

May 4, 1979

Forest Exploitation in Nepal

Much has been written in the past few years about the environmental problems of the Himalayan region. In fact, the processes of ecological degradation have been proceeding for several centuries in the highlands of Asia. Only society's recently developed awareness of the relationship between natural disasters, such as famines, floods and droughts, and mankind's manipulation of the habitat, has rekindled interest in the environmental sciences. This awakening, coupled with increased international travel, has brought the limelight to Nepal, a nation with exquisitely beautiful mountain peaks with disastrously eroded foothills. In this geologically young region, steep slopes with immature soils require careful cultivation; excessive and abusive use of the forests and grasslands has a negative impact on the whole ecosystem, including agricultural production. The relationship between the Nepalese farmer and neighboring forests is much more complex than that of the western farmer and his recreational woodlot and more intense than that of the shifting cultivator of Southeast Asia. A clear understanding of the multi-dimensional relationship between the farmer and the natural resource base is prerequisite to any successful attempt at halting the environmental degradation and improving the human condition in this region. The following paragraphs explore briefly the dependency of the rural population on the forest resources in Nepal.

The Indigenous Forest Resource

The sharp environmental contrasts between the humid tropical jungles on Nepal's southern border and the alpine scrub of the high arid Tibetan marginal valleys to the north are due largely to the affect of the Himalayas on regional weather patterns. In the summer southeasterly winds bringing warm moist air up from the Bay of Bengal contribute eighty percent of the region's precipitation. Advancing in a northeasterly direction, the summer monsoon in its attempt to cross the high mountain ridges drops most of its moisture on the eastern and south-facing slopes of the Himalayan range. As a result of the east-west precipitation gradient and the mountain rainshadows, the western and northern slopes are drier and less luxuriantly vegetated than their eastern and southern counterparts. Locally, climatic conditions vary widely due to the marked effect on local temperatures of extreme variations in altitude over relatively short distances. In some areas of Nepal there are differences in elevation of more than 8000 meters in a distance of less than 150 kilometers. One notes the penetration of tropical species into the hill region where deep shaded valleys conserve the moisture of the monsoon rains. Microclimate variations, by creating numerous ecological niches, have contributed to the great biological diversity in the Himalayan region. Floristic elements from the Mediterranean,

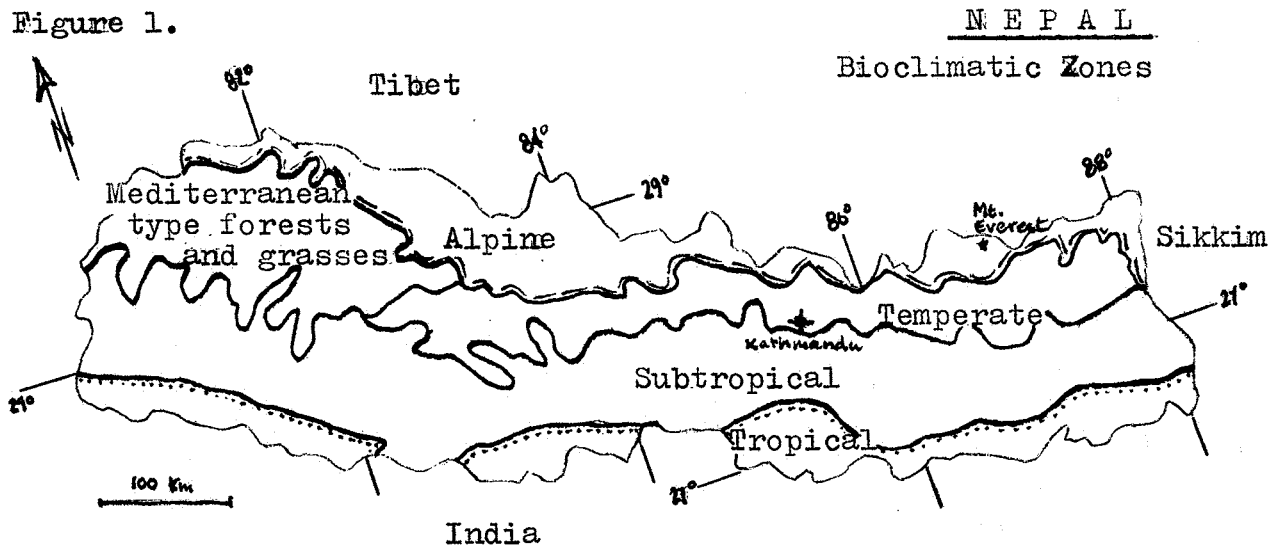
Chinese and Southeast Asian biogeographic regions have found a home in the highlands of Nepal.

After extensive field research in Nepal, French ecologist Jean Dobremez distinguished some nineteen bioclimatic zones based on variations in microclimate and species association (Dobremez, 1976). Other researchers have classified Nepal into from three to seven natural topographic regions (Hagen, 1961). From the broader viewpoint of general ecological type and human adaptation, the country can be stratified into roughly three east-west zones: the Terai, an extension of the Gangetic plain on the southern border, including the hills and the valleys of the Chure range; the Midlands, comprised of the Mahabharat range and the southern slopes of the Himalayas; and the Himalayas, the high altitude slopes and the Tibetan marginal valleys on the northern border. These three zones cover respectively approximately 17 percent, 68 percent and 15 percent of the nation's total land area (FAO, 1978).

At elevations of less than 1000 meters, the gently sloping foothills and plains of the lower Terai enjoy a humid tropical climate. The ample rainfall, averaging from 1000 millimeters in the west to 2000 millimeters in the east, supports deciduous and evergreen tropical forests primarily on alluvial soils. The predominant species in Terai forests are Sal (Shorea robusta) and Asna (Terminalia spp.) found in the company of a variety of other tropical hardwood species. Sissoo (Dalbergia sissoo), Simal (Salmalia malabarica) and Khair (Acacia catechu) are timber species important in colonizing and stabilizing new and shifting riverain deposits in this area. The relatively gentle terrain and easy accessibility of these forests have rendered them the main source of hardwood timber for Nepalese and Indian markets for several centuries. After the success of the government's malaria eradication program begun in the 1950's, much of the Terai forest land has been converted to cropland through both government-sponsored and illegal settlement. It is estimated that the Terai holds approximately one third of all national forests and one half of the national reserve of commercial forests (Bhatt, 1977). Much of the remaining forests of the Terai and Chure foothills and valleys are on immature, gravelly soils; the commercial value of these Sal and Chir pine (Pinus roxburghii) forests is limited by the instability of the forest soil.

Over the centuries the hill farmers have sculpted the slopes of the Midland foothills and valleys into neat terraces planted to rice, wheat, millet and corn. The scant remaining forest at elevations of about 1500 to 3000 meters in eastern and central Nepal are restricted to relatively small, scattered patches, which have been severely depleted by overcutting, overgrazing and periodic scorching. With annual precipitation varying from 800 millimeters in the northwest to almost 5000 millimeters on the south-facing slopes of Mt. Everest in the east, the climate varies respectively from Mediterranean to temperate and subtropical (Bhatt, 1977). The mixed broadleaf evergreen forests of the Midlands are composed mainly of oak (Quercus spp.) and rhododendron (Rhododendron spp.) in association with maple (Acer spp.), Katus (Castanopsis spp.) and Chilaune (Schima wallichii). At higher elevations up to 4500 meters, rhododendron is joined by fir (Abies spp.) and birch (Betula utilis),

Figure 1.



Source: Derived from Dobremez, 1976.

with hemlock (*Tsuga dumosa*) in the west (Stainton, 1972). In the drier, western Midlands where lower population densities have permitted the survival of relatively large forest areas, Chir pine prevails. The extensive pine forests of this region have attracted the interest of the Russians and the Yugoslavians, both of whom plan to establish a turpentine and resin factory in the west. In general, the timber of the Midlands has considerable commercial value for both fuel and construction purposes due to its proximity to two main urban growth centers, Kathmandu and Pokhara. The importance of these forests as a source of basic necessities for the hill population and as an agent of soil and water conservation far overshadows their commercial value.

On the deeply incised southern slopes of the Himalayas, a somewhat discontinuous belt of coniferous forest stretches between elevations of 3500 and 4200 meters, roughly the upper limit of vegetation and human habitation. The thin, rocky soils of this area support alpine forests of fir, hemlock, pine (*Pinus excelsa* and *Pinus smithiana*) and larch (*Larix* spp.). In the wetter, eastern Himalayas, rhododendron, birch and juniper (*Juniperus* spp.) reach to the higher altitudes. Poplar (*Populus ciliata*) yields to cedar (*Cedrus deodara*) in the dry west (Bhatt, 1977). The high montane valleys lying north of the Himalayas are arid and sparsely vegetated with desert-like shrubs and grasses and scattered junipers. The majority of the wood taken from these forests is used for fuel. Much of the forest is burned periodically to promote the growth of perennial grasses, precious feed for the yaks, sheep and goats of the itinerant herders of this region.

Almost two thirds of the nation's forest land lies in the hills of the Midlands and Himalayas. Only about one third of the hill forest is counted as commercial quality timber. The majority of the forest land in the hills is badly eroded and contains only an understocked, stunted growth of trees.

The Forest Exploited

Although the valuable hardwood timber of the Terai forests have provided revenues to the government coffers for several centuries, by far the most **important** products taken from the forest are those destined for the homes of the rural poor. Ninety-five percent of the country's inhabitants are dependent on agriculture for their sustenance. For the vast majority this means a mere subsistence level of existence which places heavy demands on neighboring forests and grasslands and participates only marginally in the regional market economy. The forest provides rural people with an enormous variety of goods and services, from the most basic necessities, such as food and fuel, to objects of religious significance.

The most important product of the forest is firewood. Ninety-five percent of all wood removed from the forests of Nepal is used as fuel in domestic or commercial establishments (Energy Research..., 1976). Initially only dry twigs and branches are gathered for fuel, but as the supply of dead wood diminishes, limbs are cut and trees are felled. In some areas of extreme wood shortages, tree stumps are uprooted and pared for fuel. It is estimated that on the average an individual in Nepal uses one cubic meter of wood annually for cooking and heating purposes (FAO, 1978). Although consumption figures are very sketchy, researchers point out that the processing of many agricultural and forest products, for example, cheese, tea, tobacco, sugar and paper, uses wood fuel. Tourism, the fastest growing industry in Nepal, increases the demand for fuelwood not only in mountain guest houses but in some urban hotels as well.

Fodder is the second most important forest crop. About forty percent of the diet of the buffalo and twenty percent of that of the local cow is leafy matter. In the hill region almost three quarters of livestock feed comes from the forest, whereas in the Terai the forest contribution is only about one third of the total (World Bank, 1978). When domestic animals are not driven into the forest to forage for themselves, women and children lop forest trees in order to bring fodder to the stable. In the spring, just after leaf fall and before the onset of the monsoon rains, the farmers set fire to the forest; the purpose of this practice is to burn off the unpalatable brush and promote a flush of new grass. In the mountainous areas farmers find that the fire also clears the steep slopes of slippery pine needles that pose a threat to grazing livestock.

The forest also provides wood for agricultural implements, furniture, household containers and utensils and general construction. Owing to the primitive nature of the woodworking tools, often only an ax and an adze, almost two thirds of the felled timber is wasted in the process of cutting and shaping the lumber. Consequently, three times the amount of wood needed must be **felled**. Frequently, very few chips or shavings are collected for fuel or other purposes. (Wormald, 1976). In some areas where large timber has become very scarce, community elders ration the limited supplies by requiring villagers to queue for cutting rights.

In addition, rural inhabitants gather a wide variety of non-timber products from the forest. Berries, fruits, nuts, mushrooms, spices and herbs figure prominently in the rural diet. Honey, silk

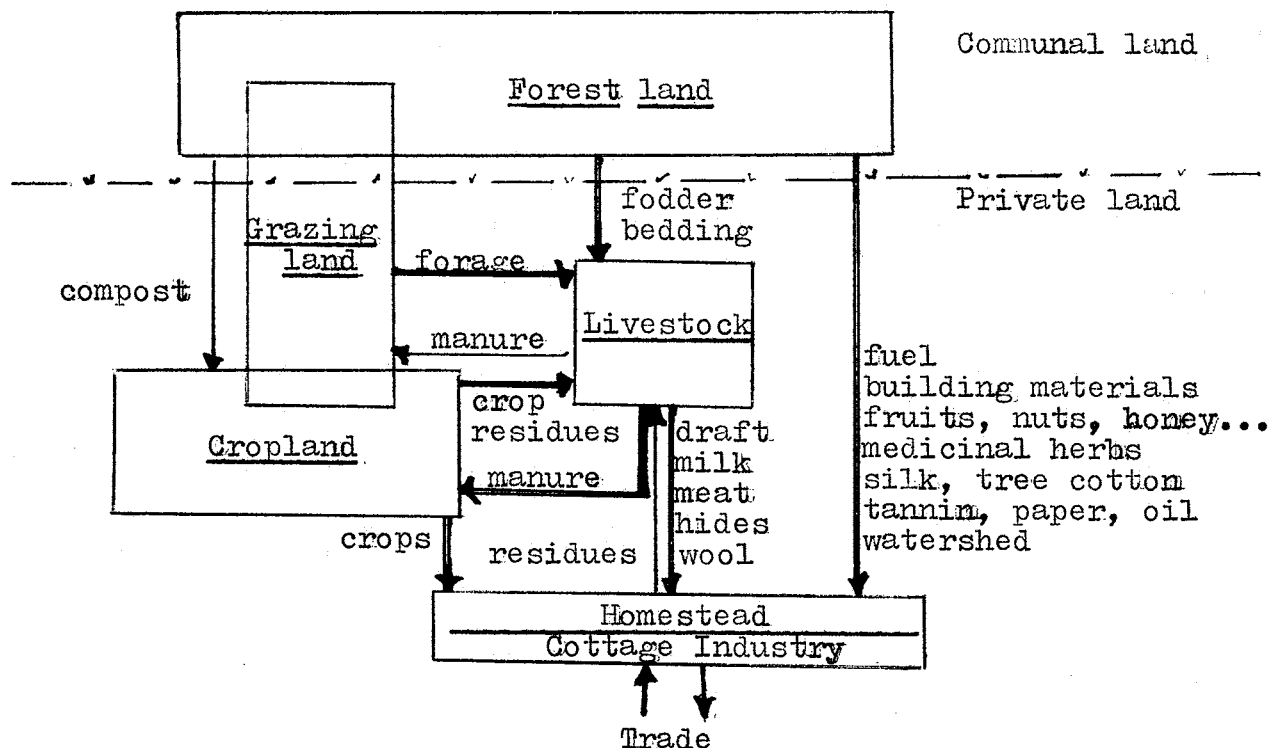


Figure 2. Model of Traditional Farm Production System in Nepal

and lac are collected from the forest insect colonies. The scent glands of male Musk deer provide a substantial, though illegal, source of income for mountain residents. In some areas leaf litter and humus are removed from the forest floor for use as compost on the agricultural terraces. Tree leaves and small branches are cut for animal bedding and wattle. Large oval Sal leaves are stitched together to form bowls and plates; these free, biodegradable dishes are popular with the picnic crowd as well as the Kaphal (Myrica nagi) berry vendors on the streets of Kathmandu.

Forest trees and herbs have figured prominently in the medicinal preparations and religious observances of the people of Nepal for many centuries. The ancient epics of the earliest Indo-Gangetic civilization (4500 to 1600 B.C.) that record the use of plants for medicinal purposes have become the basis of Hindu materia medica and Indian pharmacopoeia. As early as the tenth century, Nepal was exporting medicinal herbs to China; present customers include Japan, Hong Kong, Singapore, Europe and North America (Dobremez, 1977). The healing properties of various tree species have contributed to their high standing in both the Hindu and Buddhist religions. Many tree species are venerated for their mythical association with various Hindu deities or the Buddha. The Pipal or Bo tree (Ficus religiosa), the Banyan tree (Ficus bengalensis) and the Mango tree (Mangifera indica) are just a few of the tree species held sacred in the eastern religions. In one Nepalese ethnic group, the Newars, young girls are married in full ceremonial pomp to the fruit of the Wood-apple

or Bel tree (Aegle marmelos), a symbol of permanence. Although the girl is free to remarry, she remains wedded to the Bel fruit for life and should her human husband die, she does not become a widow and an outcaste (Majupuria, 1978).

The hill populations of Nepal have always been very dependent on forest products to supplement the harvests of their croplands. Self-sufficiency was necessary for survival in the isolated mountain valleys of Nepal. The exceedingly rugged and unstable terrain has impeded the development of transportation facilities and thus regional trade. Historically, only the most necessary commodities, such as salt, have been carried over the steep, tortuous mountain trails.

Land tenure traditions further enforced the dependency of rural inhabitants on forest resources. Generally land has been considered to be property of the state; income from the land was set aside to support the army, religious, educational and health institutions, the civil service and members of the royal family and favored nobility. Under this system more than nine-tenths of the arable land was cultivated for the benefit of the ruling classes. The remaining agricultural land was farmed under a system of traditional, communal rights. Historically the concept of state ownership did not extend to forest lands; use of forests and wastelands in most instances was customary but often regulated by communal rules. Despite the land reforms instituted after the restoration of democracy in 1951, land ownership still remains skewed with almost three quarters of the nation's households dependent on about one quarter of the arable land (Agric. Stat., 1977). The average size of holding for a hill farm family has shrunk to about 0.4 hectares, less than one acre (Bosken, 1977).

Environmental Consequences of Traditional Forest Practices

Although in this geologically young region some erosion is to be expected — and even welcomed, to the extent that it furnishes valley fields with fertile silt and modifies mountain slopes thus easing the terracing job of the hill farmer—it has been estimated that as much as one half of the erosion in the Himalayan region is instigated by human activities. The effect of man's presence on earth is registered in two ways, through his numbers and his behaviour. The growing demands of an ever increasing population forced mankind to abandon hunting and gathering for a more direct and more profitable manipulation of his environment. The techniques which society employs in the exploitation of its natural resource base have differential environmental effects depending on the intensity of application. Most agricultural and forest practices are not a priori ecologically unsound, however, it is often that too frequent application, forced by population pressures, results in environmental degradation.

Nepal's population of 12 million is growing at a rate of approximately 2.3 percent per year. Although the rate of increase in the hill region is somewhat less (1.3 to 2.0 percent as compared with 3.6 percent in the Terai), the increase in numbers is being visibly recorded on the region's natural resource base. Two thirds of the nation's population lives in the hill region. The average

hill farm family requires annually from the forest approximately 5 cubic meters of wood for cooking and heating plus 15 tons of livestock feed (Wormald, 1976). Additional wood is required for agricultural implements and building repairs. Inefficient use of fuelwood and timber magnify these demands. The relatively slow-growing indigenous forests produce from 5 to 15 cubic meters of wood per hectare per year (World Bank, 1978). Abusive forest practices often ensure that the productivity is much less.

Ecologically destructive forest practices, such as excessive and improper lopping, repeated selective cutting of preferred species and overgrazing, that is, the introduction of too many animals too often on a given piece of land, eventually impair the natural ability of the forest to recover. With continual abuse the forest is converted to scrub and herbaceous vegetation. Furthermore, recurrent fires, removal of forest humus for compost and soil compaction by foraging livestock alter the chemical and physical properties of the soil and thus damage the productive potential of the site. With the depletion of forest vegetation and the degradation of the forest soils, the water-retaining capacity of the forest declines. Water run-off increases in both quantity and velocity and thus aggravates soil erosion on the steep mountain slopes. The most detrimental aspect of the erosion process is the loss of topsoil, the medium of plant growth. Second in importance is the disruption of the water regime that results with the destruction of the forest. Increased water run-off means not only the loss of soil, but irregular water flows, flooding and siltation of reservoirs, lower ground water levels and the disappearance of springs, which provide water for domestic and irrigation purposes. Small scale water turbines, for direct drive or electricity generation, should enjoy great development potential in Nepal given the steep gradients of the numerous water courses, however, the lack of dependable water supplies due to the deterioration of watershed forests has foreclosed this energy option in many areas. Finally, severe and extensive modifications in soil and water conditions may effect the microclimate to such a degree that the indigenous forest type may be unable to recolonize the site (Kollmannsperger, 1977).

In order to furnish the supply of food required by the growing population, the hill farmers must either intensify their efforts on existing fields or extend production to new land. In any case the forest is affected. If the farmer converts pasture to cropland, he will need to graze his domestic stock in the forest more often. New farmland requires compost or manure, which, directly or indirectly, comes from the forest. (See Figure 2.) Likewise, the energy inputs that the farmers use to intensify cultivation of existing fields generally are not chemical fertilizers or diesel-powered tractors but rather forest litter compost and bullock traction fed on forest fodder. In the hills of Nepal the forest ecosystem has been subsidizing the agricultural system. The exploitation of the forest resource is analogous to a mining operation, depleting the capital of both the forest vegetation and the forest soil. This forest dependency of the agricultural system cannot be sustained in the long run with traditional forest practices at the present intensity of forest utilization. The current system has resulted in the impoverish-

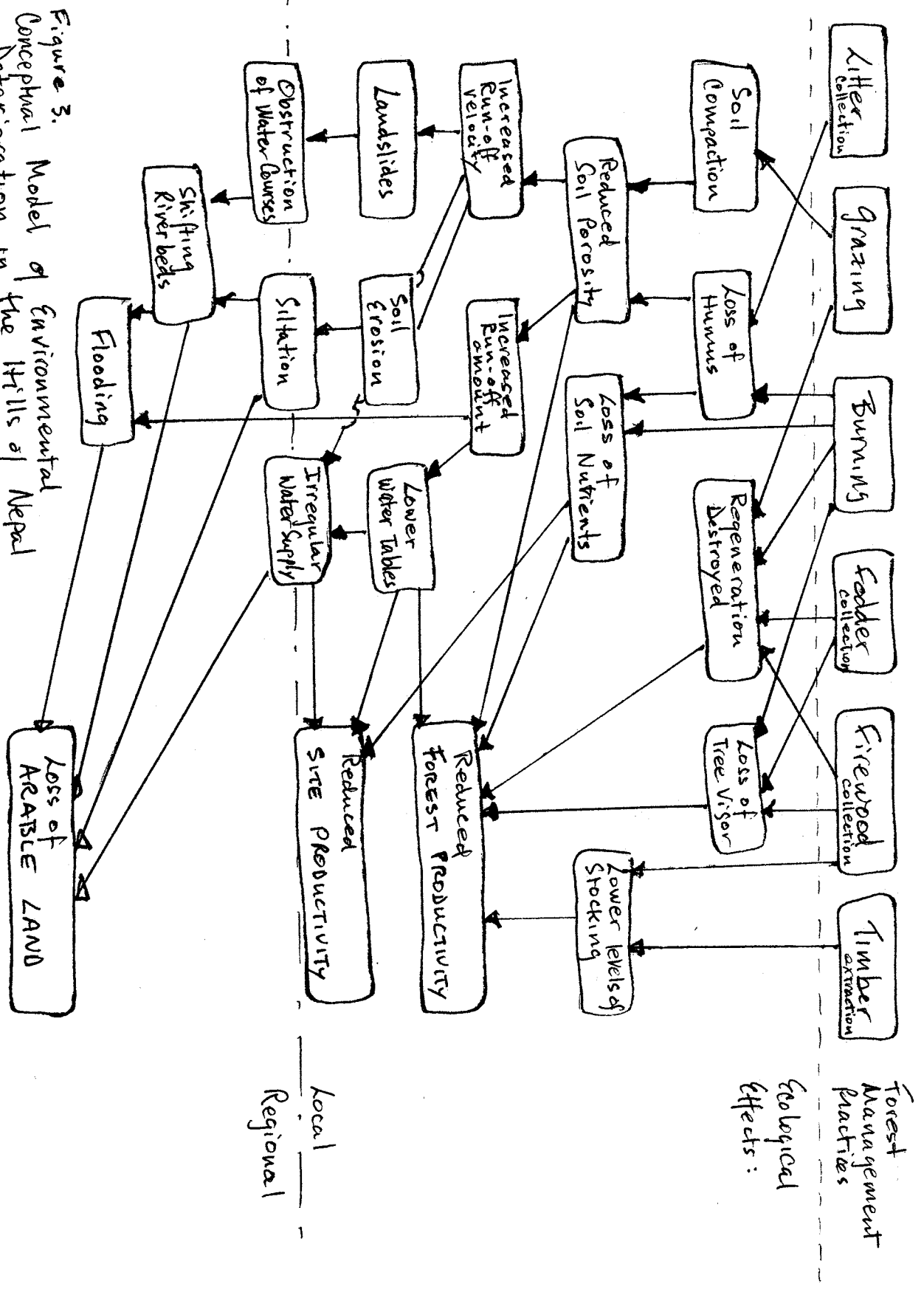


Figure 3.
Conceptual Model of Environmental
Deterioration in the Hills of Nepal

ment of the people as well as the natural resources. The desperate migration of the hill people to the alien environment of the Terai is testimony to this fact.

Official resettlement of landless families in the Terai was initiated by the government in the mid-1950's following a malaria eradication program. Unauthorized and unplanned settlement has far outstripped government efforts. The illegal encroachments commence with the squatters girdling the tall timber and setting fire to the forest. With the ground bared a crop is sown among the charred stumps and poles. When the crop is ready to harvest, the farmer returns with his family and constructs a home of wattle and mud. In the last decade over 120,000 hectares have been converted to agricultural land in this manner (World Bank, 1978). Unsuccessful attempts by the government to drive the settlers off at gunpoint resulted in several deaths. Despite the problems faced in the hill region with regard to fuel and fodder supplies, agricultural settlement schemes in the Terai have made very little effort to protect forests on fragile soils or to provide a permanent source of fuelwood, fodder and building materials for local residents.

Socioeconomic Impacts of Environmental Degradation

The impact of forest destruction on forest-dependent communities is most evident in the hill region where steep mountain slopes amplify the effects of environmental degradation. Shrinking forest areas mean increasingly longer journeys to collect fuel and fodder. In some hill villages the collection of fuel and fodder for the household for the month may require the equivalent of the full-time labor of one person. Recent research in northern India suggests that there is a correlation between family size and the availability of energy resources; the value of children as gatherers increases as diminishing forests mean more and more time must be spent in fuel collection (Vittachi, 1979). Already the forests have receded to such an extent in some areas of Nepal that fuel and fodder resources are too remote for family labor to collect. As a result, increasingly more agricultural residues and manure become fuel stock. In some cases private entrepreneurs have entered the business of fuel supply. Several years ago the government found it necessary to organize the transport and distribution of wood fuel from the Terai to the extremely fuel-short valleys of Kathmandu and Pokhara.

As additional labor is devoted to the collection of fuel, fodder and water, less labor is available for work in the fields. In the hill region of Nepal, if agricultural terraces are poorly constructed or inadequately maintained, they soon are lost through soil erosion and landslides. Moreover, the women and children who must collect the fuel and fodder not only have less time for field work but also less time for domestic chores including food preparation, vegetable gardening and cottage industry. Ultimately the family's standard of living suffers. When forest fuel sources are exhausted and rural people must resort to burning **forest** leaf litter, agricultural residues and manure, the result can only be declining soil fertility, reduced agricultural production and lower nutritional levels for both human and animal populations.

In a subsistence economy, declining nutritional standards and water scarcity soon effect the health of the community. For those who persist under these conditions, their capacity to participate in and contribute to the development process diminishes. In many families migration, either seasonal or permanent, is the only salvation. To subsidize the family's farm income in some areas, husbands and older children take jobs in the Terai, India, Sikkim or even Bhutan for periods up to six months. For some families relocation in the Terai or on the urban fringe appears to be the only solution. With little or no education the hill emigrants are ill-prepared to enter the urban work force.

Recent local news articles report an acute shortage of food grains in the hill region of central eastern Nepal. In some of these districts, people's purchasing power is so low that they cannot buy the food made available to them by the government. As a result people are subsisting on whatever they can find in the forest, but in the process suffering from harassment by government forestry officials. These type of incidents plus those between squatters and government forces in the Terai highlight the serious conflicts of interest challenging forest policy makers in Nepal. The demands of local populations often compete with the demands of both the national and the international community. The government, for instance, wants to retain large forest areas to ensure self-sufficiency in industrial wood supplies. Hydroelectric schemes serving largely urban and industrial customers require the maintenance of forests for watershed protection. Other developers demand that the forest yield to road construction, agricultural plantations and industrial parks. Various groups, some with international constituencies, call for forest reservation to prevent flooding and to preserve rare wildlife habitat and unique recreational opportunities. All too often these demands confront those of the subsistence farmer and the hill emigrant seeking a new life in the Terai.

Government's Response

Historically the primary concern of government forestry officials has been the extraction of forest products, especially the licensing and organizing of timber sales from the Terai. After removing the high value timber species, they abandoned forests to natural regeneration. No attempt was made to manage the forest for the production of goods and services required by local people.

As part of the social and economic reforms instituted after the overthrow of the Rana regime in 1951, all forest land was brought under government ownership, ostensibly to ensure the proper utilization and management of forest resources, but also to increase government revenues. Conflicting with the customary use rights of rural villagers in many instances, the new policy met with strong resistance. With traditional patterns of responsibility dismissed, conventional constraints on overuse were ignored. The exploitation of the forests actually increased as people sought to harvest the maximum possible before government representatives could come to collect what the villagers believed to be rightfully theirs. Destruction of the forest accelerated through arson and illegal cutting and grazing. The government forestry department, under-

staffed and poorly equipped, were hardly in a position to enforce the new legislation and prevent the devastation. The ultimate effect of the new policy was to hasten environmental degradation and heighten the alienation between the rural poor and their government.

After two decades of a strong centralist forest policy it is clear that a state landlord could not guarantee the rational use of forest resources. A research group from the national university has estimated that if the present trends of forest destruction continue, the accessible forests in the hill areas could disappear within 15 years and those in the Terai within 25 years (Energy Research..., 1976). Government attempts to relieve the pressure on the hill forests by promoting resettlement in the Terai appear to have done little more than increase the extent of the nation's environmental problems and postpone remedial measures in the hills. Last year, in an effort to halt further forest degradation, the government revised forest legislation by introducing several new forms of land tenure designed to encourage local people's participation in the protection and development of the forest resource. With the support of the World Bank and FAO*, the government now offers technical and financial assistance to rural villagers willing to assume the management responsibility for a given local forest. In agreeing to plant, weed and protect the forest from fire, foraging livestock and wayward woodcutters, the caretaker community is assigned proprietary interest in the forest products. Experimental programs in community forestry supported by Australian aid have succeeded admirably.

Working together with the Nepalese government in the area of forestry and rural development are several United Nations agencies, the Asian Development Bank and numerous foreign aid missions, including those of the governments of the United States, the United Kingdom, Switzerland, Germany, Canada, Australia, New Zealand and India. With the initiation of the FAO-World Bank cooperative project in community forestry development, the entire hill region of Nepal now has access to technical and financial assistance for rehabilitation and development of local forest resources. The various national and international groups have committed in total the equivalent of approximately 75 million dollars to forestry and related development programs in Nepal over the next 6 years (FAO, 1978). Included in these programs are plans for the establishment of village nurseries, afforestation with fuel and fodder species, installation of check dams and other erosion control devices, aerial photography for land-use planning, wildlife conservation and the investigation and experimentation with improved wood stoves and unconventional energy technologies, such as biogas plants, water turbines, small-scale hydroelectric generators and solar technology.

* Food and Agricultural Organization of the United Nations

Conclusion

The influence of the high Himalayan mountains on regional weather patterns has enabled the enormous ecological diversity in Nepal. Through the centuries the rich forests of the area have provided the largely isolated rural communities with a wide variety of life's necessities, including food, fuel, fiber, building materials and medicinal herbs. Forest products play an integral role in the lives of the rural people and, in fact, may become crucial to survival when agricultural production lags. Although the intricately terraced mountain slopes of Nepal are testimony to the industry and the ingenuity of the nation's farmers, agricultural production, especially in the hill region, is dependent on subsidies from the forest ecosystem. Nepal's fast-growing population has increased demands for forest products beyond what the indigenous forest can be expected to yield on a sustained basis under traditional management practices. Already in some areas of Nepal, excessive exploitation of the forest resource has led to a decline in forest productivity and a decrease in site quality.

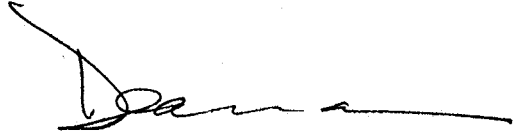
For the rural communities in Nepal environmental degradation has meant decreased agricultural productivity, a loss of arable land, lower nutritional levels and, in general, a lower standard of living. The ultimate effect of this degenerative process is the division of families and communities. Seasonal or permanent migration to the Terai, India, Sikkim and Bhutan is common. It is estimated that in the eastern hill region of Nepal as much as 38 percent of the total land area consists of abandoned fields (Eckholm, 1976).

Recent sociological studies by Gabriel Campbell point out that rural people are aware the need to rehabilitate the neighboring forest resources.* They recognize that the women and children must walk longer and longer distances to collect fodder and fuel as the forests recede. Rural populations have not benefitted from the current system of forest management and consequently government forest legislation has been unenforceable and ineffective. Forest policy makers have begun to realize that if forests are to survive to meet the broader demands of the national and international community, they must address the needs of the rural communities. Recent institutional changes and legislative amendments could be regarded as sufficient legal framework to bring extensive reforestation in Nepal. A shortage of adequately trained personnel, however, is a fundamental constraint to the rapid and extensive implementation of a national reforestation program. Government officials, largely schooled in traditional timber management methods, lack experience with community groups. From encounters with the government's forest guards, the farmers often distrust the motives and commitment of forestry officials. The foreign technical assistant may escape the problems of local political factions but his effectiveness is restricted by his ability to train local people to carry on in his absence. The rate of population growth and the dearth of communication and transportation facilities are stumbling blocks to any development project in Nepal. Despite these constraints and the exciting research being done on alternative energy technologies, the reforestation of Nepal must proceed with great zeal for in the foreseeable future there appears to be no realistic alternative to the continued

*(Bosken, 1977)

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exploitation of the forest as a major source of some of the most basic necessities of the rural people of Nepal.

A handwritten signature in black ink, appearing to read 'Deanna', with a long horizontal line extending to the right.

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Forest and Man Fellow

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