1 THE THEORY OF HIMALAYAN ENVIRONMENTAL DEGRADATION: WHAT IS THE NATURE OF THE PERCEIVED CRISIS?

Conservationists, scientists, and administrators have expressed growing alarm about the rapid deterioration of the Himalayan environment over the past thirty years or so. This alarm has made itself felt in a large number of ways through the media. Television viewers, with striking regularity, are assailed with dramatic visions of deforestation, landsliding, and large-scale downstream flooding, coupled with statements about uncontrolled population growth, increasing poverty, and malnutrition. These processes – physical, human, socio-economic, and political – are frequently linked together into a gigantic cause-and-effect drama which is claimed to be pushing both the Himalaya and the northern plains of the Indian subcontinent to the brink of environmental and socio-economic collapse.

This pattern of thought, which can be divided into numerous sub-variants, has been widely accepted as established fact by large numbers of people who often lend their support to perpetuate it as a truism. In turn it seems to pervade the evolution of policy making in the areas of conservation, resource development, and foreign aid. In this context we feel we are justified in referring to it as the Theory of Himalayan Environmental Degradation.

While we are convinced that there is an enormous problem facing the Himalayan region, we believe that it is clouded in uncertainty and complexity. Much of the problem is contained within the overly simplistic view, as expressed in the Theory, with its assumed cause-and-effect relationships, that appears to have captured the imagination of so many people, both onlookers and actors.

During the early stages of our own Himalayan research efforts we also had accepted the Theory of Himalayan Environmental Degradation as self-evident. Fortunately, the nature of our research, initially concentrating on mountain hazards and the perceptions of, and the response to, such hazards by the local people, forced us to review critically the evidence for a number of the general assumptions upon which the Theory is based. This critical process was made the more rigorous by the mix of our co-workers (multi-disciplinary and multi-national). It was further assisted by the requirement of revisiting the intensive study sites at various times of the agricultural year and over a period of years.

As we began to realize that several of the widely accepted assumptions were

either without factual support, or were demonstrably unsupportable, at least in a number of small field areas with which we were becoming familiar, our commitment widened to embrace an overall challenge of the Theory itself. This book, therefore, as indicated in the Preface, is the story of our increasing dissatisfaction with the Theory of Himalayan Environmental Degradation. It details our attempt to seek a fuller understanding of the physical and socio-economic dynamics of the Himalayan region. It is also intended to demonstrate the need for a much broader and deeper perspective of the problems facing the Himalayan region as a prerequisite for the development of more effective solutions.

The necessary first step is to provide a detailed exposition of the Theory of Himalayan Environmental Degradation itself. This is the purpose of the present chapter. What follows, therefore, has been abstracted from a large body of literature – and presented as a synthesis of the Theory that we are deliberately setting up for evaluation. We believe that this intellectually satisfying construct must be analysed, challenged, and dismantled before any real progress can be made toward solution of the Himalayan Problem. There must be a better attempt than hitherto available at defining the Problem before there can be hope for effective mitigation. Thus we will begin with a synoptic response to the question – what is the nature of the perceived crisis? While by no means acceptable to us, the response can be based upon a review of numerous reports in the news media, internal reports of aid and development agencies, and countless published books and papers in the scientific and conservationist literature.

We do not wish to imply that this body of literature is all inaccurate; we do believe, however, that the generalization, or accumulated perspective, is seriously distorted. Our primary objective, therefore, is to achieve a much more critical assessment of established thought as a necessary first step for advances in scholarly endeavour and for more effective aid and development policy formulation. This carries the implication that there is a pressing need for a much firmer linkage between scientific research, policy analysis, and policy making – in effect, we have become engaged in *science-for-public-policy*, whether we like it or not.

The most compelling and trend-setting characterization of the Himalayan region and its anticipated eco-disaster is that published by Erik Eckholm (1975, 1976), although he was exceeded by Claire Sterling (1976), amongst others; moreover, and more seriously, he is perpetuated by Norman Myers (1986) amongst many other environmental alarmists, the works of which Messerschmidt (personal communication, March 1987) describes as 'the Claire Sterling Effect.' The most startling visual presentation is contained in the superb movie, *The Fragile Mountain*, produced by Sandra Nichols (1982) with substantial financial support from the World Bank and other agencies. In addition, a spate of books and articles has been published, especially in India and Nepal. Some of the most prominent are Lall and Moddie (1981); Bandyopadhyay *et al.* (1985); J. S. Singh (1985); T. V. Singh and Kaur (1985); and Joshi (1986a).

THE THEORY

Any synthesis of this literature would include all, or most, of the following points although, strictly speaking, they apply to Nepal and have been extrapolated to characterize the much wider region:

1. Following the introduction of the modern health care, medicine, and malaria suppression in the Terai after 1950, an unprecedented wave of population growth occurred which does not yet appear to have peaked. For Nepal as a whole it appears to have reached 2.6 percent per annum for the 1971–81 census decade (Goldstein *et al.*, 1983) but in many areas it exceeds 3–3.5 percent per annum. Nepal's total population in 1988 is probably in excess of 16 million.
2. This veritable population explosion, with an overall doubling period of about 27 years, is augmented by uncounted and uncontrolled illegal immigration from India into the Nepalese Terai across the open frontier. Furthermore, over 90 percent of the 1981 population is rural and subsistence. This has led to rapidly increasing demands for fuelwood (more than 90 percent of Nepal's energy depends upon the combustion of biomass), construction timber, fodder (the domestic animal population has undergone a parallel, or even greater, increase to that of the human population), and agricultural land on which to grow food.
3. The next step in what has been described as a vicious circle, is that the needs of the burgeoning subsistence population are exerting increasing pressures on the forest cover. This has led to massive deforestation, amounting to a loss of half the forest reserves of Nepal within a 30-year period (1950–80) and a prediction that by AD 2000 no accessible forest cover will remain (while there are varying estimates of the rates of deforestation, a topic to be treated more fully in Chapter 3, it is widely assumed that the situation has reached crisis proportions).
4. The deforestation, which includes the cutting of agricultural terraces on steeper and more marginal mountain slopes, has led to a catastrophic increase in soil erosion and loss of productive land through accelerated landslide incidence, and to the disruption of the normal hydrological cycle.
5. This situation, in turn, has led to increased run-off during the summer monsoon and increases in disastrous flooding and massive siltation in the plains, and lower water levels and the drying up of springs and wells during the dry season. Related ills are: rapid siltation of reservoirs; abrupt changes in the courses of rivers; spread of barren sand and gravel across rich agricultural land on the plains; and increased incidence of disease in downstream areas.
6. The increased sediment load of the rivers emanating from the Himalayan system is extending the Ganges and Brahmaputra delta and causing islands to form in the Bay of Bengal. Amongst the evidence cited are extensive plumes of sediment that can be seen on LANDSAT imagery to extend several hundred kilometres into the bay.

7. The continued loss of agricultural land in the mountains leads to another round of deforestation to enable the construction of more terraces on which to grow subsistence crops. Yet, as the labour of walking greater distances from the village to fuelwood supplies increases with the receding forest perimeter, a critical threshold is reached whereby the available human energy (principally female) becomes progressively over-taxed and an increasing quantity of animal dung is used for fuel.
8. Consequently, another vicious circle is linked to the first one: terraced soils are deprived of natural fertilizer – the animal dung now being used for fuel, thus depriving the agricultural terraces, in many instances, of their only source of fertilizer. This lowers crop yields. Also, the ensuing weakened soil structure further augments the incidence of landslides. Even more trees are cut on more marginal and steeper slopes to make room for more agricultural terraces to feed the ever-growing subsistence population.

Many other facets can be added to the eight-point scenario. These include the pressures generated by the subdivision of the finite amount of agricultural land as the population continues to double every twenty-seven years; at present it is calculated that there is less than 1 ha of land per family. Similarly, the added pressures of collecting and carrying fuelwood and fodder and fetching water falls predominantly on the women. They, in turn, become progressively overworked and undernourished and their next generation of children begins life more and more deficient in essential nutrients, so that the situation worsens further. Domestic animals, essential to the Middle Mountain subsistence mixed-farming system as suppliers of fertilizer and draught energy, depend heavily on fodder from the depleted forests, so that their capacity also diminishes.

It follows from this brief exposition of the Theory of Himalayan Environmental Degradation that a series of linked vicious circles is envisaged as operating inexorably to drive a downward spiral. The apparent impossibility of breaking any of these circles thus leads to the prediction of widespread environmental and socio-economic ruin in the near future. There is perceived to be a progressive and accelerating shift from *potential* instability to massive *actual* instability. This includes: mountain slopes, from a physical point of view; hill-village subsistence agriculture; breakdown in traditional mountain culture; disruption of the regional or national economy. All these gathering tragedies will put increasing pressure on the already fragile political balances of the wider Himalayan region.

In the face of the irreversible destructive processes in the Middle Mountains, for instance, out-migration increases. This in turn not only deprives the source areas – the villages and hamlets of the Middle Mountains – of a proportion of their youngest, fittest, and most creative members, but it adds to the already existing heavy population pressure on the resource base of the Nepal Terai. Population growth in the Terai, for example, including both natural increase and in-migration, is calculated at over 4 percent per annum

(1971–81 census; cf. Goldstein *et al.*, 1983; Hrabovszky and Miyan, 1987). Fifteen to twenty years ago it was believed that the opening up to settlement of the previously malaria-infested jungle of the Terai would provide a breathing space by enabling the absorption of excess population of the Middle Mountains, Nepal's most densely populated area. Today it can be seen that the 'new land' in the Terai is virtually used up, a process accelerated by the surge of illegal immigration across the open border with India. And yet, despite extensive out-migration, the population increase in the Middle Mountains continues at an unacceptable, or unmanageable, rate in excess of 2 percent per annum. Goldstein *et al.* (1983), for instance, characterize Nepal as being in transition, demographically speaking, from a highland, rural country to a lowland, urban one.

The net results of the various destabilizing processes in the Middle Mountains are perceived as absolute deforestation, lowered crop productivity (both in terms of total national production and as yield per unit area), increase in absolute numbers and percentage of the subsistence farming population with nutrient intake below a minimum acceptable level, and progressive mountain desertification. Since the mountain desertification is assumed to be occurring on steep slopes, the associated processes of gullying, soil erosion, and landsliding are cited as having calamitous downstream effects. Thus are envisaged the rapid siltation of reservoirs, excessive shortening of the useful life of major hydroelectric and irrigation projects, increased flooding on the plains (already an annual disaster for India and Bangladesh), increases in the levels of river beds, and destruction of rich lowland farmland by the spread of sand and gravel as rivers break their banks and change their courses. In short, the worst-case scenario foresees that the terrain of Nepal and that of adjacent areas of the Himalaya, and certainly the very basis of life, the topsoil, will virtually flow down the Ganges and Brahmaputra rivers by the year AD 2000. It has even been suggested that, in preparation for such an event, His Majesty's Government of Nepal should transfer its patronage of the Swiss technical-aid system (SATA) to that of the Dutch. In this manner Nepal can begin the struggle to reclaim (and legally claim) land below sea level and establish polders in the Bay of Bengal, the product of its own topsoil (Indian and Bangladesh gunboats are already rumoured to be patrolling extensive new islands that are being added to the outer Sundarbans, the outer delta of the distributaries of the Ganges and Brahmaputra).

The last sentence of the preceding paragraph, while an extreme interpretation that may be criticized as a macabre joke, has been introduced to demonstrate both the seriousness and the science-fiction attributes of this powerful Theory of Himalayan Environmental Degradation. More than a decade ago Eckholm (1976) wrote eloquently of the process whereby Nepal was exporting to India the commodity that it could least afford to part with, namely topsoil, and in the form that India could least afford to receive it – as silt that clogged reservoirs, turbines, and irrigation works. The broad theory, nevertheless, is an intellectually satisfying concept which seems so reasonable

that it is hardly surprising that it is widely accepted as fact. And, of course, there are further ramifications, such as claims by environmentalists that the deforestation, in turn, is affecting the climate in such a way as to reduce normal annual rainfall amounts. This, of course, would set up yet another vicious circle to accentuate the effects of the others.

The eight-point scenario and brief discussion presented above lead to a number of critical implications which further enlarge what can be described loosely as the *perceived* Himalaya–Ganges Problem. It infers that a few million Nepalese hill farmers are responsible for the massive landscape (and climatic) changes that are affecting the lives and property of several hundred million people in Gangetic India and Bangladesh. This raises two related points: (1) that the downstream countries, as victims of this unwarranted and irresponsible environmental disruption, could justify reprisals in economic, political, or military terms; and (2) that Nepalese interests are served well (assuming no reprisals are actually taken) by this perceived image of helpless drift into environmental and socio-economic chaos, since it may account for its disproportionate amount of international and bilateral development aid in relation to its total size and population.

A further point is applicable within Nepal itself, and within several of the Indian states that have a plains and a Himalayan component, such as Uttar Pradesh. This is that the popular image of the hill farmer as the cause of the growing environmental disaster makes him a convenient scapegoat; it has been claimed that the relatively few mountain farmers are holding hostage the very many on the plains. Once more, effect is taken for cause, and corrective measures are misdirected.

Whether or not the eight-point scenario of disaster for Nepal can be extended along the entire Himalayan system will not be discussed here except for emphasis of several related points. The Kumaun and Garhwal Himalaya appear to fall within this framework, with two additional components. One is the excessive commercial cutting of mountain forest stands to meet the timber demands of the lowland population centres (until recently checked by the Chipko Movement - see below page 67). The other, associated with it, is the extensive development of mountain roads, especially as a military response on the part of India resulting from the border war of 1962 with China (see p. 119 below). Much of the road construction is substandard and has caused a great increase in landslide incidence; the roads also opened up extensive mountain forests to commercial clear-felling and to large-scale movement of people.

As we proceed westward into Himachal Pradesh, Jammu and Kashmir, and the Karakorum and Hindu Kush, we enter a series of mountain and highland landscapes with very different climatic regimes. Increasing aridity with distance from the influence of the summer monsoon greatly reduces the value of comparison with the Nepal and Central Indian Himalaya. Conversely, eastward from Nepal, into Sikkim and the Darjeeling (West Bengal) Himalaya, and Bhutan we enter mountain areas with increasing amounts of summer monsoon precipitation. Bhutan, and probably the even

less accessible and less well-known Arunachal Pradesh, should be accepted as unique cases where assumed deforestation and environmental disturbance are modest or insignificant and where fuelwood supplies are reported as abundant. However, even these regions can be assumed to be poised to follow the same road to disaster along which Sikkim, Nepal, and the Central Himalaya of India are travelling.

There are several additional contributing problems that need to be introduced. The first is the political processes that beset the region: the border dispute between India and China; the three Indo–Pakistan wars of 1947, 1966, and 1971 and the continued border tensions, especially along the Kashmir cease-fire line; the frictions between India and Bangladesh, and especially the very slow progress in negotiations over management of the flow of the Ganges and Brahmaputra. There are also the political tensions within India – Punjab, Assam, West Bengal – generated, in part, by the competing demands for access to natural resources by different ethnic groups.

The 1959/60 exodus of approximately 120,000 refugees from Tibet, and their impacts on the natural resource base of Khumbu Himal and Mustang, for instance, and the consequences of China's closing of the frontier with Nepal, must be seen as unprecedented disruptive events. The much more extensive disruption in Afghanistan, and the impacts of over three million refugees on the Pakistan Hindu Kush and adjacent northern areas, is a problem of world magnitude in itself, notwithstanding the widespread political implications.

The rapid growth in tourism is also an important contributing factor. While most data, again, are available for Nepal, popular access to the Garhwal Himalaya, especially the Valley of Flowers and the Nanda Devi Sanctuary, is causing a large increase in environmental pressure of an entirely different kind, the result of demands for recreation and adventure from people outside the mountain area. Fifteen years ago the growth of tourism in Nepal was perceived as a panacea for that country's balance-of-payment deficits. Today that perception has changed. Certainly in specific areas, such as the Khumbu Himal and the Kali Gandaki and Annapurna circuit, the numbers of tourist visitors each year now exceed the total indigenous populations. And their demands are seen as increasing the threat to local forests as well as being disruptive of the way of life of the local people.

It follows from the foregoing discussion that, regardless of whether or not we accept the cause-and-effect linkages that together make up the Theory of Himalayan Environmental Degradation, the broader Himalayan region must be viewed as dynamic in the extreme – geophysically, climatically, and in the socio-economic and political senses. It is also useful to extend our consideration beyond the limits of even the broadest conventional depiction of the Himalayan region since similar catastrophic processes are presumed to be operating. For instance, the perceived linkage between mountain deforestation and downstream effects also has been applied to the Hengduan Mountain–Chengdu Basin system, far to the east of the Himalaya proper.

Here extensive deforestation in the 'River Gorge Country' of western Sichuan and northwestern Yunnan, and its impact on the hydrology and sediment load of the Jinsha Jiang (Yangtze), is credited with increased flooding, siltation, and damage to heavily populated and rich agricultural land downstream (the Chengdu Basin). As with the Himalaya–Ganges system, population growth, deforestation, and soil erosion have been perceived as post-1950 phenomena, in this case with the added overtones of mismanagement during the Mao Tse-tung years with the Great Leap Forward, and Cultural Revolution, and the ensuing chaos created by the 'Gang-of-Four.'

It must be said that the 'save-the-world's-forests' lobby has had a powerful influence on large sections of public and scientific opinion. It has been widely agreed that serious problems will arise from loss of the tropical rain forests (and also from mountain deforestation in the Himalaya and elsewhere). This we accept and strongly support: our intention is not to challenge the importance of the world's forest resources but to examine critically some of the claims that are made in terms of the assumed effects of forest clearance, and their facile extension to other, especially mountain, regions. We believe that such a critical assessment is a vital undertaking, a prerequisite to rational corrective policy development.

LINKAGES OF THE THEORY AND THEIR IMPLICATIONS

To sum up our discussion of the perceived Himalaya–Ganges Problem, it is necessary to point out a number of basic assumptions about and salient linkages between the component parts of the eight-point scenario. There is also a basic philosophical issue – what should be our attitude to the ignorant subsistence farmer who is seen, unthinkingly, to produce swarms of children, and irresponsibly to devastate the mountain forest cover and so to accelerate landslide occurrence on his poorly constructed and badly maintained agricultural terraces, or in some areas, by his catastrophic slash-and-burn (swidden) agriculture? To take the basic assumptions and salient linkages first:

1. That a population explosion was initiated shortly after World War II due to the introduction of modern health care and medicine and the reduction of malaria and other diseases;
2. That increased population in subsistence mountain societies has led to:
   (a) reduced amount of land per family
   (b) deepening poverty
   (c) massive deforestation;
3. That mountain deforestation, on such a scale, will result in total loss of all accessible forest cover in a country such as Nepal by AD 2000, and is the cause of accelerating soil erosion and increased incidence of landsliding;
4. That destabilized mountain slopes resulting from points 1, 2, and 3 above cause:
   (a) increased flooding on the Ganges and Brahmaputra plains,
   (b) extension of the delta and formation of islands in the Bay of Bengal,
   (c) drying up of wells and springs in the hills and lower dry-season river levels downstream,
   (d) massive siltation and drastic reduction in the useful life of highly expensive water resource projects;
5. That deforestation also leads to climatic change in general and reduced rainfall amounts in particular.

It is not our intention to dispute the facts, wherever reliable information exists, but the assumptions that so frequently are not based upon facts. Nevertheless, throughout this attempt to dissect the Theory of Himalayan Environmental Degradation the causal relationships between timing and degree of population growth, deforestation, loss of agricultural land, and downstream effects are paramount. We will attempt to demonstrate that most of these linkages and assumptions are founded upon latter-day myth, or falsely based intuition, or are not supported by rigorous, replicable, and reliable data. They are the 'sacred cows' of the perceived Himalayan Problem, and we will seek to dismantle them, in part or in whole. However, our claim of lack of reliable data cuts both ways – we cannot demonstrate unequivocably that *all* the linkages are inoperable in *all*, or even in most, cases. Nevertheless, we do believe that we can dispose of enough of the 'sacred cows' and damage others sufficiently to support our claim that the overall Theory of Himalayan Environmental Degradation is untenable and that the Himalayan Problem needs to be much more rigorously defined.

The perceived problem, in our view, is in the minds of the vested interests – whether the World Bank, the Chipko Movement, different national governments, or the scientists. It is likened to a kaleidoscope, which will change its pattern depending upon the way in which it is tilted, or upon the angle of view. This is the essence of Thompson and Warburton's (1985a) 'Uncertainty on a Himalayan Scale.' The uncertainty is a large element of the Problem. Thus the present claim that we expect to demolish most of the underpinnings of the Theory itself must be qualified by the very nature of the uncertainty. There must be the qualification that *in certain instances*, and *in specific areas*, we believe we can show that many of the widely preferred assumptions are untenable. The widespread temptation to extrapolate, or generalize, must be resisted or else we ourselves would commit the error that we are seeking to expose – unwarranted generalization. The single and obvious generalization that we do make, however, is that the Himalayan region is so varied and so complex that generalization is counter-productive. Hence, the application of broad panaceas by aid and development agencies in most, if not all, instances will not succeed; in some instances they may well exacerbate the problem.

But what of the ignorant and fecund subsistence farmer whose well-being lies at the crux of the Problem? He has indeed become a convenient scapegoat. We will demonstrate this by a single observation, illustrative of many others.

Figure 1.1 Middle Mountains, Nepal. View of intensely terraced landscape a few kilometres from Kathmandu; from the Trisuli Road below Kakani. The bare, outward-sloping terraces on the right are rainfed (*bari*) and are fallow during the dry winter season. A crop of winter wheat emphasizes the irrigated terraces (*khet*) down the centre of the small valley which gives relatively easy access to water.

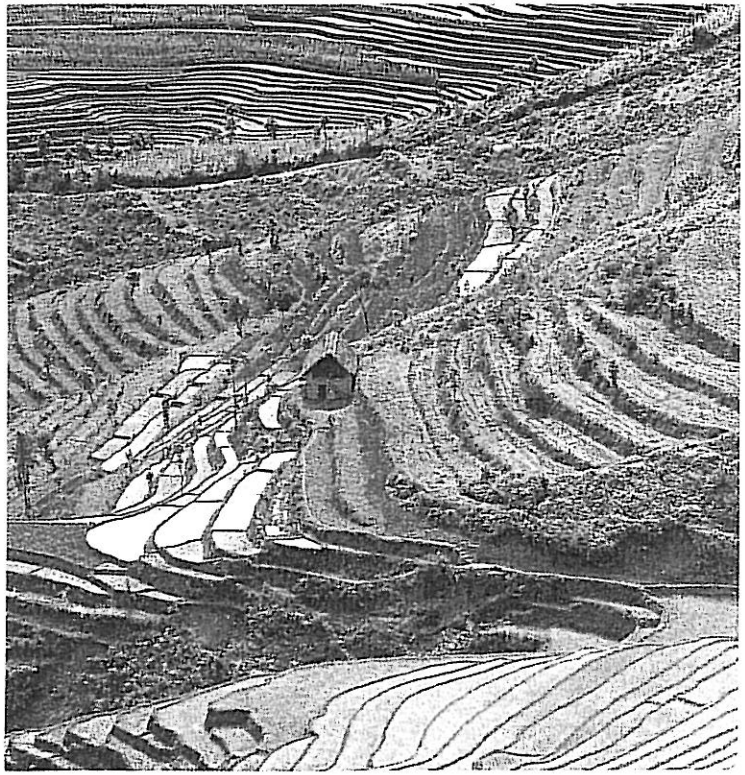
In an otherwise impressive review of the Nepal Agricultural Sector, the following quotation from a report by the Asian Development Bank (ADB 1982: (II) 34) indicates the extent of the misunderstanding of the subsistent farmer's role: 'Terraces, especially on rainfed land, are often poorly constructed; they are outward rather than inward sloping and do not have a grassed bund on the edge.' The fact is that *bari*, or rainfed terraces, in Nepal mostly support maize, millet, buckwheat, and other crops. They are constructed usually on the upper, steeper slopes in the Middle Mountains which are inaccessible to irrigation systems. They slope outward from the hillside so that these crops are not damaged by waterlogging. In our Kakani field area (Johnson *et al.*, 1982; Gurung, 1988) the local farmers are well aware that an increased accumulation of water on terraces (such as would

Figure 1.2 Maintenance of terraces in the Middle Mountains on slopes of up to 45 degrees requires constant labour. Here *bari* terraces are being prepared for early summer planting of maize or millet. Note the careful trimming back of terrace fronts in the lower right. The soil from this is then worked into the next terrace step below, with manure and crop residue added.

result from inward-sloping forms) would greatly exacerbate the problem of landsliding by increasing the degree of soil saturation and adding the weight of the ponded water itself. Furthermore, annual repair of the terraces would require a much larger labour input if they sloped inward. The summer monsoon rain is intended to run off the outward-sloping terraces.

Although there are undoubtedly poorly maintained terraces in Nepal, and in other areas, many are very well maintained and have vegetated steps; absence of a bund on the *bari* terraces (in contrast to the *khet*, or irrigated, terraces) is deliberate and *ensures* rainwater run-off. It can be argued that both *bari* and *khet* terraces are, for the most part, superbly engineered in Nepal. Admittedly, during heavy monsoon downpours available human energy is concentrated on repairing damage to the *khet* and irrigation

Figure 1.3 A mixture of *khet*, *bari*, and rough grazing on the northwestern edge of the Kathmandu Valley. Young rice seedlings stand a few centimetres above the irrigation water in the foreground. The rainfed terraces above the house will be used for maize or millet, or a variety of vegetables.

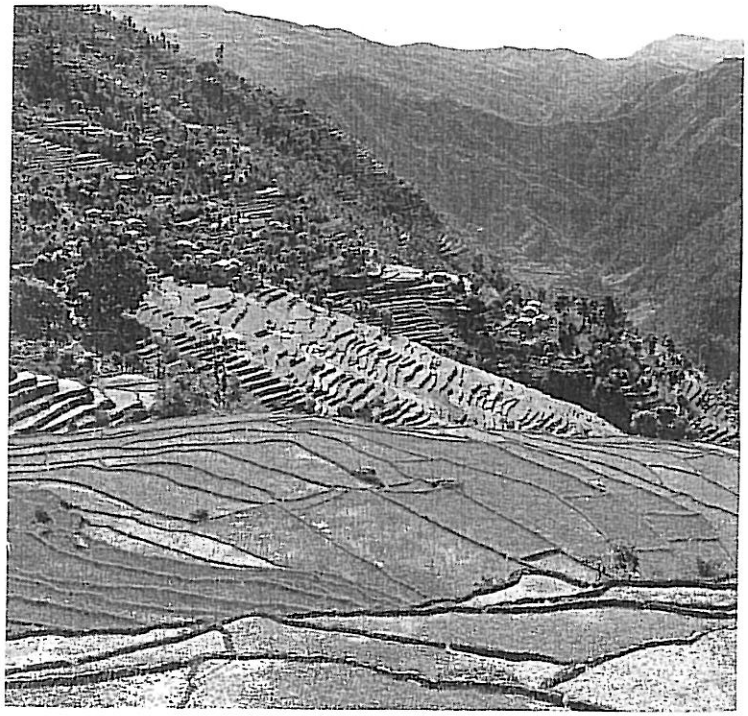


systems, and the *bari* terraces may have to be left to collapse; this is because the much higher-yielding *khet* terraces, usually under paddy rice, are consequently more vital to the survival of the subsistence family. Any apparent neglect of the terraces may be due to shortage of available labour at the particular moment that they were observed by the visiting 'expert' rather than a reflection of the ignorance of the farmer.

The famous English mountaineer, H. W. Tilman, more sensitive to the hill farmer than many latter-day experts, made a poignant observation many years ago when the Himalaya was still a distant fantasy land of 'Shangri La' to most of us:

> Whether it takes place little by little or in one swift calamity, soil erosion is generally attributed to man's careless greed, his idleness or neglect. It would not, I think, be fair to blame the people of these valleys on the Himalayan fringe for the frequent landslides which occur here. In turning the steep slopes into fruitful fields they have neither been lazy nor neglectful.
>
> (Tilman, 1952: 126–7)

Figure 1.4 Sindhu Palchok District, Nepal Middle Mountains, near Chautara, headquarters of the Nepal-Australia Forestry Project. Note the relatively dense forest cover on the steeper, more distant slopes, the large number of individual trees on private land near the farm houses, and the precise maintenance of the *khet* terraces in the fore- and middleground.



The date of Tilman's writing is significant in that the Theory of Himalayan Environmental Degradation had not then been formulated.

Frequently the subsistence farmer can be shown to be a highly knowledgeable and intelligent land manager with a wealth of accumulated, traditional wisdom of great potential value to the 'educated' elites, if only they would listen (Whiteman, 1985). This leads to the claim that there is a need for gift exchange in contradistinction to *charity* - a synonym for international and

bilateral aid (Hatley and Thompson, 1985).[1] Nevertheless, we do not wish to imply that all subsistence farmers are intelligent indigenous scientists, nor that even the most gifted amongst them can necessarily control the change which is sweeping them along; and there are ignorant and foolish farmers, just as there are ignorant and foolish factory workers, tradesmen, scientists, and decision makers.

Before concluding this chapter two further points must be made. First, there are no claims to be established for any individual's academic or scientific precedence, despite the intellectual satisfaction of having the opportunity to fault a widely accepted paradigm. Members of the United Nations University/Nepal MAB-Mountain Hazards Mapping Project began to suspect the reliability of some of the pre-existing claims of the Theory of Himalayan Environmental Degradation. They began to doubt that deforestation and increased landsliding were linked in a simple cause-and-effect relationship. They also began to understand, as fieldwork progressed over several years and during different parts of the annual agricultural cycle, that the human impacts, principally those of the subsistence farmer, were not all negative. Part of the farmers' coping strategy was to re-terrace landslide scars and stabilize slopes. They also responded to prospects of immediate landslide initiation by such acts as agricultural de-intensification (Johnson *et al.*, 1982; Messerschmidt, 1987). Similarly, reconnaissance of the Qinghai-Xizang (Tibet) Plateau, and in the Hengduan Mountains of western Sichuan and northwestern Yunnan (Ives, 1981, 1985; Messerli and Ives, 1984) led us to suspect that the assumptions of post-1950 massive deforestation were also over-simplifications, and that the actual history of deforestation was a very much longer and more complex process. This gradual growth in understanding of the complex nature of the region and the processes operating therein led to this questioning of conventional wisdom. Our doubts about recent mountain deforestation brought us into contact with the work of forest historians Richard Tucker (1986, 1987) and John Richards (1987), with ecologists and Chipko activists Vandana Shiva and Jayanta Bandyopadhyay (1986a and b), with Tej Mahat, David Griffin, and Kenneth Shepherd (Mahat *et al.*, 1986a and b; 1987a and b), with Michael Thompson, Michael Warburton, and Tom Hatley (Thompson *et al.*, 1986), with David Pitt (1986), Lawrence Hamilton (1987), and Deepak Bajracharya (1983a), and many others, together with the spiritual leadership of Chipko Messenger, Sunderlal Bahuguna. We discovered from these contacts that simultaneous doubts and challenges had been developing along similar lines (cf. Carson, 1985). It is the coming together of this group, facilitated by the United Nations University's support of the Highland–Lowland Interactive Systems project, that has led to this concerted effort to challenge the Theory of Himalayan Environmental Degradation.

The second point is equally important. All members of this now considerably enlarged working group do not necessarily agree on all points, or even on any one particular point; nor do we, nor can we, all have the same perspective. But we all do agree that a major arena of enquiry has been

opened up that is fraught with an unusual level of uncertainty. We also wish to stress that the enquiry has been encouraged by many individuals within several major agencies of the United Nations Organization, despite the occasional criticisms that appear to be levelled against them. We believe, however, that the enquiry has an important potential bearing on the well-being of several hundred million people and on the socio-economic and political stability of a pivotal region of the world. Thus further exhaustive pursuit of the enquiry should become a major endeavour, not only for the United Nations University, but also for other relevant UN agencies, bilateral aid and development agencies, and the governments of the region.

To conclude this chapter we wish to emphasize again that it is not our intention to dispute the validity of established facts, nor to imply that there is no Problem facing the Himalayan region. We believe that there is a most serious problem; that it has been exacerbated by the very tendency to generalize, to accept uncritically a large number of inter-related assumptions, and to precondition policy making by rigidly defended perceptions. One of the more destructive of these perceptions, for instance, is that deforestation is necessarily bad (cf. Hamilton, 1987); another, related to the first, is the habit of using the term *human impact* invariably in a negative sense (cf. Messerschmidt, 1987).

Now that we have set forth a synthesis of the Theory of Himalayan Environmental Degradation and begun the process of questioning the validity of some of its component parts, following our geographical overview (Chapter 2), we will devote the next four chapters to a more exhaustive examination of the linkages that form the vital fabric of the physical basis of the Theory.

NOTE

[1]Hatley and Thompson maintain that, in its present form, foreign aid is perceived as charity: only when a clearly perceived two-way sharing of benefits can be established will development aid produce more convincing results. The 'ignorant' subsistence farmer has much to offer; from various parts of the mountain world he has already provided the world community, amongst many other 'gifts,' potatoes, maize, quiñoa, and intricate sustainable farming systems. Much more remains to be discovered, including a wealth of indigenous knowledge.

2 THE HIMALAYAN REGION: A GEOGRAPHICAL OVERVIEW

INTRODUCTION

The purpose of this chapter is to provide a very brief overview of the general geography of the Himalayan region. This is a necessary but rather unsatisfactory task, in part because of the constant outpouring of publications on practically every conceivable aspect, with a heavy emphasis on applied topics – resource development, environmental degradation, foreign aid – and in part because of the very complexity of the topic. Regrettably, there is no recent systematic treatment. It is even difficult to produce a justified regional break-down. We have added a short section at the end of the chapter which is a synthesis of the most recent attempt to tackle this difficult problem of regionalization. This is the result of a graduate diploma study of Markus Wyss, Geographical Institute, University of Berne (1988). We will largely limit ourselves, nevertheless, to a brief indication of the region's complexity in the process of sketching some of the major components of the topography, climate, vegetation, and human geography. We are not attempting a geography *per se*; rather we are providing selected background material and additional literature citations to support the discussion that forms the *core* of the book. First we will define the area under review.

The traditional definition of the Himalaya, *sensu stricto*, is that great range of mountains that separates India, along its north-central and northeastern frontier, from China (Tibet), and extends between latitudes 26°20′ and 35°40′ North, and between longitudes 74°50′ and 95°40′ East. In this sense the Himalaya extend from the Indus Trench below Nanga Parbat (8,125 m) in the west to the Yarlungtsangpo–Brahmaputra gorge below Namche Barwa (7,756 m) in the east, a west-northwest to east-southeast distance of about 2,500 km. This definition includes, politically, the independent kingdoms of Nepal and Bhutan, a small part of Pakistan, parts of China (Xizang Autonomous Region), as well as the western, central, and eastern sections of the Indian Himalaya (see Figure 2.1): sections 6 (Kashmir Himalaya), 7 (Central Himalaya), and 9 (Assam Himalaya), together with portions of the Plateau (8) and the Plains, as shown on Figure 2.2.

Also, traditionally, a north–south topographical transect across the Himalaya would include the whole, or parts, of several aligned physiographic

Figure 2.1 The Himalayan region, southern Tibet and northern India. The Himalaya *sensu stricto* extend from Nanga Parbat, above the Indus Gorge, to Namche Barwa, above the Brahmaputra. The wider region takes in the Hindu Kush and the Hengduan Mountains. Topography: copyright, Swiss *High School Atlas*, 1988.