of forests.

(d) The Effect of Education

The Sherpa children began to receive education from 1961, when Sir Edmund Hillary built schools in various villages at the request of the local people. The effect of the education on the society was generally beneficial. The Sherpas learnt to speak the Nepali language which enabled them to communicate with people from other ethnic groups and develop better understanding. The knowledge of the English language made it easier to work with the tourists. With the improved education, people became more independent. Their job opportunities are greater and most importantly, the education has enabled them to cope with the modern changes.

9.2 Recommendations for Management of Park Inhabitants

1. Public Relations and Participation

The support and involvement of the Park inhabitants seems to be essential for the success of the Park's programmes. The National Park Office should seek participation of the people in major decision-making processes.

Good public relations are the key to success of any programme. The Park Manager must convince the people, both in words and in action, that the establishment of National Parks is in their best interest, and should aim towards establishing good public relations.
2. **Local People must not be Removed or Displaced**

'National Parks must not serve as a means for displacing the members of the traditional societies who have always cared for the land and its biota. Nor can National Parks survive as an island surrounded by hostile people who have lost the land that was their home'.

(Dasmann 1975)

The local people who have been living in the Park and own land and property within the Park boundary should be able to continue to do so. Removal of people out of Sagarmatha National Park or their displacement within its boundary may have destructive social and economic consequences to the people affected. Such an action would cause loss of public support and interest for conservation programmes in the country. It also may lead to a loss of international reputation and support since the action would contradict the underlying philosophy of National Parks.

"Hotel Everest View" - the biggest tourist complex in the Park.
3. Need for Population Control Policy

Due to the fragile nature of the mountain environment, the total number of permanent residents the Khumbu region can support without environmental damage is limited. The growth of local population seems to be slow due to a low fertility and high mortality rate. In fact, "it seems to be trend that the population of Khumbu has been decreasing from the beginning of 1970" (Bjoannes 1979). This may have been due to outward emigration of the younger Sherpas and the Tibetan refugees. The emigration of the Sherpas may only be temporary. The number of semi-permanent immigrants settling in the Khumbu region over the past decade has been substantial. It consists mainly of Government employees, casual job seekers and people with commercial interests in the area. The population of these temporary immigrants could be expected to rise with the increasing Government involvement and tourist activities in the region.

Because of the simple and mobile nature of the lifestyle of the people, Sagarmatha National Park can accommodate the existing Sherpa population without undue pressure on the environment. However, any great increase in present population would not be desirable since the resources of the area are limited. Thus, there is a need for a population control policy.

A desirable population size must be determined with reference to carrying capacity of the land and policy measures should be introduced to achieve the desired level and should maintain it by encouraging family planning and monitoring the immigration and emigration balance.

4. Need for Conservation Education

In the past the Sherpa people maintained their conservation practices through strong social and religious taboos. With the recent changes, the social unity is breaking down and people's faith in religion is decreasing. This in turn is causing deterioration of the age-old conservation traditions. There is an urgent need for conservation education to replace the declining faith in religion by a real understanding of conservation principles. Conservation education programmes
should be carried out throughout the communities in the Khumbu region with special emphasis on schools. It must become part of the school curriculum. The National Park Office needs to appoint an expert to work especially in the field of conservation education and interpretation.

5. Priority in Jobs and Incentives to Locals

The migration of people from hills to Terai and into the cities is putting pressure on the agricultural and forestry land of Terai; and causing problems of overcrowding and adjustment in the cities. In the light of these problems, it seems to be in the interest of the whole nation to retain the mountain people in their place. This could only be achieved through provision of jobs and incentives in the mountain region. The establishment of National Parks in the mountains and staffing them with local people would be an ideal example. This will provide an alternative source of income to the people which helps to reduce pressure on the Park resources. It will also get the support and involvement of the Park inhabitants in the Park programmes. "As His Royal Highness Prince Gyanendra emphasized, nature conservation in Nepal can make little progress unless the local community is involved in conservation schemes" (Mishra 1973). Hence, local people should be given first priority in Park jobs.

9.3 The National Use of Resources in Tourist Industry

The Khumbu region is a popular tourist center. It has been reported that the number of tourists visiting the Khumbu region has been increased from 20 in 1964 to 3000 to 4000 in a year in 1974. The impact of the growing tourism on the natural and cultural environment of the Khumbu region has been discussed in previous chapters.

Economically, tourism has benefitted the people of Khumbu. Most Sherpas derive their monetary income from tourism. Tourism has also benefitted Nepal's foreign exchange earnings. However, if a cost-benefit analysis of tourism is carried out entirely within the Khumbu region, the losses would outweigh the benefits since the increased
The number of tourists has threatened the natural and cultural resources upon which tourism and local people depend.

This situation has occurred mainly because tourist development has never been planned and controlled, and resources were not protected.

It must be realised that the economic benefit of tourism is only a product of natural and cultural resources. Their relationship may be compared with that of a hen (resources), which lays golden eggs (economic benefit from tourists). The golden eggs can be obtained only as long as the health of the hen remains in good condition. Thus, the rational use of mountain resources will require conservation and protection of natural and cultural resources from the harmful impacts of tourism. This in turn requires management and control of tourists and tourist developments.

9.4 Recommendations for Tourist Management

(a) Importance of Understanding Tourists and Tourism

The proper management and control of tourism development, to ensure protection of resources, requires an understanding of the tourists' needs, motivations and behaviour. Measures such as strict protection of resources, direct control of visitor activities or development of extra facilities to absorb the increasing number may not be acceptable. Thus, resources can be better protected if visitor activities could be influenced, channelled and regulated through understanding of their needs and behaviours.

The proper understanding of the nature of tourism is also essential in planning and development of tourist related facilities.

(b) Application of Carrying Capacity Concept

The visitor carrying capacity concept is the visitor use the Park can tolerate without causing unacceptable impact. There are no precisely defined measures to determine how much impact is acceptable or unacceptable. This decision largely rests on the judgement of the Park planners.

The physical carrying capacity of the Park could be measured in terms of available visitor facilities (e.g. camp-
ing grounds, accommodation and sanitation facilities) in relation to the number of tourists present. The biological carrying capacity can be based on impacts of visitors on vegetation, wildlife, etc.

The social carrying capacity can be based on the impacts of visitors on local communities and also on the experience of the visitor.

The introduction of the carrying capacity concept is essential for providing a framework for limiting use in order to protect the Park values.

(c) **Visitor Facilities and Services**

The visitor facilities and services essential for protection and maintenance of Park values must be established as soon as possible.

**Accommodation and camping facilities** should be developed only when and where it is necessary. The Park planner should be responsible for producing development plans which specify the amount, location, size and style of these developments. A reasonable standard of cleanliness and sanitation facilities must be provided. Facilities must not be over-crowded and in conflict with the local environment.

A Park building designed to blend into the local landscape.
Interpretation and information facilities should be established in the Park, so that the natural and cultural resources of the Park can be interpreted to the visitors. 'The better a visitor understands the resources of the Park, the better he understands the problems and need for special regulations and zoning' (Linn 1976). He then respects the Park regulations more readily. The understanding of the Park values also enhances the visitor experience which in turn provides encouragement to support and participate actively in protecting the Park. The main interpretive facility should be located at the main Park visitor centre at Namche and information centers should be built in several other locations.

Park visitor centre under construction

Search and rescue facilities. In the past, most tourists visited Khumbu region in organised trekking and mountaineering groups with guides and porters. The recent trend has been towards smaller mountaineering parties and individual trekkers without guides. This change in the nature of visitor parties may have been caused
by recent development of air transport, accommodation facilities and availability of information in the form of books, brochures and maps. With the increasing number of these smaller parties, there is a likelihood of increasing mountain accidents and sickness which may call for the establishment of a search and rescue organisation. The Sagarmatha National Park should be responsible for organising this facility in conjunction with the existing Himalayan Rescue Association and Khunde Hospital. The local people with good mountaineering skills should be trained in search and rescue techniques.

The funding must be mainly through donations and contributions made by the individual or parties involved in the accident. Establishment of such an organisation will benefit both local people and visitors alike.

9.3 Restriction and Control

The conservation of natural and cultural resources of the Khumbu region is not possible without some restraints on the activities of the tourist. The impact of tourist on the natural and cultural environment of the Khumbu region has already been mentioned in the previous chapters.
Conflicts between tourists and the Sherpa culture are also known to occur. Tourists camping at Tengboche have been known to wash their socks in the monastery well (the only source of water in the Tengboche area). The gong used for summoning the monks has also been known to be rung by tourists. Some tourists abuse local hospitality by walking off from hotels and lodges without paying their dues.

The lack of consideration of some tourists can also affect other tourists. In camping areas the singing and dancing around campfires, consuming large quantities of firewood and Chang (local rice beer), continues on until late night. This can have considerable impact on the experience of the other campers wishing to sleep after a tough day's walk or before one. The inconsiderate behaviour of a few tourists could cause loss of respect for the tourists by the local people. It could also cause a deterioration of relations between visitors themselves. "As Lee (1975) notes, social relations between wilderness campers are more important to the satisfaction of those users than was the condition of the physical environment. Therefore, encouraging appropriate wilderness behaviour might be the most important action managers can undertake". (Burch, 1978).

There are two ways of discouraging undesirable behaviour of the people. Since bad behaviour is often the result of a lack of cultural understanding, it can be improved through education and interpretation. The second option is direct intervention, strict regulation and enforcement.

The second option should be taken only when the first one has failed to be effective.

9.4 Fees and Charges

The capital cost of establishing a National Park such as Sagarmatha is immense due to the foregone opportunity cost of the resources, e.g. land, water, forest, etc. The cost involved in development of visitor facilities and services are massive. A continued source of finance would be required for perpetual maintenance and administration of the Park. The development, maintenance and administrative cost increases
with increasing visitor numbers.

The majority of the users of Sagarmatha National Park consist of foreign visitors who do not contribute towards Nepal's tax system. Therefore, it would seem desirable to introduce a system charging user fees. A reasonable charge could be made for the use of Park and Park facilities and services. The collected revenue could be spent on the better management and protection of the Park resources and for improving and maintaining visitor facilities.

Mendel Pu Hill - the National Park Headquarters development site.
CHAPTER 10

ADMINISTRATIVE RECOMMENDATIONS

1. The Park Warden Officer should be responsible for the day-to-day management and administration of the Park.

2. Staff meetings should be held regularly to receive their views and feedback as well as to make them better informed regarding the various Park programmes and objectives.

3. The public image of the staff is important for the Park. Regular training sessions should be organised for the staff to improve their ability and competence.

4. The presence of large human population, visitor pressure and other interests in the Khumbu region poses considerable difficulties in administration and management of Sagarmatha National Park. It would seem desirable to form a Management Committee consisting of representatives from various government departments, the Panchayat members, local community groups and private enterprises. This Management Committee should be responsible for making management decisions of the Park along with the Park Administrator.
SUMMARY

To a thinking mind, the speed of recent environmental and cultural changes in the Khumbu region has been frightening. The direction and speed of these changes needs to be carefully controlled for the benefit of both man and his environment.

The Sherpa people have been living in the Khumbu region for several centuries. Their simple way of life did not cause serious impact on the environment. The major environmental degradation began due to the influx of Tibetan refugees, uncontrolled tourism development and other social and cultural changes in the Sherpa community.

Designating the Khumbu region as a National Park would be an effective solution to the environmental problems only if the needs and aspirations of the Park inhabitants are fulfilled.

Although the displacement of the people out of the Park brings ease of administration and management of the Park, it seems highly undesirable due to the social and economic cost involved. Instead, the way of life of the local people should be integrated into the National Park system with emphasis on cultural conservation. The evolution of culture should be allowed to continue naturally and the rights and privileges of the local inhabitants should be protected.

The Park should be divided into different zones to meet the needs of the people and to provide for the requirements of the National Park status.

In the presence of proper management and planning, tourism would do little damage to the environment. Tourism is also an important economic factor for Nepal and it would provide economic justification for conservation of the environment. Tourism should thus be encouraged with proper regulation and control to minimize its impact on the social and natural environment of the Park.
Environmental education and interpretation of the Park resources should be an important aspect of management of the Park. It would be desirable to involve public in decision-making processes. The Park Manager function should be to provide alternative choices and the final decision should be left to the representatives of the people.
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APPENDIX

Map of Sagarmatha National Park
SAGARMATHA NATIONAL PARK
ZONATION MAP

(This map is not intended as a definitive zonation)
SCALE 1:70000

Legend
- Human Settlement Zone
- Agricultural Zone
- Pastoral Zone
- Natural Landscape Zone
- Special Area
- Wilderness Zone
- River
- Mountain Peak
- Entrance Point

Drawn by Lhakpa Sherpa