# HIMALAYAN DEFORESTATION - LOWLAND FLOODING

Throughout the 1970s and 1980s there was widespread belief that deforestation in the Himalaya after about 1950 was the primary cause of the assumed serious increase in major monsoon flooding in Gangetic India and Bangladesh. Furthermore, the direct and primary cause of the 'deforestation' was laid at the doors of the 'ignorant' mountain subsistent farmers whose uncontrolled population growth and continued dependency upon the forest for fuelwood, in the words of the World Bank (1979), would leave Nepal with no remaining accessible forest cover by the year 2000. This, and many other publications, were not only apocalyptic in spirit, but they provided lowland Indian and Bangladeshi politicians and decision makers with a perfect scapegoat -- the Nepalese mountain farming community.

This complex paradigm, that contained many 'vicious circles' within 'vicious circles', excited a world-wide appeal. It was reported as *fact*, not only by the popular news media, but in conservationist publications, and even in the scholarly/scientific literature (e.g. Myers, 1986). Ives (1985) referred to the many variations on this general theme collectively as 'The Theory of Himalayan Environmental Degradation' in one of the earliest attempts at critical examination. The Theory embraced the Himalaya as a whole, as well as providing smaller scale examples, such as the Khumbu Himal (cf. case study e: pp. 87-95); and it was extended to areas far beyond the Himalaya *sensu stricto* (cf. case studies c: pp. 68-76 and h: pp. 103-132). It was taken into the core of the rapidly expanding extreme conservationist propaganda that predicted global catastrophe: there was a veritable news media blitz with much

TV coverage. The furor was especially significant because it had a direct effect on the policy development of international, multilateral, bilateral, national government, and NGO agencies. In other words, not only were considerable financial and other resources expended by this confusion of cause and effect and by identifying the wrong 'culprits', both policies and interventions were causing harm rather than providing environmental and socioeconomic benefits to mountain farmers. Nor were they helping flood victims on the plains.

Several individuals and groups had begun contesting this vast over-simplification, if not total misunderstanding, of a presumed highland-lowland interaction. However, it was only in 1986 that many of these 'voices in the wilderness' were brought together to discuss the 'Himalaya-Ganges Problem' and to initiate a concerted reassessment (Thompson *et al.,* 1986; Ives and Ives, 1987; Thompson, 1998). This led to a detailed critical review of 'The Himalayan Dilemma' (Ives and Messerli, 1989).

The foregoing discussion occurred more than a decade ago. Yet it is remarkable that the Theory, while considerably weakened, retains much of its appeal. The conservationist literature and the popular news media continue to employ this intellectually satisfying mental construct (environmental myth) that, to the uninitiated, appears self-evident (that deforestation of steep slopes in a monsoon climate must inevitably lead to gullying and soil erosion and serious downstream effects), and so continue to cloud the real issues. For example, the *Basler Zeitung* (15 September, 1998) made the claim:

> The severe floods in Eastern India and Bangladesh are not the result of a natural disaster, but of a ruthless exploitation of the forests which

has been practiced over centuries in the Himalaya.

The most bizarre example was a recent reporter's claim on a CBC-TV (Canada) review of the devastating cyclone that hit Orissa, India, in September 1999 (21 March, 2000). This stated that conditions in future would deteriorate because sea level was rising as a result of deforestation in the Himalaya.

Nevertheless, many protagonists of the Theory have since reversed themselves. Indeed, Ives and Messerli (1981) were initially influenced by the then all-pervasive claims that had been encoded in the conference held in Munich in 1974 (Müller-Hohenstein, 1974). Agarwal, Chopra and Sharma (1982: 31-56) and Agarwal and Narain (1985), in the first annual reports on *The State of India's Environment* embraced the Theory. Subsequently, Agarwal is reported to have concluded that:

> …..the Nepalese are being falsely pilloried for causing floods downstream in Bangladesh. Rivers such as the Ganges naturally produce huge amounts of silt. There is no evidence to believe that ecological solutions like reforestation will control floods.
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> (Fred Pearce: *The Guardian Weekly*, 1999, Vol. 160(14): 24)

Regardless, these strong statements remain opinions: they are not based on any field research or available secondary data. This uncritical reporting of the work of others without access to real information has been one of the difficult problems confronting this and many environmental issues -- a reliance on emotional appeal! These statements, in turn, were used to refute other efforts to, in effect, support the Theory. A forceful example is taken from a 1999 report from China whereby the central government claims that the catastrophic floods on the Yangtze in 1998, that took 3,000 lives and caused $20 billion in damage, was the result of deforestation in the upper reaches of the great river. This prompted the State Council to formally halt

timber extraction in the mountainous upper reaches of both the Yangtze and Yellow rivers and to launch a billion dollar reforestation programme.

The most recent commentary on the 'environmental degradation' debate is by Blaikie and Sadeque (2000). They prefer to be "more cautious . . . [and] take the view that there are environmental problems in the Hindu Kush – Himalayan region – in some areas, for some people and for some of the time – that, sometimes, they are serious, and that they are recognized as such by most of the stakeholders" (Blaikie and Sadeque, 2000: 14). This, however, could be read as a paraphrase of Ives and Messerli (1989: xix):

> … the most serious anxiety that faces us in our attempt to demonstrate that the Theory is an over-dramatization and distortion is that our position should not be interpreted as indicating that there is no problem and that, therefore, there is no need for re-thinking, action, or alarm.

Their intent, reiterated here, was to eliminate gross generalizations, insist on conclusions based on reliable information, and shield the subsistent farmers from the role of scapegoat. Blaikie's and Sadeque's contribution is interesting but it also is hardly based upon new or first hand data. This case study, therefore, is included in an attempt to redefine the issues of highland -- lowland interactions in the context of the Himalaya and two of its three great river systems -- the Ganges and the Yarlung-Tsangpo/Brahmaputra--in the light of more recent work.

Through the 1990s a large amount of research was undertaken in the Himalayan region. Much of it was directly generated by the Ives/Messerli publication; much evolved independently, but in response to the earlier work; and

much was entirely serendipitous. Only a few of the main conclusions of these still expanding research endeavours are included here, largely because of sheer volume.

One of the more important research efforts is that stemming from the Nepal-Australia Social Forestry Project. The early phases of this work (Bajracharya, 1983; Mahat *et al.,* 1986 a and b, 1987; Griffin, 1989) had contributed to the initial challenge to the Theory. This work has continued up to the present. Of special interest, in this respect, is the documentation and confirmation of several of the working hypotheses that had emerged from the conference on the 'Himalaya-Ganges Problem'. Thus, by the early 1990s Gilmour (1988), Gilmour and Fisher (1991), and Gilmour and Nurse (1991) were able to demonstrate for parts of the Nepalese Middle Mountains, that between 1972 and 1989 there had been an actual increase in tree cover on land controlled by local farmers. Much of this 'reforestation' had been spontaneous and without government or foreign aid assistance. Continued investigation into the dynamics of the Middle Mountain environment has further refined this initial assessment. Jackson *et al.* (1998) have shown that between 1978 and 1992 community forest activities at lower altitudes have had a beneficial impact on the local environment and the stability of the land-use system. For instance, shrublands and grasslands are being converted to more productive forest land. In contradistinction, however, they produced clear evidence that on the upper slopes forest cover was being rapidly lost. This is an important qualification of the earlier work of Gilmour and associates and is directly related to the degree of local control (or lack thereof) of the land. Thus "sustained population pressures combined with a lack of coherent and coordinated land management policies and practices, have resulted in a rapid

decline in forest resources on the upper slopes, together with a loss of catchment stability" (Jackson *et al.*, 1998).

Bruijnzeel and Bremmer (1989) have undertaken a review of the literature relating to highland- -lowland interactions between the Himalaya and the Ganges/Brahmaputra and concluded, in accordance with Ives and Messerli (1989), that the Theory retained little credibility. This challenge to the established orthodoxy of the Theory was placed on a much more rigorous footing subsequently by Hofer (1993), amongst several others, and will be discussed in detail below.

Metz (1997) also, from detailed and reiterated studies in Middle Mountain forest communities, has raised the issue of natural plant succession as a hitherto ignored factor in the 'deforestation discussion'. Metz studied seven little- disturbed stands of temperate forest 40 km north-northeast of Kathmandu between the altitudes of 2,400 and 2,900 m. He demonstrated that the only major canopy dominant that appeared to be regenerating sufficiently to maintain its current population was *Tsuga dumosa.* He hypothesized that *Quercus* species are unable to reproduce in individual tree-fall gaps and require a much more severe level of disturbance, such as produced by intense ground fires and large mass wastage occurrences (Metz, 1997:349).

Another research group effort of great significance is the University of British Columbia- -Bern University joint study of several small watersheds in the Nepal Himalaya (Schreier and Wymann, 1996). The Schreier research team studied the Chilime Khola watershed, a remote valley near the border between Nepal and Tibet, to assess the human impacts on water and sediment dynamics in the High Himal and

to link the processes and their effects through the Middle Mountains to the lowlands. This was complemented by a Messerli--Hofer project in the Ganges--Brahmaputra floodplain and delta. Schreier's group added the Jhikhu Khola watershed in the Middle Mountains and initiated minutely detailed studies over a period of more than five years. They analysed thousands of soil samples and studied the impacts of farming activities, with the use of sophisticated GIS modelling. One question of critical importance was: how do the episodic rainstorms translate into run-off and sediment dynamics? They concluded that human intervention plays a significant role in sediment transfer at the local scale by redistribution of the losses incurred by cultivation of steep slopes. Wymann (1991) had already demonstrated that soil nutrient content is inversely proportionate to altitude in the Jhikhu Khola whereby the lowest rice paddies have a high nutrient status. One corollary of this is that the farmers, with their elaborate indigenous system of retaining and redistributing sediments, maintain an important control over their fields. Only in extreme rainfall events was it possible to obtain some measurable response beyond the limits of the small watershed. This provided further support for diffusing the 'myth' of human impact on a Himalayan scale.

Schreier and Wymann (1996) had concluded that: "As we moved from a first order stream system . . . to the complexity of the Himalayan foothills we were overwhelmed by the scale of the processes, and the question of human impact simply fades away by the sheer magnitude of the natural processes."

Independently, and as part of a project initiated by the Royal Geographical Society, Wu and Thornes (1995) undertook a detailed study of Middle Mountain terrace

irrigation from a geomorphological perspective. They determined that terracing does not change the hydrological behaviour of the hill slopes and that the effects of human impacts are positive rather than negative. They showed that individual terrace failures during torrential monsoon downpours do not contribute any sediment to the downslope and stream flow. The mechanisms of the large-scale terraced slope failures, which involve dozens of terraces, are much more complicated. Even on such a scale of failure, however, farmers who manage terraces and irrigation canals on land naturally prone to erosion and failure can repair most of the damage and induce lower sediment yield and reduce overland flow. Nevertheless, the problem of extrapolation to a larger region remains to be resolved.

At higher altitudes again, Watanabe (1994) demonstrated that mass transfer induced by over-grazing and yak-trampling close to and above treeline was restricted to the immediate slope; the mass movements simply redeposited the weathered material and nothing measurable entered even the first order drainage.

From the Ganges- -Brahmaputra floodplain and delta, related meso- and macro-scale conclusions have been drawn (Hofer and Messerli, 1997). These results, in part, were anticipated by Hofer's (1993) study of hydrological changes of the rivers Sutlej, Beas, Chenab, and Jhelum, major tributaries of the Indus. This led to the understanding that, with the available data, it is not possible to demonstrate any significant changes in these rivers that cannot be explained by normal climatic processes: that rainfall events on the floodplains themselves are the most important cause of flooding.

Hofer and Messerli assessed the available historic flood data and changes in river courses by examination of available documentary information back into the nineteenth century; they analysed all available hydrological and climatic data; and they processed a large number of socioeconomic questionnaires. They concluded that the floods are a natural process, independent of human activities in the upper mountain catchments and that neither their magnitude nor frequency can be shown to have increased over the last 120 years. Hamilton's (1987) early speculation that it is direct rainfall over the territory of Bangladesh that is the primary cause of flooding was largely substantiated. In particular, rainfall patterns in the Meghalaya Hills are the main cause of fluctuation of the Meghna River. Peak discharges on the Ganges and Brahmaputra are not generally synchronized. And from the perspective of the local farming populations, dry season low water, river bank erosion, and cyclones in the lower delta were more threatening than monsoon flooding.

Above all, it would appear that mega-projects, such as the training of entire river systems by massive input of concrete, steel, and earth, are not the solution (Rogers *et al.,* 1989). First, they will be too expensive, exceeding the GNP of Bangladesh, for instance, by orders of magnitude; second, there is the potential for many negative consequences of such an action and third, it is doubtful whether it would ever be technically possible to 'control' a river like the Brahmaputra, regardless of how much money is allocated. The foregoing discussion of the situation in Bangladesh has been extended and heavily substantiated by Hofer's (1997) definitive study.

Going westward, beyond the limits of Nepal, researchers of the G.B. Pant Institute for Himalayan Environment and Development, and several of the Indian Hill universities, have produced increasingly well documented results that indicate the need for modification of several of the generalizations derived from the 'Mohonk Conference' on the Himalaya—Ganges Problem (Ives and Ives, 1987). Road construction, accelerating out-migration of males, unequal treatment of women, increased pressures from tourism, are all contributing to a worsening of the overall environmental situation in the Garhwal and Kumaun Himalaya. Similarly, studies by Hoon (1996) and Chakravarty-Kaul (1998) have documented serious environmental problems at high altitude – up to and above the treeline in the Central Indian Himalaya. Here the problem is poorly thought out government policies and actual prejudice toward transhumant Gaddis and Bakerwals. This is leading to a break-down in the age-long synergism between the transhumant herders and the settled subsistent agriculturalists (Uhlig, 1995) to the detriment of most members of both groups; the alpine pastures, the winter grazing areas at low altitude, and communities along the transfer routes are all affected negatively (cf. pp. 43-44).

Negi *et al.* (1997), building on the work of Tucker (1987), Richards (1987), and Guha (1989), have emphasized the importance of obtaining a full historic perspective before interpretation of the prevailing environmental and socioeconomic situation in the Central Indian Himalaya. They show that patterns of land use and forest resource extraction, established by the mid-nineteenth century in former British Garhwal and in the autonomous state of Tehri Garwhal, are central to a full understanding of present-day dynamics. They have also demonstrated that the

dependence on forests for revenue increased significantly after Independence. Consequently, this accelerated environmental pressures and exacerbated social tensions. This type of study also provides insights into the origins of the Chipko Movement and its consequences.

In recent years, increasing scholarly and development-agency attention has been focused on social forestry (Jackson *et al.* 1998), indigenous knowledge, gender, and the opportunities created by a decentralized system of government. This surge in the social sciences is especially relevant to mountain studies. There is no doubt that, within the last few years, Nepal has moved from the background to the forefront of the increasing awareness of common property rights and local institutions (Jodha, 1997, 2000; Blaikie and Sadeque, 2000). Two important publications (Berkes *et al.,* 1998; Duffield *et al.,* 1998) demonstrate the reasons for the relatively more stable environmental and socioeconomic conditions of the Kulu Valley, Himachal Pradesh, compared with many other sections of the Central Indian Himalaya. Nevertheless, they do point to problems, both in terms of diversity and sustainability of resource use created by the replacement of traditional agriculture with orchards and other cash crops, and the heavy use of subsidized pesticides (Berkes *et al.*, 1998:32). They conclude that the current changes in the Kulu Valley support Shiva's (1993: 7) claim that development policies and prescriptions imported from the West "may be turning this culturally and biologically diverse world into a monoculture." Perhaps even more serious is what Shiva refers to as "monocultures of the mind" as undermining the very local social institutions that are such a positive force for sustainable resource use.

This case study has shown, once again, that what often begins as a simple explanation of highland-to-lowland environmental and socioeconomic interaction is much more complicated when subjected to rigorous investigation. In particular, it points to the dangers of dramatic reporting of unproven assumptions. The actual assessment of highland-lowland interactions between the Himalaya and the lowlands to the south must recognize the impacts of policy formulation driven by self-interest of the political power structures based in the lowlands and internationally. In addition, it has established the effectiveness of extensive historical analysis and the need for great skepticism when reviewing alarmist conclusions based largely on emotion and short-term impressions.