

WATERSHED MANAGEMENT IN THE INDIAN HIMALAYAS

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Introduction

Of the Indian Himalayan Area, 53.2 per cent is classified as forest land and is under the control of the Forest Department. The actual area under forest varies from 8.3 per cent in Meghalaya to 91.3 per cent in Arunachal Pradesh. Large areas of land that are not under the control of the Forest Department may be assumed to be either devoid of forest, or supporting only very degraded cover. Even the land within their control is often inferior both for use as forest land and for cultivation. Only 58 per cent of it is economically exploitable.

The land in this area is grossly mismanaged. The condition of grazing land is fair to poor at all altitudes. Only irrigated land is properly bench terraced. Shifting cultivation is practised extensively in the North-eastern Himalayan Zone. At present, the fallow period is between five and seven years, which is insufficient to allow natural regeneration of the 16.8 per cent of land that is generally under cultivation at one time.

In recent times, the increasing pace of developmental activities such as mining, quarrying, road construction, and power transmission towers have contributed to the degradation of the watersheds. But the primary physical factors that have accelerated the degradation of the watersheds in the Indian Himalayas are misuse and mismanagement of land.

Among the secondary factors high pressure of human and livestock population may be included. Given these pressures, subsidiary factors, such as steepness and length of slope, geological features, and climate, intensively contribute to very high rates of erosion, runoff, and degradation.

Problems of erosion and land degradation received attention as early as the late 19th and early 20th centuries. After independence, when planning for development was initiated, soil and water conservation programmes and research and training activities were provided in the First Five Year Plan (1951-56). A close scrutiny of the agricultural development programmes reveals that emphasis was placed on watershed management only since 1974 with the start of the drought area development programme.

Forestry programmes were also initiated during the First Five Year Plan. Soil and water conservation programmes were taken up in the first plan and expanded in scope and activity with each successive plan, by the State departments of Agriculture, Forest, and Irrigation. Before the end of the Second Plan there was an urgent need to pay attention to the reduction of sedimentation rates of reservoirs. Catchment treatment programmes were therefore started from the Third Plan (1961-66). For centuries, India has developed and used tanks and ponds on an extensive scale to harvest water from watersheds and to store and recycle it for crop growth. Since the commencement of the Sixth Plan, not only the entire soil and water conservation programme but also agricultural development programmes have been firmly based on the concept of watershed management.

It was not until the Sixth Plan (1980-85) that a national policy was adopted to use watersheds as a unit of land and water resource development. During the Seventh Plan (1985-90) it is anticipated that the main thrust will be towards intensification of soil and land use surveys, continuing the ongoing programme of stabilisation of catchments of river valley projects and flood prone rivers, control of shifting cultivation, and initiation of large-scale restoration and development of wastelands.

The Himalayan River Valley Project catchments have an area of 52,000km² of which 61 per cent have been covered. A pilot project for controlling shifting cultivation was initiated in 1977/78 in Andhra Pradesh, Assam, Meghalaya, Nagaland, Orissa, and Tripura. The programmes included developing and allocating 2 ha of land for subsequent allotment to each beneficiary family.

On non-agricultural land, tree plantation programmes are being undertaken. Attention has been paid to water resource development and conservation and sediment control, by programmes such as *nala* bunding, check dams, gully plugging, land shaping, percolation tanks, water harvesting, and water conveyance. Up to 1984/85, a total land area of 27.07 million ha has been treated. In addition 2.31 million ha was treated under the central sector.

Seven catchments of river valley projects were under treatment during the Sixth Plan. Although expenditures for each plan have been progressively increasing, regrettably, the cost per hectare of land treated has also been rising. To that extent the area treated has become proportionately reduced.

From 1951 to 1980, India has invested 128,690 million rupees in agriculture and allied programmes (34.1 % on agriculture and land reforms and 18.8 % on forestry). This reflects the level of priority given to the creation of an infrastructure for increasing food production. In the Sixth Plan a quantum jump was made in the investment in the forestry sector; 6,925 million rupees as compared to the investment of 4,839 million rupees in the preceding 20 years. The centrally sponsored scheme of SOILWATCH (Soil, Water, and Tree Conservation in the Himalayas) started during the Fifth Plan. In the Sixth Plan, 250 million rupees were provided for this sector.

Watershed management programmes, in catchments of river valley projects have a primary concern to increase the life of reservoirs. In Bhakra Reservoir and Ramganga Catchment, the observed rates of sedimentation in the reservoirs were 200 per cent more than the designed inflows, and, contrary to the belief that all sediment would be deposited in dead storage, the sediment has been deposited in both live as well as dead storage. The treatment of river valley catchments, after construction of the reservoir, is at best a remedial measure. There is a need for preventive measures to be taken before the reservoir is filled. This approach has perhaps more economic advantages as will be shown later.

India has been fortunate in terms of awareness of the problems of watershed degradation. At the government level, this is evident in extensive development, research, and training programmes initiated and implemented. At the people's level, the Chipko movement in the Himalayas is a classic example showing that they are also aware of the degradation of their production base and the disappearance of water. Regarding national land use policy, the Government of India constituted, in 1984, a National Land Board under the Chairmanship of the Minister of Planning and a National Land Resources Conservation and Development Commission. The former is the apex body and the latter has been entrusted with responsibility for the formulation of policy and for its implementation.

Programmes and Policies

Himalayan watersheds, in particular, have inherent biophysical and socioeconomic constraints which impinge on the pace, quality, and growth of development. Constraints identified are:

- o isolation of the area and poor infrastructural facilities;
- o lack of efficient management sustained production; the natural system being ecologically fragile and refined;
- o a wide variation in agro-ecological conditions within very short distances due to many permutations and combinations of altitude, slope, and aspect conditions; and
- o very limited good agricultural land available which places a natural barrier on increases in food production.

The strategies implemented include the following.

- o All States, parts of States, and Union territories, located in the Himalayas, have been recognised as "**BACKWARD HILL AREAS FOR SPECIAL CONSIDERATION**". Guidelines for dealing with backward hill area problems have been provided to States and Union Territories (Planning Commission 1981).
- o The Fourth Plan, suggested a multi-directional area development approach to accelerate development of backward areas - Himalayan hill areas included.
- o The Fourth Plan recognised that in hill areas investment is high and returns low. Therefore, more central assistance was allocated to meet specific needs and problems.

A chain of soil conservation research, demonstration, and training centres was established during the first and the early part of the Second Plan. Two centres were responsible for work in the Siwalik Hill Region (at Chandigarh) and the Himalayan watersheds (Dehradun). In addition, there is an extensive network of universities, central research institutes, and State research centres in the Indian Himalayan regions.

In the First Plan, 1951-60, training of labour power for the development programmes in soil and water conservation was provided due to continually expanding watershed management programmes. The lack of trained personnel has been recognised as a major constraint in starting, implementing, and reaping better fruits from soil and water conservation. Currently, the rate of degradation is higher than the rate of restoration/afforestation.

Legislative authority on land and water issues lies with individual States. In order to enthuse, encourage, and support the State Governments to enact such legislation, the Central Government formulated a "Model Conservation Bill" in 1955, and circulated it among the States. Sixteen States and union territories now have legislation relating to soil conservation (Jacob 1981). In some States the soil conservation measures have been implemented under earlier, existing statutes, e.g., Madras Land Improvement Scheme Act (1949) and Bombay Land Improvement Act (1953).

The same is the case with the Forest Act. As a sequel to the recommendations of the National Commission on Agriculture (1976), a Central Forestry Commission was established to formulate a model bill of forests for eventual adoption by the States, since the subject of "forests" was also in the States' legislative jurisdiction. Amendments incorporated place the subject of "forests" in

the Concurrent List, confirming jurisdiction of the Central Government to also enact legislation. As a consequence, a new draft of the Forest Act has now been prepared for enactment by the Parliament.

Conclusions

With the changing socioeconomic conditions, programmes such as soil and water conservation, watershed management, afforestation, and social/community/farm forestry have an urgency. Hence there is need of new legislative approaches and initiatives. Policy initiatives regarding land use and forestry are anticipated and new legislation may be forthcoming in the near future.

Seventy per cent of land holdings are less than 1 ha and only 13 per cent are more than 2 ha, with as many as 13.5 locations per holding. The problem cannot be resolved within the present farming system. The solution may lie in development and growth of other sectors so the population is weaned away from the land.

Regarding forest land, about 50 per cent of the land in the Himalayas is under the control of the Government Forest Departments, but it is not necessarily forested land. Emphasis should be on increasing the pace of afforestation and developing a sense of a job well done.

It would appear that the situation of carrying capacity is very critical in the Uttar Pradesh Himalayas and not critical in Arunachal Pradesh. Other States fit at various levels between these two extremes. However, it is clear that in the entire region, wherever man has intervened, are pockets where the carrying capacity has been exceeded. To that extent, the entire Himalayan ecosystem in India, either extensively (as in UP) or locally is consequently subject to stress and strain. What are the options? The only option is to optimise land use and increase productivity on a sustainable basis, in conjunction with population control.

A primary source of sediment generation, instability of hill slopes, cause of landslides, erosion, and gullyng and forest degradation is road construction; yet, roads are the first prerequisite of development. The techniques and technologies of aligning and constructing roads on a scientific basis and stabilising the slopes are well-known. The issue is not technology but socioeconomics and politics. What is needed is action which ensures that, with given allocations for road construction, roads are aligned and safe based on scientific principles including provisions for drainage and slope stabilisation. This calls for managerial and political will. However, the best of roads can easily be damaged or destroyed by ecological disturbances if the surrounding forest land and grazing land is not properly used. Coordination and cooperation are the needs of the day.