

# **ENVIRONMENTAL PROBLEMS IN THE NEPAL HIMALAYA**

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## **Background**

Though one can visualize the environmental problems in the mountain regions in almost all the countries of the world, the magnitude of the problem is very high in a mountainous and developing country like Nepal. Due to the rapid growth of population and consequent effect on over-exploitation of the depleting resources, ecological degradation is taking place everywhere in the Nepal Himalaya. The main objective of preparing this paper is to analyse environmental problems faced by Nepal, particularly in the hills and mountain regions. This paper, after portraying a geographical background of Nepal, throws light upon the global concern regarding the environmental problems of mountains, analyses the various causes and consequences of environmental degradation in Nepal, highlights upon some efforts made by the government to solve the problems, and concludes with some recommendations.

The Himalayas constitute the highest mountain system of the world. They extend for a distance of over 2,000 km from Kashmir in the west to Burma in the east (Hagen 1980: 41). Its breadth ranges from 150 km to 400 km and covers an area of 500,000 sq. km. Along this chain of mountains lie almost all the famous summits on the surface of the earth. Mt. Everest (8,848 metres), the highest peak on earth, lies in the Nepal Himalaya. The Himalayas are tectonic mountains formed by the upheaval of Tethyan sediments. It is believed that the Himalayas are still rising at the rate of 1 cm per year and that it took several million years to attain their present heights and structures (Sahni, 1989: 215). Among the mountainous regions of the world, the geologically young and tectonically unstable Himalayas form the world's most fragile ecological system. The Nepal Himalaya extend for about 800 km in the central part of the Himalayas to form the nucleus of one of the world's strategic ecological nerve-centres (Eckholm 1975: 764).

Nepal, occupying one-third of the Himalayan mountain system, is a land of diversity. About 75% of the total land of the kingdom is covered by

mountains and hills. The most obvious regional differentiations are the plains (Tarai) hills (Pahad) and high mountains (Himal) which form three broad geographic regions with its own distinctive environment. Consisting a broad subtropical zone along the central belt of the country, the hills are the threshold between high alpine mountains (Greater Himalayas) in the north and the fertile tropical Tarai plain (northern extension of the Ganges plain) in the south. The outer Himalaya (Siwalik) and middle Himalaya (Mahabharat Lekh) comprise the middle hill areas. The geographic regions of Nepal correspond to the altitudinally arranged ecological zones. About half of its total area over 1,500 metres above sea level deserves a close examination in terms of environmental economics (Gurung 1982 a:46).

The country has one of the highest densities of population (126 persons per sq. km in 1991) among the mountainous countries. According to the recent census report of 1991 the rate of population growth in Nepal between 1981 and 1991 was 2.1% per annum. Despite development efforts, national productivity has failed to keep pace with population growth. If the deteriorating situation of the mountain and hill environment is not reversed and better managed, this population growth may lead to the collapse of the delicately balanced ecological system between the Himalaya and the Ganges plain (Reiger, 1976). The future of valleys and plains is intimately bound to the development on the slopes and plateaus above (Eckholm, 1976: 75). Ecological changes in the highlands quickly lead to changes in the adjoining valleys and plains.

### **Global Concern**

Since the first United Nations' concern in 1951, the highlands (land above 1,000 metres) have become a new horizon of ecological focus (Gurung 1981: 1). The magnitude of environmental problems in the global perspective was seriously realized during the U.N. conference on 'Human Environment' held at Stockholm, Sweden in June 1972. After realizing the precarious ecological situation prevailing in the mountains, particularly in the Andes and the Himalayas, various international seminars and workshops were held around the world (UNESCO 1973, 1974, 1977; Nepal Research Centre 1979; Ahmad et al. 1990; ICIMOD 1984; ICIMOD and UNESCO/MAB 1979; LEADERS 1992; etc.)

All such conferences and workshops have identified common problems and highlighted the increasingly deteriorating environment due to population pressure, especially in the mountain ecosystems and thereby increasing human interference with the depleting resources.

Though there are environmental problems everywhere, their intensity is dissimilar. In a mountainous and developing country like Nepal, the

environmental problems have been aggravated by rapid population growth, which has ultimately led to forest depletion for fuel wood, timber and fodder, and the expansion of agricultural land on more and more marginal areas to sustain the rapidly increasing hungry people. At present, the environmental situation of Nepal has become very fragile, posing a critical threat to the man-environment relationship.

### **Cause and Consequences of Environmental Degradation**

In recent years, mountains, especially the Himalayas, have become the focal point of ecological concern. Among the mountainous countries, Nepal's ecological situation has become worse and the country is further approaching towards the brink of ecological collapse (Eckholm 1975, 1976; Reiger et al. 1976; Rana 1976; Proffenberger 1980; Bhatt, 1981; Moddie 1981; Gurung 1982; Bajracharya, 1983; Shrestha, 1983; Joshi 1984; Karan and Iijima 1986; Shrestha 1986; Ives and Messerli 1989; Bajracharya and Gurung 1992). The factors behind environmental problems in the Nepal Himalaya are natural as well as man-made. The natural processes of environmental degradation have been aggravated by man's quest for more food, fuel, fodder, timber and so forth. In probably no other mountain countries are the forces of ecological degradation building so rapidly and visibly (Eckholm 1976: 76). This ecological degradation can be easily observed if one travels through the Nepal Himalaya. Nepal provides the most dramatic example of spreading desertification due to reckless deforestation. 'In a flash within the decade ending 1971, Nepal lost 50% of its forest cover' (Moddie 1981: 344). According to the Ministry of Forest and Soil Conservation HMG/Nepal, four hundred thousand hectares of forests were destroyed in the Tarai and Inner Tarai region between 1964 and 1979, and an additional one hundred and sixty thousand hectares of forests were destroyed between 1979 and 1985. With the destruction of 5.4 million hectares of national forests, the total forest area in Nepal has been reduced to four million hectares or about 27% of the total land area of Nepal (*The Rising Nepal* 1992). It has been estimated that the desirable area of forest for a mountainous country like Nepal should be about 60% in order to keep the environment in a balanced state. The present rates of deforestation in Nepal are far higher than the natural regenerative capacity, causing severe environmental problems.

At present, according to the census report of 1991, 53.3% of the total population of Nepal lives in the hills and mountains. They cannot feed themselves on the deteriorating environment, forcing the hill people to migrate over the entire Tarai region and into the plains of India. Out-migration of the hill people is an indication of rapid environmental degradation in the Nepal Himalaya. The conditions will further steadily

deteriorate as population pressure on available agricultural land increases (Rana and Thapa 1975).

**Table 1: Per Capita Agricultural Land and Persons per Hectare of Agricultural Land in Different Ecological Zones of Nepal (1974-75)**

Region	Average per Capita agricultural land in hectare	Persons per hectare of agricultural land
Mountains	0.11	9.22
Hills	0.11	8.69
Tarai	0.30	3.34
Nepal	0.18	5.34

Source: National Planning Commission, 1974.

There is a heavy pressure of population on limited, poor and marginal agricultural land in the mountains and hills of Nepal (table 1). The fast growing population in the hills is extending its cropland to more and more marginal land which for reasons of topography and soil quality is unsuitable for agricultural practice (Shrestha 1990). Due to lack of job opportunities, the rapidly increasing population must depend on the subsistence agriculture. The ever increasing population in the hills has led to expansion of cropland on to steep and unstable slopes, overgrazing of animals in the woodlands, and reckless cutting down of trees from the dwindling forests for fuel, fodder and timber (Shrestha 1983: 97). Consequently, the area under forest is fast diminishing under the combined pressure of shifting cultivation, expansion of agricultural land, overgrazing of animals and wood gathering for timber and fuel. Similarly, natural vegetation still provides food, fodder, fertilizer, shelter and even raw materials for traditional rural cottage industries which has resulted in further destruction and devastation of the forest resources. Fuelwood in Nepal alone accounts for 95% of all wood consumption in rural areas and 87% of all energy consumption in the country (Malla and Shrestha 1983: 90). The deforestation process and expansion of unscientific agricultural practice on more and more marginal areas (not based on agricultural capabilities) in Nepalese hills and mountains have resulted in changing landuse patterns. Over-exploitation and mismanagement of the land resource along the hill slopes have set in the process of environmental degradation in the fertile valleys in the form of debris deposition and flood hazards. Thus, loss of fertile agricultural lands along the valleys in the middle hill region of Nepal leads to the decrease in agricultural production, forcing the people to occupy marginal and ecologically sensitive steep hill slopes for cultivation.

The destruction process of forest resources in the Nepal Himalaya has resulted in climate changes leading towards aridity and loss of organic topsoil. Each year the monsoon rains wash away more than 12 tonnes of soil from every acre of the hill side. In the worst areas 80 tonnes of soil are ripped from each acre (Lean, 1983). In the hills and mountains of Nepal, farmers keep animals for manure to maintain the fertility of the soil and for extra income to keep pace with the increasing demands for the basic necessities. Huge quantities of vegetation are consumed by the livestock, either roaming in the forest area or stall fed in the villages. Goats, cows, yaks, sheep and oxen are usually herded throughout the year over the slopes of the barren hills and the animals consume whatever they can find. In the Nepal Himalaya, it is estimated that cattle over graze the land by factor of nine, tearing up grass, crippling trees and eating seedlings before they can grow (Lean 1983). During the dry season (May to June) burning of forests and grassland is commonly used (Bajracharya 1983: 237) to stimulate early growth of grass for animals to graze. This is a devastating practice because it removes most of the mulch and exposes the soil to erosion.

The process of soil erosion in turn has led to sheet and gully erosion, land slides and flood hazards. The effects are the permanent lowering of soil productivity with a high degree of instability and frequent crop failure, changing the hydrological cycle by increasing runoff, reducing the water retaining capacity of the soil and increasing the silt load in the river beds along the valley and plain areas (Shrestha 1983: 97-99). The incidence of flooding of swollen rivers flowing down from the hills has been increasing every year. It has been observed that some of the river beds in the Tarai are rising from 15 to 30 cm every year (Rana 1976: 115). This, in turn, has resulted in serious damage to the lives and fertile agricultural lands in the Tarai plain. During the third week of July, 1993, heavy downpour severely hit most of the districts of Nepal causing landslides, devastating floods, and untold misery. The severely affected districts were Sarlahi, Makawanpur, Rautahat and Chitwan. By September 10, 1993, about 1,157 persons died along with 67,374 families and 428,851 persons being affected by the floods. Similarly, 15,029 houses were completely destroyed, 18,565 were partially damaged and 36,929 hectares of agricultural land were seriously affected or damaged by the devastating floods. According to the press release of the Home Ministry, HMG/N, by September 10, 1993, it was estimated that the century's worst flash flood altogether damaged property worth 4.87 billion rupees (International Forum, 1993: 3).

Similarly, construction of roads, intrusion of development, industrial activities and tourism have negatively impacted the mountain ecosystem (Gurung, 1982 b: 17). In the historical past, there were some traditional iron

and copper mining and smelting industries in the hills of Nepal. But those activities have been dead now for the last few generations because of the shortage of fuel resources. While those mining industries were in operation, they were responsible for soil erosion and landslides and at the same time, heavy destruction of forest resources for making wood and charcoal for fuel purposes. As the traditional industries closed down, the employees had no alternative jobs, so they started shifting cultivation in the high altitude mountains, and over-grazing of cattle and sheep inside the forest area (Acharya 1976: 73). The introduction of an intensive carpet industry in the Solu Valley (eastern Nepal Himalaya) implied even more dramatic consequences. The dying process of wool requires a lot of firewood. This led to a wide destruction of forests near the settlements within less than 15 years (Schild 1976: 8). These processes of rural industrial activities have further led to the deterioration of mountain environment. In the marginal environments and low levels of cultural development, people usually derive their livelihood directly from nature. As a result, every economic effort of man may have environmental impact of significant magnitude. Even a small effect of economic activities on the environment may have far-reaching implications in the local ecology, owing to marginal conditions (Shrestha and Manandhar 1977: 8).

In recent years, the soaring number of tourists and mountaineers in Nepal is damaging the ecology of the Himalayas (Shrestha 1976; Shrestha 1989; Sharma 1989; Shah 1990; Bajracharya 1990). The heavy influx of mountaineers and trekkers along the upper slopes of the Himalayas have created a booming trade of firewood for local villagers, and they are depleting forests in ecologically fragile and sensitive areas. Due to the heavy flow of trekkers and mountaineers, especially in the Everest region (eastern Nepal Himalaya), the forest cover has been decreasing at an alarming rate. In almost all the trekking routes, it is found that the camping sites are left unclean. Frequently used camping sites are becoming very unhygienic because of human and mule excrement, unburnt pieces of wood, ash and garbage. These practices have led to pollution and deterioration of the Himalayan paradise (Shrestha 1976: 89).

The unscientific alignment and construction of roads along the geologically weak and unstable slopes of the hills and mountains have resulted in numerous land slides and serious soil erosion (Tautsher 1974: 9). It is estimated that the sediment load from road cutting in the Himalayas is as high as 8,000 m<sup>3</sup>/km (Sharma 1987). Likewise, according to another report, as much as 1.99 tonnes of sediment are reported to be generated per annum by each 10 metres of road in the Himalayas (Chadha 1989: 17). The debris slowly find their way into the streams and rivers, increasing their sediment

load. Thus, it can be said that the major sources of sediment due to human activities are landslides which develop due to unscientific alignment and construction of roads.

Furthermore, the demographic pressure in the hills has caused more and more marginal areas to be brought under cultivation to feed the ever-growing population. The decreasing forest areas have discouraged the villagers from collecting more fodder, which has led to lower rates of manure application on agricultural lands. Thus the agricultural productivity has declined steadily, whereas the population is increasing at an alarming rate. This process has generated more demand for cultivable land, and the forest areas have been further reduced. All of this has led to the creation of a vicious circle. This circle is of course accelerated by a growing population and greater aggregate demand for arable land (Blaikie et al., 1982: 214). Thus, it is obvious that accelerated environmental degradation over the Nepal Himalaya is due to several combinations of interrelated and complex factors, of which population pressure in the limited land resource cannot be overlooked.

### **Some Efforts to Solve the Problems**

In recent years, the problems and consequences of environmental degradation in the Nepal Himalaya have become a matter of serious concern. Restoration of the deteriorating environment has become a great challenge to Nepal. To overcome the problems, several plans, policies and programmes have been implemented in the country. His Majesty's Government (HMG) of Nepal created the Department of Soil and Water Conservation (DSWC) under the Ministry of Forest in 1974. It was renamed as the Department of Soil Conservation and Watershed Management (DSCWM) in 1980. The Ministry of Forests has also been renamed as the Ministry of Forests and Soil Conservation in 1981 (Joshi 1984: 398). The ministry was again renamed as the Ministry of Forest and Environment after the restoration of democracy in Nepal, and recently the name has been changed to the Ministry of Forest and Soil Conservation. In October, 1992, the Environmental Protection Council was established under the Chairmanship of the Prime Minister. This high-level policy body has a broad mandate that includes policy formulation, planning and coordination among line agencies and programmes related to environment.

After the establishment of DSWC, systematic efforts and approaches were initiated to conserve the soil and water resources of Nepal. Keeping in view the UNESCO's effort to overcome the man-environment problems of the biosphere, the Nepal Man and Biosphere (MAB) Committee came into existence in 1974. The Nepal MAB Committee's main objective is to overcome the deteriorating environment caused by human activities in the

course of socioeconomic development. In May 1974, HMG/Nepal formed a Task Force Committee on land use and erosion control. The committee prepared and submitted a report on 'Landuse and Erosion Control' in 1974 (National Planning Commission, 1974). The Task Force Committee adopted a sound and rational policy on land use and erosion control for the then forthcoming Fifth Plan (1975-1980). During the Fifth Plan period several programmes and projects were carried out to conserve the environment. Among the main programmes and activities were tree plantation, gully control, landslide stabilisation, trail improvement, and terracing. The Sixth Plan (1980-1985) and the Seventh Plan (1985-1990) have set separate policies on environment and landuse to be carried out during the plan period. Both plans have emphasized horticultural development, afforestation, resettlement, soil and water conservation, environmental education and national park and wild life conservation. Likewise, the plan initiated and framed national policies for environment to overcome the environmental and landuse problems faced by Nepal (National Planning Commission 1980, 1985).

Environmental protection and management considerations have been mentioned for the first time in the constitution of the Kingdom of Nepal 1990. This can be regarded as an important obligation of the state and can be taken as a milestone in the history of environmental protection in Nepal. During the Earth Summit held at Rio de Janeiro in Brazil in 1992, Nepal expressed her commitment to the conservation of the environment and its resources. The Eighth Plan (1992-1997) adopts some basic policies to restore the deteriorating environment of Nepal. The plan emphasises assessing environmental impact while formulating projects, minimising negative impact on the environment at the planning stage for large-scale physical and industrial development, making detailed legal provisions for sustainability to facilitate environmental management, identifying norms related to pollution, arousing awareness of the people regarding environment through the involvement of the Non-Governmental Organizations (NGOs), preparing plans to execute and check environmental degradation at the tourist destinations, and determining the causes of pollution in polluted areas to introduce management plans for pollution control (National Planning Commission, 1992: 616-17).

The Department of Soil Conservation (previously known as the Department of Soil Conservation and Watershed Management) is concentrating its efforts to restore the deteriorating environment in collaboration with international agencies like USAID, FAO, UNDP, ADB, as well as the Governments of Switzerland, Germany, United Kingdom and Canada. The international agencies and various governments are cooperating with His Majesty's



Government of Nepal with financial aid, loans and technical assistance to combat against the deterioration of the mountain ecosystem of Nepal.

Furthermore, the establishment of the National Committee for Man and Biosphere (MAB), the implementation of national parks and wildlife preservation schemes in various geographic regions of the country, the establishment of the 'King Mahendra Trust for Nature Conservation' and the recently established high level 'Environmental Protection Council' will certainly play important roles in preserving the fragile mountain environment of Nepal. In the meantime, the International Centre for Integrated Mountain Development (ICIMOD) was established in Kathmandu in 1983 under HMG/Nepal's agreement with UNESCO and the sponsorship of Germany and Switzerland. The centre has been concentrating its efforts in countries along the Hindu Kush Himalayas, which include Afghanistan, Bangladesh, Bhutan, Burma, China, India, Nepal and Pakistan, in preserving the environment and undertaking sustainable development without ecological destruction. Though various efforts have been made in various fields to restore the deteriorating mountain and hill environment in Nepal, much more remains to be done. Mass participation in preserving the environment is of utmost importance at the village level. This can be achieved through environmental education, but at present, this is lacking in the country.

### **Concluding Remarks**

Ecological degradation in the Nepal Himalaya has become a grave concern in context of sustained and balanced development of the country. The main problem in this context seems to be the increasing amount of soil erosion, landslides and flood hazards as a result of forest destruction due to increasing human intervention. This situation has come about in Nepal because of increasing demands to meet the basic needs of the fast growing mountain and hill people for firewood and extension of agricultural land in marginal areas. Rapid deforestation leads to landslides, soil erosion and loss of precious top soil containing most of the nutrient on which plant and animal life depend. Nowadays indiscriminate felling of trees in the forests is taking place everywhere in the Himalayas. Deforestation in the Himalayas has ultimately led to adverse effect on the delicately balanced ecosystem of both the Himalayas and the plains in the form of soil erosion, landslides, debris deposition, flood hazards, siltation and drying up of springs. This has indirectly led to the migration of the people from the Himalayas. The twin effects of deforestation seem to be adversely influencing the productivity of agricultural land and the stability of the mountain and hill ecosystem of Nepal (Shrestha and Sharma 1980: 52). Furthermore, the precarious ecology of the Nepalese hills cannot be improved without first tackling the economic

poverty of the people (Gurung, 1981: 10). To overcome the problems of poverty faced by the hilly people, greater opportunities to earn a living outside agriculture should be made and much emphasis should be laid on the use of alternative energy to relieve the pressure on forest for fuel wood (RECAST 1981).

For regeneration of the dwindling forests, massive afforestation programmes in the barren hills should be made on a war footing. Afforestation programmes should also be undertaken in the watershed areas of large hydropower plants and irrigation projects, as well as along river banks. At the same time, one should realize that regeneration of forests would be impossible unless open grazing and over grazing is stopped. Regeneration of the dwindling forests in Nepal is a great and challenging task that the government alone may not be able to carry out without the active cooperation and participation of the local people. This requires that the people realize that they have a close relationship with the forest resources on which they depend for their living.

While formulating plans and implementing development projects like construction of roads, irrigation canals and hydro power dams in the mountain and hill areas, the government should seriously concentrate on probable environmental consequences and should emphasize sustainable development and development without destruction. Moreover, demographic pressure upon the resources is the main cause for deterioration of the Himalayan ecosystem. Thus, it is quite obvious that uncontrolled growth of population should be timely checked through different measures and at the same time the rural people should be made aware of the population explosion and its consequences to the environment which may ultimately affect their own existence. For proper and rational use of resources and comprehensive development of the hills and mountains, the deterioration of environmental conditions should be prevented through proper watershed conservation and management of different rivers by adopting appropriate landuse measures based on conservation oriented policies by discouraging the unwise and wasteful use of land resources. At the same time, effective resource conservation and management policies should be adopted by involving local people for arresting the problems of environmental degradation in the Nepal Himalaya (Shrestha, 1986: 269).

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