

**CHAPTER III****ECOLOGY OF SIKKIM AND IMPORTANCE  
OF THE SMALL SCALE INDUSTRIES**

Environment has been conceived of as the total web of life and man enters this ecologic scene with his traditions, perceptions, means, resources and social organisations - in short his culture which affects and is effected by the total web of life. Adaptation in man is the process by which he makes effective use for productive end of the energy potential in his habitat.

Life in mountains is hard. It is a constant struggle with the uncongenial physical environment. However, the hazards and hardships of life in the mountainous region has never overwhelmed man or curbed his initiative. As a matter of fact these very hardships and hazards have had the contrary effect of bringing out the best in man in terms of adaptive skills and vigour. These two qualities are largely responsible for the self-sufficient economy of the hilly region. The people in the hills and their adaptation to their environment in view of industrialisation and other avenues of employment is an important topic of the day.

The basic characteristics of all mountainous areas is that they present a series of altitudinal zones or niches that can be exploited in different ways. In mountains, human biological interaction is static and correlational rather than dynamic and creative. An inability to appreciate the role of human response to environmental constraints leads to a focus on the natural resource base, in particular the nature of land, as the major force of change<sup>1</sup>.

The Himalayas, as the abode of snow, is taken as a vast rampart bordering the Indo-Gangetic and Brahamaputra plains on the north-west, north and north-east of India. This vast chain of mountains of the Himalayas measuring more than 2500 kilometre along its central axial range (i.e. the Central Himalaya) possess together a width ranging in between 160 mt. to more than 400 kilometre<sup>2</sup>.

In the Sikkim Himalaya, the high hills of Darjeeling form a mountain cleft and the region itself is in effect all but an enclosed basin occupied by the mountain torrent of Tista along the axis of an overturned anticline at the core of which lies Kanchanjunga, 8579 metre high, the 3rd highest point in the World and the highest in India. The Central Himalaya in Sikkim is characterised by open folding (rather than the intense homoclinal folding in Western Himalaya), the latter may be the topographic clue for the Chumbi Valley (through Nathu La) providing the easiest passage into Tibet from India across the Donkiya range (4570-5180 mt.) leading directly to Gyantse and Lhasa<sup>3</sup>.

The variation of altitude easily reveal the east west felts of soil that varies from north to south. To the extreme north, one can find mountainous skeletal soil with a very thin layer of top soil. In the foot-hill zone where the rivers debauch, one can notice a belt of gravelly and sandy soil on extreme south, some alluvial soil is found along the river beds.

The soil of this area is derived shales, schists and conglomerates which form a more sandy soil on the upper part of the foothill zone and become progressively clayey in the lower reaches.

In the zone of the tropical forest (the Southern part), the soil is well leached but is rich in humus contents. The elevation of land<sup>4</sup> in Sikkim is as under :

	<u>Type of Land</u>	<u>Level of Elevation</u>
1.	Lower Hills	Altitude ranging from 270 mt. to 1500 mt.
2.	Mid hills	Altitude ranging from 1500 mt. to 2000 mt.
3.	Higher hills	Altitude ranging from 2000 mt. to 3000 mt.
4.	Alpine zone	Altitude above 3000 mt. with vegetation, and
5.	Snow Land	Very high mountains without vegetation and with perpetual snow cover upto 8580 mt.

As compared to Western Himalaya this part has a warmer and a more humid climate. To the north Sikkim, the area having been occupied by the greater Himalayan range has hardly anytime when the temperature is above freezing point. The maximum ever temperature recorded 32.2° Celsius in 1957 and minimum ever recorded -9.7° Celsius in 1961. Sikkim is the most humid place in the Himalayas because of its proximity to Bay of Bengal and its exposure to the moisture bearing South Western monsoon winds. The average, annual rainfall varies from 821.1 milimetre to 3494.5 milimetre<sup>5</sup>. Interestingly, the Capital Gangtok observe highest annual rainfall of 3494.5 milimetre.

In tropical zone (upto 1500 metres) figs, far, orchids and oaks are most common species.

Among minerals coal, copper and dolomite are important.

The mainstay of economy of Sikkim is agriculture. Rice, maize, millet, cardamom, mandarin, orange, apple, potatoes, ginger and soyabean are the main products.

The ecological balance in Sikkim hills lopsided, gradually. However, this environmental degradation is a global phenomenon. Increase in population, soil erosion, depletion of forest, over stocking of cattle, destruction of valuable flora and fauna and lack of infrastructure have become perinneal problem in this region.

The problem of over population in Sikkim caused concern alongwith the rest of the country. A sizeable number of people from plain land migrated regularly to Sikkim. Again huge number of tourist-influx causes concern during tourist season. Because over population creates scarcity in water supply, electricity and weaken the soil by cutting trees and hills for housing.

Soil erosion results lowering of the production capacity of the soil. It is estimated that it takes 500 to 1000 years to form an inch of top soil<sup>6</sup>. It is obvious that enormous amount of soil from the mountains of Sikkim is being lost to the Teesta river every year and there is no effective means yet evolved to stop the outflow of this vital component of environment.

The main causes of soil erosion are traditional agricultural system, removal of forest cover whereby the soil is directly exposed to the effect of weathering. It is estimated that the forest area has diminished from over 60.0 percent original to 10.0 to 15.0 percent. It is estimated that about 22 million to 45

million cubic feet of soil are annually washed down through landslides and soil erosion associated with road construction<sup>7</sup>.

Denudation of forest is done for housing and dishonest earning. It has severe effect on climate and rainfall in Sikkim. Overstocking of cattle leads to destruction of young seedlings thus impeding regeneration of forest. Destruction of scientifically unstudied and unused flora and fauna caused loss to the environmental study. A lot of medicinal plant could be effectively used for earning and employment with sound ecological management.

Lack of infrastructure has caused inaccessibility in many parts in Sikkim and hindered spread of economic and industrial activities. Thus ecological pressure is being mounted on certain places due to futility in infrastructural facilities all around.

Keeping in mind above ecological hazards for such a mountainous terrain, improvements and modernisation cannot be easily achieved unless there is considerable investment for development of the infrastructure of better communication facilities and proper planning for education, health, unification and economic development.

In 1978, the Department of Industrial Development, Government of India and the All-India Financial Institutions i.e. IDBI, IFCI, ICICI and SISI conducted two separate studies and recommended not to establish large and medium scale industries for lack of infrastructure. They specified a number of SSIs and fixed some criteria for selecting viable projects.

These industries —

- (i) Should not involve sophisticated technology;
- (ii) Should not require transport of raw material of high volume;
- (iii) Should have high value added part; and
- (iv) Should have a low break-even point.

With the establishment of Directorate of Industries in 1976, a list of viable industries were made as under :

(A) Agriculture, Horticulture, Animal husbandary and forestry based industries viz.,

1. Ginger dehydration and Ginger Oil extraction;
2. Cardamom drying;
3. Vegetable seed production;
4. Fruit Nurseries;
5. Fruit Processing and Preservation;
6. Integrated Wood Working;
7. Pencil, incense and agarbati manufacture;
8. Floriculture;
9. Cheese and Milk Products manufacture.

(B) Engineering and Allied Industries, viz.,

1. Tin containers manufacture;
2. Wooden electrical fitting;
3. Diesel nozzle unit;
4. Electronics complex (selected items);
5. Polythylene film and bag manufacture;
6. Soap based on non-edible oil;
7. Battery manufacturing and charging Unit.

(C) Rural Industries, viz.,

1. Handlooms;
2. Carpet weaving.
3. Tribal Jewellery;
4. Thanka drawing;
5. Wood carving;
6. Bamboo and cane work;
7. Sericulture;
8. Bee keeping;
9. Knitting wares.

The above mentioned industries were assumed to be environment friendly. As time elapsed and situation warrants, the government has to materialise different avenues of development. In this process, future should also be considered with present. The decision makers should create awareness and find out devices to control pollution, effluent etc.

The Department of Environment, Government of India, can take up the problems of the mountain environment which on account of the environmental conditions have specific problems of both physical and socio-economic environment. A.S. Paintal in his presidential address of the Indian Science Congress at Lucknow in 1985 had emphasised the need for developing a Department of Mountain Development apart from the existing Department of Environment.<sup>8</sup> The great variety of environment with the multiplicity of specific conditions requires to be assessed properly. Tourism, hydel generation and mineral exploitation, horticulture and plantations have tremendous potentialities but the response of the diverse Himalayan People with their own socio-economic traits is the most important factor.

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