

Sikkim Himalayas : Ecology and Resource Development

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ABSTRACT Sikkim, a small mountainous state in the Eastern Himalayas has witnessed great changes in its political system, social structure, economic life and cultural values during the past hundred years. The process of change was quickened by currents from four different directions, resulting in a multiform ethnic mix. Sikkim is divided into numerous small valleys with an uneven distribution of population, and with inadequate communication facilities. The economy of Sikkim is overwhelmingly rural and agricultural. Industry, whether small or large scale is insignificant. Different ethnic groups are characterised by specific ecological adaptations, as well as by the social organization of the region where they live. The traditional human interaction with the environment experienced by the entire Sikkim State had always remained with one another that developed into a totality and a closed system. The ecological conditions and finite resource base had limited production abilities, but the scattered village communities were self sufficient with its agro-pastoral subsistence level economy and had almost fixed output of food grains and livestock products. The primitive and conventional methods of agro-pastoral activities and operative technologies did not generate enough surplus for export except for local and to certain extent inter-regional trade limited mostly to barter system. The development programmes in the State were directed towards improving condition in the villages, where most of the Sikkimese live. No society remains changeless; it always changes because of self-propelled forces. But if directed and planned change has to come it must be beneficial and ameliorative to all. The process of planned economic development in Sikkim was initiated in 1954. The political integration of Sikkim with the rest of the country has incited the processes of economic development in the state. In the present study an attempt has been made to study the issues of development : problems and recommendations.

INTRODUCTION

The most important mountainous region threatened with ecological disaster is the Himalayas. Step by step, nature is being destroyed and human, terrestrial and aquatic life are being shortened by the effects of de-

velopment, in the form of landslides, sedimentation, the eutrophication of reservoirs, lakes and rivers, the drying up of springs etc. The fast-growing population and the human aspirations for a better standard of living have increased pressure on land. The felling of trees for timber, fuel, fodder, building construction, road construction, dams and canal construction and the development of sites has caused crop land to be seriously damaged and the vegetal cover of the ground has been destroyed.

The paramount importance of environmental protection and regeneration is recognized not only because Himalayas are a source of water for irrigation and hydro-electricity, and of natural resources, but also because of their crucial importance for the survival and growth of the people living in the Himalayan region. In view of the need to balance economic development with the imperatives of environmental conservation of mountain ecosystems, the protective, regeneration of resources and protective strategies should be visualized. The resource base has to be projected in all its aspects, namely soil, forest, water and other natural resources present in the ecosystem. The basic strategy should be development without destruction.

Development is difficult to describe or to measure, because it involves multi-dimensional qualitative changes and that too irreversibly large ones (Hicks, 1957). That is why development is more complex than growth which require merely incremental changes in quantity. In analytic terms, growth is a linear, marginal phenomenon while development is a nonlinear process which stretches the economy beyond the elastic limit and bends it into a new shape altogether

(Indiresen, 1990: p.14). There are as yet no accepted standards for indicating the quality of development. In evolving development indicators, it is the usual practice to select significant consequences of development, such as literacy and infant mortality. The choice which set of factors constitute significant elements in development —is a subjective one. Gross National Produce (GNP) is a poor indicator of the status of development. Therefore, to GNP we add several other factors as well.

The emphasis in development planning underwent a major shift between the 1950s and the 1970s. In the 1950s, the stress was mainly on industrialization to achieve economic growth. The bottlenecks in this type of economic growth were lack of capital and supporting physical infra-structure. Purely growth-oriented development strategies which neglected social-sectors and poorly helped in reducing poverty levels produced dissatisfaction. Thus began an era in development economics in which importance was given to investment in human capital and in so called "informal" sectors of economy.

The mid 1980s saw ideas about human resource development, wherein the main focus was on central role of human beings as the key factor in the development processes. Balanced and integrated treatment of the supply and demand was emphasized. This human capital approach was seen to supply-sided and seeks to link, "the productive role of human resources that is the care of human capital theory with the consumption role of human resources embodied in the quality of life literature. The mechanism that link these two roles is rewarded participation in economic activity, which simultaneously provides individuals with the incentive to invest in human capital and the means for improving their quality of life..... not only are..... investments in human capital a vital source of increased production, but the most important human capital investments, in health and ed-

ucation, are simultaneously highly valued items of consumption in developing countries and among the most important determinants of the quality of life" (Corner, 1991:8).

The humans are not mere users and exploiters of other resources, but they themselves are a resource for their own use. The human resource development involves reduction in human reproduction curbing population explosion and promoting economic growth through increase use of human power. There is difference between 'Human Development' and 'Human Resource Development.' Human Development is a broader concept with emphasis of ethical and non-economic aspects of socialisation and enculturation. The Human Resource Development use humans as resources and acknowledges the need to develop them, so that they can be means to further human development. It means manpower deployment for the betterment of quality of life. There is a need to develop a holistic approach of human development. In their dual role as both the object and a key instrument of development, people must be central in development planning.

Sikkim, a small mountainous state in the Eastern Himalayas with an area of 7899 square kilometers, has witnessed great changes in its political and social structure, economic life, and cultural values during the last hundred years or so. The process of change was accelerated by currents from four different directions, resulting in a multiform ethnic mix. The geographical location of Sikkim has exposed it to outside influences. Its religious and cultural life has been strongly influenced by Tibet. And by virtue of being a protectorate of India until 26 April 1975, it became the twenty second State of India.

The political integration of Sikkim in to the Indian Nation has led to economic development in the state. The Sikkim state, so far unblemished by industrialization and modernity is now open to various forces of development especially technical and educational

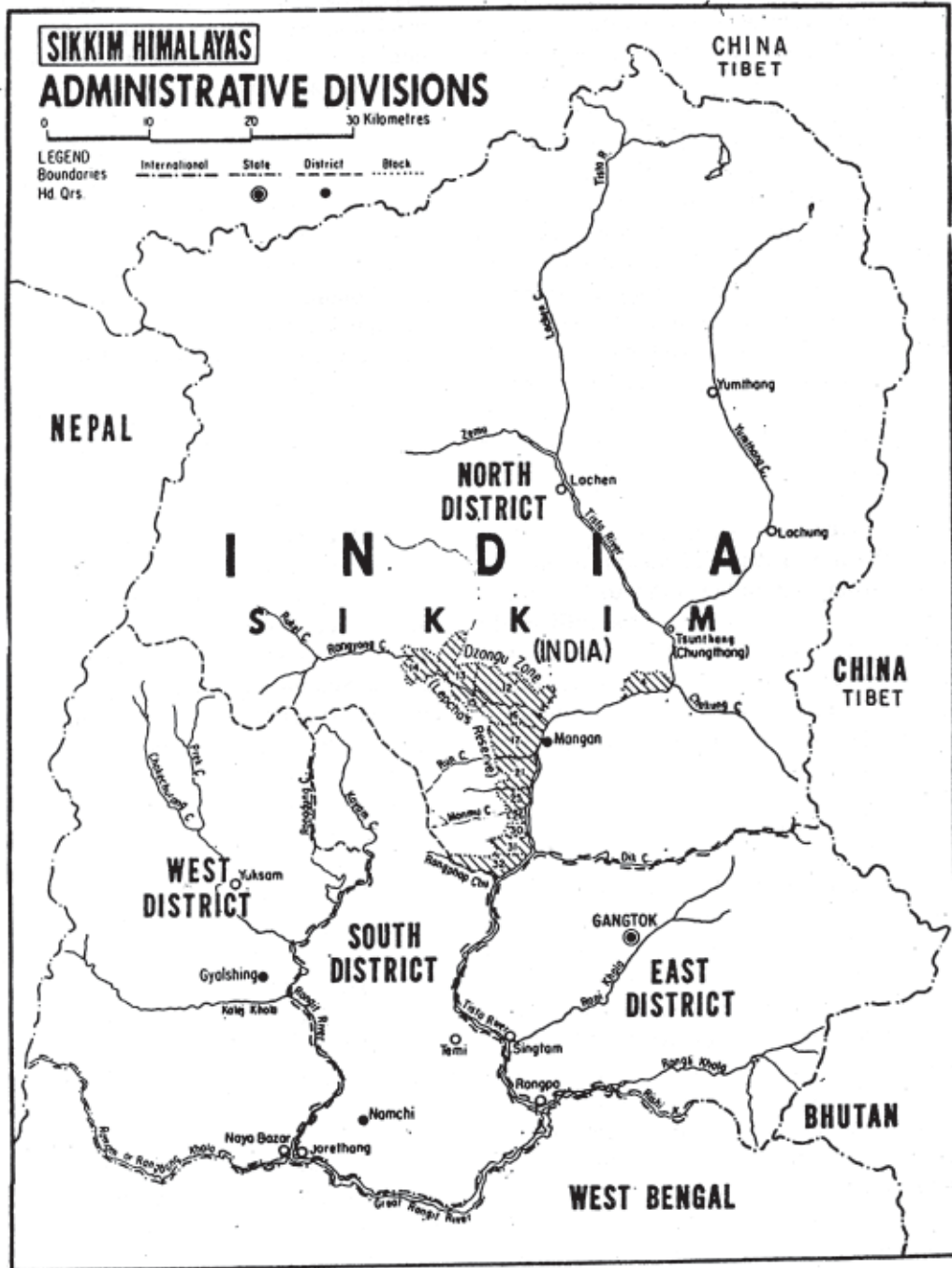


Fig. 1. Sikkim Himalayas : Administrative Divisions

programmes. With more scientific knowledge and ecological understanding of the region the development programmes can be made more beneficial. The negative factors of developmental change can be limited by careful planning with detailed knowledge of existing natural, human and cultural resources.

With the objective stated, a project was framed to study the impact of technology and community development programmes on the people of Sikkim. To assess the human activities (transfer of technology and community development programmes), data were collected by observation and interviews. Different schedules were prepared in order to gather information *vis-a-vis* different aspects of human life as well as the extent to which different programmes have affected the life of the people.

A comprehensive field survey was carried out in the four districts of Sikkim during the period from September 1981 to December 1983. It is felt, that this project is sufficiently broad in its coverage to be of value to anyone interested in data interpretation regarding man-environment interaction pertaining to Sikkim especially by planners, administrators and scientists.

SIKKIM STATE

Viewed broadly, the Himalayas is cut across by three major linguistic, cultural and racial stocks. The valleys of these mountain ranges are inhabited by different ethnic groups having Mongoloid and Caucasian features, and speaking Indo-Aryan and Tibeto-Burman languages. Two great religions: Hinduism and Buddhism co-exist. In Nepal, during the course of time, this co-existence has resulted in an amalgamation of Buddhist and Hindu practices and beliefs. A different situation exists in Sikkim where Nepali migration is a recent phenomenon. The impact of this migration has been great and has social and cultural ramifications. In Sikkim, the re-

lationship between the established Buddhist Sikkimese population and the Nepali Hindus has led to competition and confrontation culminating in the dethronement of the Buddhist monarch and the incorporation of Sikkim into the Republic of India.

Sikkim, a small mountainous State in the Eastern Himalayas with an area of 7299 square kilometres, has witnessed great changes in its political structure, social structure, economic life and cultural values during the past hundred years. The process of change was quickened by currents from four different directions, resulting in a multiform ethnic mix. It lies between 27° and 28°N latitude and 88° and 89° E longitude (Fig.1). To its north lies the Tibetan plateau; to the west, the kingdom of Nepal; to the east, the kingdom of Bhutan and the Chumbi valley of Tibet and to the south, the Darjeeling District of West Bengal. The State is almost rectangular in shape, being 1.3 kilometres long and 64 kilometres wide and the elevation varies from 300 to 8400 metres above mean sea-levels. Sikkim has been strongly influenced by Tibet in its religious and cultural life. By virtue of being protectorate of India until 26 April, 1975, it has been politically and economically influenced by India and became the twenty-second State of India after that.

Before its assimilation into the Indian Union, Sikkim was an independent kingdom ruled by a hereditary *Maharajah*, who was assisted by large landowners, the *Kajis*, in the administration of the State. The *Kajis* were hereditary ministers. During the British rule, the *Maharajah* was also assisted by British Political Officers along with the hereditary *Kajis*. The *Maharajah* was a Buddhist and Buddhism flourished greatly because of the encouragement to the Lamas and the setting up of monasteries. There were no Christian missionaries in the State at that time and Europeans could not enter Sikkim without a legal permit. The State was closed to outsiders because of its strategic position

between Nepal, Tibet and Bhutan.

Physical Geography

Sikkim is a hilly state consisting of a tangled series of interlocking mountain chains rising range above range from the south to the foot of the wall of the high peaks which mark the snow line in the north. The highest peak is Kanchenjunga 28200 feet (8595 metres). The northern portion of the state is deeply cut in to steep escarpments, and, except in the Lachen and the Lachung valleys, is not populated. Southern Sikkim is lower, more open, and fairly well cultivated.

This configuration of the country is partly due to the direction of the main drainage, which is southern. The physical configuration of Sikkim is partly due to geological structure. The northern, eastern and western portions of the state are constituted of hard massive gneissose rocks capable of resisting denudation to a considerable extent. The central and southern portion, on the other hand, is chiefly formed of comparatively soft, thin, slaty and half-schistose rocks which are denuded easily, and it is this area which is the least elevated and the best populated in Sikkim (Bose, p.57 *c.f.* Risley, 1894).

Sikkim is predominantly occupied by unfossiliferous metamorphic and crystalline rock groups under the inner and axial tectonic belt. The higher regions to the north and

beyond are covered under the Trans-axial belt and are less investigated. The inner belt is essentially made up of Pre-Cambrian Daling and Darjeeling Group of Meta-Sediments and minor developments of the Buxa group of rocks. The axial belt exposed the crystallines of the central region and intensive granites. Geologically mobile belts and weak structural features are known to be the cause of thermal springs in different districts.

Composition of Population

According to the Census of 1991, the population of Sikkim is 406457 out of which 369451 are rural and 37006 are urban *i.e.*, 91.90 per cent of the total population is rural (Census of India 1991). The density of population is low and varies from region to region. The average density of population per square kilometre is 45. In June 1978, the Bhutias, Lepchas, Sherpas and Doptapas were notified as Scheduled Tribes. The Kami, Damai, Lohar, Majhi and Sarki have been classified as Scheduled Castes which constitute 5.8 per cent of the total population of Sikkim. They are smaller in number in the North District, though evenly distributed in the other three districts.

The decennial growth of population since 1901 (Table 1) shows a massive increase, the reason being not only the increase in birth rate but the Nepali migration which was ini-

Table 1 : Decennial growth of population (1991 Census) of Sikkim state

Year	Population			Decennial Variation	Percentage Decennial Variation	Density per sq. km.
	Total	Male	Female			
1901	59014	30795	28219			8
1911	87920	45059	42861	+ 28906	+ 48.98	12
1921	81721	41492	40229	- 6199	- 7.05	12
1931	109808	55825	53983	+ 28087	+ 24.37	15
1941	121520	63289	58231	+ 11712	+ 10.67	17
1951	137925	72210	65515	+ 16205	+ 13.34	19
1961	162189	85193	76996	+ 24464	+ 17.76	23
1971	209843	112662	97181	+ 47654	+ 29.38	30
1981	316385	172440	143945	+ 106542	+ 50.77	45
1991	406457	216427	190030	+ 90072	+ 28.47	57

tiated by the British and has been a continuous process up to the present day. Nepali migration has altered the ethnic scene in Sikkim. The Census of 1931 registered 25790 Lepchas, but this number also included the Lepchas of Derjeeling. It is generally estimated that the number of Lepchas in Sikkim in 1931 amounted to about 13000 out of 110000. Today the balance is still more to the disadvantage of the Lepchas, even though their number may have increased.

In order to prevent the Nepalese from completely taking over the land from the Lepchas, the Sikkim Government reserved a particular area, Dzongu, in the central and northern part of the country, for the Lepchas. Now the Lepchas are Buddhist, though at one time they worshipped the spirits of the mountains, rivers and forests, a natural outcome of their surroundings. The religion of the Bhutias is a form of Lamaism. The Nepalese, who migrated from Nepal, are Hindu by religion (except for the Sherpas and the Tamangs who are Buddhists) and have the usual division into castes.

Some of the major groups in Sikkim are found throughout the State, while Scheduled Tribes like the Lepchas, Bhutias, Sherpas and Doptapas are found in limited areas. All these groups are characterized by specific ecological adaptations, as well as by the social organization of the region where they live. Most groups are culturally adapted to certain altitudes which has been a barrier to overall population mixture.

Many languages and dialects are spoken in Sikkim. The three main languages of the State are Nepali spoken by about 90 per cent of the population; Bhutia by about 28 per cent and Lepcha by about 10 per cent. Various other dialects of ancient Nepali tribes which are in use are Gurung, Limbu, Kharabu, Mangari and Murmi. The Lepchas and the Bhutias speak their own language, though many of them can understand and speak Nepali since majority of the agricultural labour-

ers and helpers are Nepali. Hindi is generally understood by a majority of the people. English is the official language of the State and is used for both external and internal communication.

Lamaism, Hinduism and Animism are practised by different ethnic groups, but it is very difficult to classify them accurately. Some Nepalese are Hindus and others are Buddhists, while the Lepchas are Animists and Buddhist. The religion of the Scheduled Castes is uncertain.

The red sect Lamaism of Tibetan Buddhism is the official religion of the State, with thirty-eight major monasteries and several small *Maneys*. The Red sect has the Tibetan Saskya Lama as its supreme head. It is the oldest branch of Lamaism and its monks enjoy the privilege of marriage. Many Sikkimese monks are married. They live with their wives and children on their farms, devoting regular periods, to religious services in the Gompas to which they are attached. Because of the mass migration of Nepalese, the followers of Hinduism are numerically superior in Sikkim as the Nepalese are devout Hindus. There are also a few hundred Christians, converted by the Finnish and Scottish missionaries.

The form of Buddhism prevalent here is not of the most spiritual type. The craving for protection against malignant gods and demons causes the people to pin their faith on charms and amulets and to erect tall prayers flags, with strings of flaglets, which flutter from house-tops, bridges, passes and other places believed to be infested with evil spirits. Prayers hang upon the people's lips. The prayers are chiefly directed to devils, imploring them for freedom or release from their inflictions, or plain naive requests for aid in obtaining the good things of life. The popular religion both of the Hindus and the Buddhists is based on demonolatry and in this there is no deep cleavage between the two sects. Even the Brahman joins the other

peasants, both the Hindus and the Buddhists, in making regular contributions to the Buddhist monasteries in order that the Lamas may protect their crops from hail.

Since 1970, with the spread of education, some changes have taken place, but the essential structure has remained the same. In multi-ethnic villages, the interrelational pattern is expressed mainly in commensal behaviour, that is, what a person can eat or drink, where and what he can give or take from whom. Of almost equal importance are the rules governing marriage. All the ethnic groups have their own taboos concerning the eating of flesh of certain animals. The veneration of the cow is accepted by practically all Nepali groups except the Sherpas and the Tamangs. Earlier, the Brahmans and the Gurungs did not indulge in drinking *Rakshi* and *Tumba* (local liquor), but now some peo-

ple do drink, though not in public. It was considered bad for them, whereas it is and was customary for the Rai to prepare liquor at home. The Brahmans and the Gurungs who have taken to drink these days, do not prepare liquor at home but buy it from others. The specific rules governing intercaste interaction between Nepali groups are always within the general framework of the Hindu caste system, though with some regional variations.

There are fourteen different groups inhabiting Sikkim. The Lepchas, Bhutias, Sherpas and Tamangs are Buddhists, while other groups are Hindus. Among the Hindu groups there is a major cleavage between touchables and untouchables. This distinction rests on the ability to pollute merely by touching with hands or by touching certain cooked food items. The Brahmans and the Chhetris are at

Table 2 : Distribution of ethnic groups by religion and language in Sikkim state

S. No.	Ethnic Groups	Religion	Language	Per cent
1.	Lepchas*	Buddhism	Lepcha	12.8
		Christianity	(Tibeto-Burman)	
2.	Bhutias	Buddhism	Bhutia (Tibeto-Burman)	14.1
3.	Shepas	Buddhism	Sherpa (Tibeto-Burman)	3.7
4.	Tamangs	Buddhism	Tamang (Tibeto-Burman)	5.0
5.	Brahmans	Hinduism	Nepali (Indo-Aryan)	8.4
6.	Chhetris	Hinduism	Nepali (Indo-Aryan)	11.6
7.	Pradhans (Newars)	Hinduism	Nepali/Newari	3.5
8.	Rais	Hinduism	Nepali/Rai	14.6
9.	Limboos or Limbus (Subba)	Hinduism	Nepali/Limboo	9.4
10.	Mangars	Hinduism	Nepali/Mangar	2.6
11.	Gurungs	Hinduism	Nepali/Gurung	6.1
12.	Scheduled Castes	Hinduism	Nepali/Indo-Aryan)	5.9
13.	Trading communities			2.2

* A few follow Christianity

Table 3 : District-wise distribution of revenue and panchayat blocks in Sikkim state (Census 1981)

S. No.	District	District Headquarters	No. of Panchayats	Total No. of Revenue Blocks	No. of Uninhabited Revenue Blocks	No. of Towns
1.	North	Mangan	21	54	3	1
2.	East	Gangtok	68	128	2	3
3.	South	Namchi	66	145	1	2
4.	West	Gyalshing	60	120	1	2
	Sikkim		215	447	7	8

the top of the social ladder. The Pradhans, Mangars, Gurungs, Limboos and Rais belong to the touchable groups and the Kami (metal workers), Sarki (leather workers), Damai (tailors), Lohar (blacksmith) and Majhi (fishermen) are Scheduled Castes. The Sherpas, the Tamangs, the Lepchas and the Bhutias as non-Hindu ethnic groups are fitted into the system in ranks below the touchables.

The ethno-historic characteristics of the various population groups represented in Sikkim are as follows:

Lepchas: The Lepchas are about 13 per cent of the total population and are one of the Scheduled Tribes. They are probably of indigenous origin since they have no recorded history of migration. Buddhism was accepted as a religion by most of the Lepchas. Whereas the Lepchas formerly subsisted upon hunting and shifting cultivation in the dense forests, where they constructed pile dwellings made of bamboo (Si-Khim, Tibetan=bamboo houses)—they are now mainly landowners or workers on the land. In the Dzongu area of North Sikkim their chief occupation is cardamum cultivation with very limited activities for horticulture and agriculture pertaining to other crops. It may be mentioned here that this area has remained inaccessible for a very long time and no one other than a person originally from this area was permitted to trade or reside there. Thus one can say that the Lepchas of the Dzongu area (North Sikkim Lepchas) are culturally the most isolated group. The language of the Lepchas belongs to the Himalayan group of the Tibeto-Chinese language family.

The Lepchas were always regarded as being on a lower plane of civilization than other ethnic groups of Sikkim, and considered independence more valuable than a settled routine and life style. They had less communication with the outside world and fewer trading facilities and opportunities than the Bhutias and the Nepalese. The Dzongu region was characterized by great environmen-

tal richness and diversity. The inhabitants hunted, fished, gathered wild-plant products and engaged in slash and burn cultivation. In Dzongu, slash and burn cultivation was sufficiently productive in combination with other subsistence and productive activities, to account for the small permanent hamlets. Social organization was at chiefdom level with the *Mandal* as village chief dealing with outsiders. However, the rest of the community remained undifferentiated, the main stratum not having any real roots. The Lepchas had an efficiently organised system which made possible the distribution of the varied resources and products of their land.

The geographical position of Dzongu has accentuated its isolation from the rest of Sikkim. Due to this, Dzongu had not benefitted from the development which has taken place in North Sikkim in the shape of roads and communications — thanks to military settlements—as it does not fall on the highway. The Lepchas of Dzongu even now practise slash and burn agriculture (though in restricted areas of upper Dzongu) and grow dry rice, buckwheat, millet, and barley in these fields following a seven-year rotation cycle. Along with this, they practise sedentary cultivation of wet rice, maize, wheat and vegetables. Cardamum as a cash crop was introduced at the beginning of this century. Though still a reserved area, the isolation barriers are gradually disappearing as the government sponsored development schemes are being implemented. (One has to obtain a permit for visiting the Dzongu area. The Deputy Commissioner alone can issue the permit).

Bhutias: The Bhutias are of Tibetan origin (Bhutia means Tibetan). They are about 14 per cent of the total population and are also a Scheduled Tribe. Most of them now-a-days are farmers, but some of them are still herdsmen and breeders of sheep and yaks, which is their original profession. Their religion is Buddhism, and their language belongs to the

Bhotia group of the Tibeto-Chinese language family. The Bhutias, who took refuge in Sikkim after the schism in 15th and 16th century, are now spread out in all the districts of Sikkim. However, the Bhutias in the North Sikkim, inhabiting the two river valleys of Lachen and Lachung, situated on the banks of the tributaries of the Tista-Lachenчу and Lachungчу are known as Lachenpas and Lachungpas, respectively.

These areas are specially reserved ones where the right to settle or own land is not allowed to outsiders, irrespective of their ethnic origin. The inhabitants of these valleys do not conform to the general pattern prevalent in Sikkim, even among other Bhutia communities. The Lachen and Lachung area has a special status with regard to settlement, land revenue and local administration.

Lachen and Lachung have their own traditional local government system. The provisions of the 1965 Panchayat Act are not extended to this area. For centuries they had grazed their herds in the Khama Dzong section up on the northern borders, marginal agriculture and animal husbandry is not sufficient to sustain a large population, so the people of Lachen and Lachung indulged in marginal trading activities with the Tibetans across the borders. The barter of timber, wood, dye stuffs and dairy products of that region for Tibetan salt and wool formed the basis of this trade. The people of Lachen and Lachung pursued it as an occupation intimately inter-woven with their pastoral activities. Thus, as long as trade was unhampered by political restrictions, it enabled them to remain economically independent. However, with the closing of the Tibetan border in 1962, social life changed for these people. It deprived the Bhutias of their livelihood and had an adverse effect on their traditional crafts. As long as Tibetan wool was imported in large quantities, weaving flourished and they produced a variety of woven articles. Such partial transformations of economy

have led to many changes in the Bhutia society. The situation of the Bhutias is unlike that of other ethnic minorities and it does not conform to the usual pattern of integration into larger economic and political systems. Political events beyond their control have led to the transformation of their traditional economic system, forcing them to reorient it. Variations in the economic strategies of the Lachenpas and the Lachungpas emerge from several factors, showing interrelations of ecology, technology and social organisation. Limiting factors operating in the subsistence economy of the region are elements of the physical environment, biological environ-

Table 4 : List of revenue village (with location Code No.) Categorized under four Districts of Sikkim state from where data were collected

S. District No.	Revenue Village
1. North District	Lachen (1), Lachung (2), Naga Namgor (6), Singhik (18), Zimchung (20), Tingchim (23), Upper Mangshila (24), Heegyathang (25), Phadong (36), Kabi (43), Tingda (44).
2. East District	Sumdong (12), Ranaka (15), Sicheygaon (16), Chandmari (17), Tathangchen (21), Tumen (26), Rewate Rumtek (31), Tadong (32), Syari (33), Samdur (37), Lingzey (Assam) (39), Assam (48), Martam (52), Khamdong (56), Aho (66), Parkha (74), Sakyong (81), West Pendam (82), Lingzey (Sumen) (83), Tarethang (91), Lingtam (97), Aritar (105), Rhenak (108), Central Pendam (114).
3. South District	Rabong (24), Kewzing (34), Tarku (45), Temi (47), Wak (51), Salghari (96), Rateypani (105), Bikmat (106), Sadam (115), Sumbuk (1224), Turuk (126).
4. West District	Arithang (8), Yuksum (13), Yangthang (37), Sapong (42), Dentam (52), Hee (56), Bamyak (59), Barthang (60), Namgoon (Kishenpong) Zoom (91), Chakung (92), Soreng (94), Karthuk (96), Rumbuk (98), Okhrey (102).

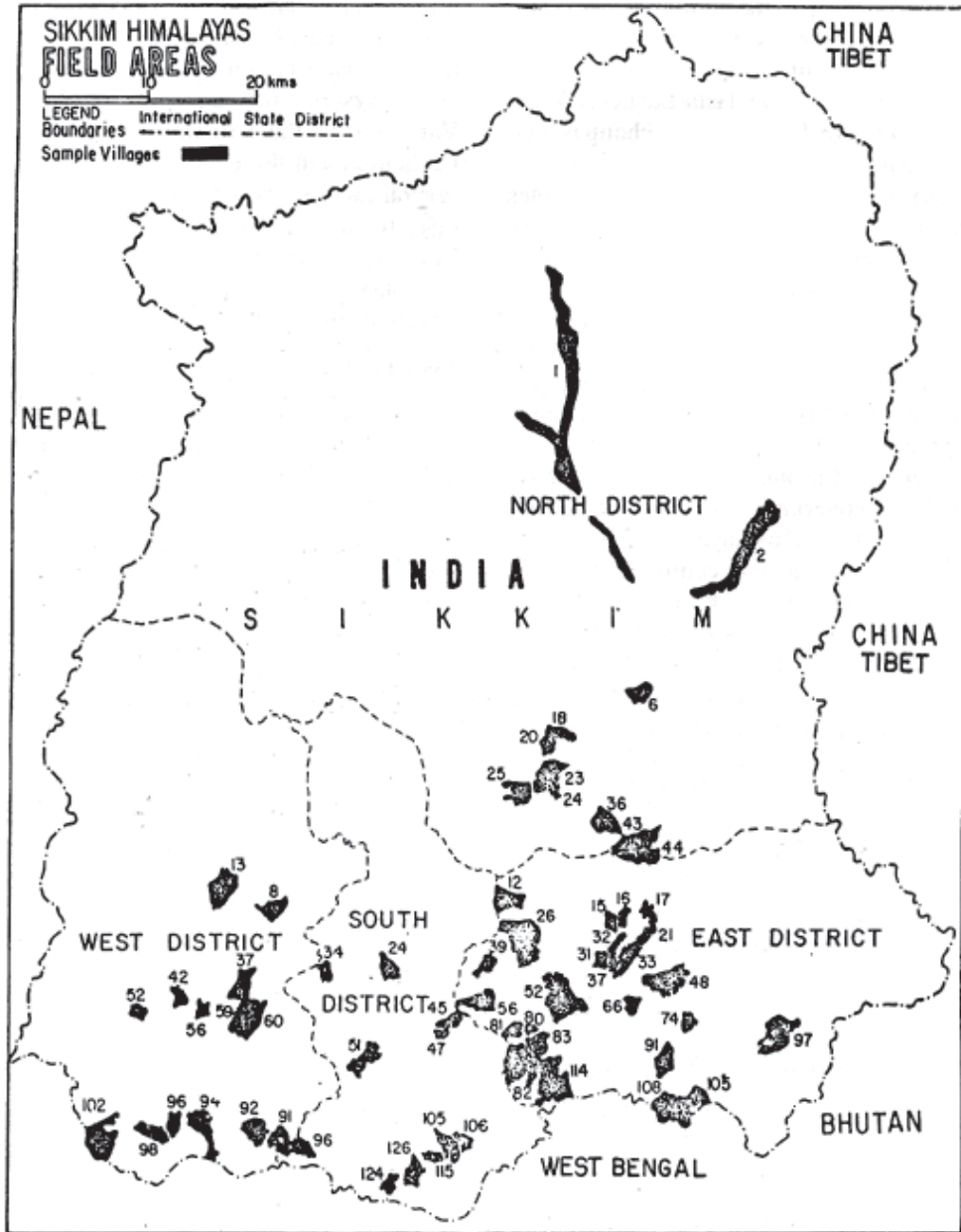


Fig. 2. Sikkim Himalayas : Field Areas

ment, socio-cultural environment and external elements. The latter are external markets, traders, employment opportunities outside the traditional sources and government sponsored programmes.

Sherpas: The Sherpas, another Scheduled Tribe of Sikkim, constitutes about 3.7 per cent of the total population. They are mainly found in the western parts of Sikkim. The Sherpas originated most likely from East Tibet and migrated from there to the eastern parts of Nepal, which they reached in the first decades of 16th century. During the last three centuries, some groups of them immigrated into the adjacent part of Sikkim. There is some evidence that the Sherpas have mixed with the Tibetans (Bhutias). Most of them are small land-owners or cultivators. They are followers of Buddhism. Their language belongs to the Bhotia group of the Tibeto-Chinese family.

Tamangs: The Tamangs form about 5 per cent of the total population of Sikkim. They are also followers of Buddhism and are said to have come originally from Central Tibet. Their language is classed with the Tibetan Chinese language family (Himalayan group). The Tamangs are mostly farmers. They are spread over all parts of west, south and east Sikkim, which they populated long ago from Nepal. They are therefore one of the so called Ancient Nepalese Group.

Brahmans and Chhetris: They constitute about 8.5 per cent and 11.5 per cent of the population of Sikkim, respectively. They are spread in all the Districts of Sikkim except the North. Their language is Nepali (Indo-European language family). The name Chhetri is probably derived from Kshatriya (=warrior caste of the Hindu caste system). These two Indo-Nepalese groups are of Caucasoid origin and immigrated into Sikkim mostly during the last hundred years.

Pradhans (Newars): The Pradhans are members of the Ancient Nepalese Group. They are Hindus by religion. Their language

belongs to the Tibeto-Chinese language family (Himalayan group). They constitute about 3.5 per cent of the Sikkim population. The Newars were the first people of Kathmandu valley, from where they immigrated into Sikkim. In Nepal they are divided into two great religious groups: Hindus and Buddhists. The Pradhans of Sikkim belong to the Hindustic Shreshta caste group. Their main occupations are trade and handicrafts.

Rais: The Rais form now 14.6 per cent of the total population of Sikkim and are concentrated in the Western and Southern Districts of Sikkim. They are Hindus and belong linguistically to the Tibeto-Chinese language family (Himalayan group). Together with the Limboos they are known as the Kiranti group, which most likely has its origin in Tibet. Thus the Rais and the Limboos have apparently a common origin, but today they live separately.

Limboos or Limbus (Subbas): This group is also addressed as Subbas, which means headman or chief. They constitute 9.4 per cent of the population of Sikkim and are mostly found in the western and southern parts of the State. In other respects, too, they correspond to the Rais, with whom they form another Ancient Nepalese Group, which immigrated into Sikkim during the last two centuries.

Gurungs: The Gurungs (about 6 per cent of the total population of Sikkim) belong also to the Ancient Nepalese Group, but they are Hindus. Their language belongs to the Himalayan group, of the Tibeto-Chinese language family. The Gurungs are most likely to be traced back to one of the old Mongoloid mountains population of Nepal, which have mixed with Caucasoid immigrants coming from South, and which have given up their traditional cultural patterns including religion and language. They immigrated into Sikkim during the last two centuries.

Mangars: In this connection another Sikkim population has still to be mentioned,

the Mangars, who are related to the Newars and are only 2.6 per cent of the total population of Sikkim. They are Hindus by religion. Their language belongs to the Himalayan group of the Tibeto-Chinese family. The Mangars are the largest ancient ethnic group of Nepal, from where parts of them immigrated into Sikkim, where they are mostly spread in the West and South Districts.

Scheduled Castes: The five castes—*Damai* (Tailors), *Kami* (Smiths), *Lohar* (Blacksmiths), *Maji* (Fisherman) and *Sarki* (Cobblers) are referred to as the Scheduled Castes of Sikkim. They are about 6 per cent of the total population of Sikkim and immigrated during the last hundred years from Nepal and West Bengal. Their language belongs to the Indo-European language family; their religion is Hinduism (Table 2)

At the ethnic level, it is difficult to determine who dominates the economic scene. Traditionally, all land belonged to the king, who used to give portions of it to his cronies, courtiers, *Kazis* and the like in return for their services. These in turn, used to appoint the village headman—the *Mandal* who, in turn, could rent out the arable land to the individual families of cultivators. The cultivators were obliged to work for the *Mandal*, the aristocracy, the bureaucracy, the clergy and the landholding and estates of the rulers were privately and personally owned by them. Besides the private estates, five monasteries had their own estates.

The major portion of the trans-Himalayan trade was in the hands of Marwaris, the ar-

istocracy, and some of the Lamas. With the sealing of the Indo-Sino borders, the Bhutia traders lost their business. Now the commercial establishments are controlled by the Marwaris and Madesia traders from the Indian plains. They are money-lenders, general merchants, hoteliers, wine vendors, clothiers, wholesale dealers etc.

The agriculture sector is dominated by the Nepalese, who are industrious and practise intensive agriculture. The Lepchas practise subsistence agriculture. The Bhutias with their large animal herds practise pastoral economy on high altitudes. In the traditional structure, which exists even today, the elite owns the estates, commands wealth, status and a degree of power. The estates in rural areas were owned by the *Kazis* and the Newars. With their accumulated wealth, the *Kazis* and the Newars have made investments in other sectors. These are in and outside Sikkim. Another source of income is their cardamum fields. The important cash crops such as cardamum and apple are grown in areas reserved for the Lepchas and the Bhutias. Orange orchards in southern Sikkim are mainly in the hands of the Nepalese.

The white-collar professions such as teaching, journalism, medicine and engineering have been a relatively new phenomenon for Sikkim. The clerical and lower teaching jobs are open to all, but the more prestigious and important posts are the domain of the second generation of the dominant class. Sikkim being a theocratic State, the priesthood commands respect and power. Anybody can be recruited as a monk from among the Buddhist population. On the other hand, among the Nepalese, entry to priesthood is regulated by birth. A person has to be born into a Brahman family to become priest. Modern education is the best method to move up the social ladder. It elevates the status as well as increases the income of the family.

The population of Sikkim is unevenly distributed over the state's land area. This spa-

Table 4 : Percentage of working force in different sectors according to 1981 Census in Sikkim state and India

Particulars	Sikkim	India
Cultivators	60.65	41.53
Agricultural Labourers	3.55	25.16
Household Industry	1.40	3.99
Trade and Commerce	34.40	29.32
Total	100.00	100.00

tial distribution is influenced by a host of environmental, historical, socio-cultural, economic, demographic and developmental factors. For example, environmental/geographical factors, such as climate, terrain, soils, natural resources, etc. could very well account for the variation in opportunities for economic activities in various regions of the state. These factors could also directly affect the spatial distribution of population by restricting people's physical mobility.

Sikkim is divided into two zones—North and South. The southern zone starts from the Chakung and the Tista river subdivides it into east and west zones. Administratively, Sikkim is divided into four districts—Mangan (North), Gangtok (East), Namchi (South) and Gyalshing (West), the dividing line being based on the dividing line of the two rivers, Tista and Rangit.

For administrative purposes, Sikkim is divided into 447 revenue blocks (Table 3 Till the 1961 Census, the primary enumeration block was co-terminus with the revenue collection block in charge of a Mandal. However, for the purpose of the 1971 Census, the primary enumeration block was enlarged to a Panchayat area. There are 215 Panchayat blocks in Sikkim (excluding the towns).

We have seen from the ethnographic account of the population of Sikkim that Sikkim is a plural society, where many ethnic groups are residing side by side. The main groups are the Lepchas, Bhutias, Nepalese, and migrants from other states of India. Associations with their places of origin have major epidemiological importance. There are free movements of populations from Nepal, Bhutan and neighbouring states—merchants, road-side labourers and construction workers.

The social pattern in Sikkim has developed from a casteless Buddhist culture. As a result there were no menial or artisan classes in the State until frequent association with neighbouring states in India and Nepal led to their migration from the Gangetic plain, par-

ticularly from Bihar and Uttar Pradesh. This has produced frequent and often extensive communication between all parts of Sikkim and the previously small fox endemic areas of Uttar Pradesh and Bihar.

FIELD AREA AND METHODOLOGY

Field Area

Generally all the demographic data are available in the Census, Sample Surveys and Sample Registration Systems for vital events. In spite of the abundance of information available from all these sources however they are not all encompassing. They do not provide all the required data for the present study which is an indepth micro-level study of Buddhists and Hindus (Sikkim) communities. The census data provides most of the information required in great detail but there is no further classification among Hindus and other religious groups or any other particular community. In the registration systems there is fear of under registration, in spite of the numerous governmental efforts.

Keeping this in view, interview schedules were prepared which include information regarding different aspects, of life, general demographic and socio-economic variables; methods relating to preventive health care, disease and its curatives which are being used by the people.

The field work for the study was conducted between the September 1981 to December 1983 in Sikkim State. The data were collected through observation and interviews with the help of schedules in villages (rural area) selected from all the four Districts in Sikkim (Table 4).

The data have been collected from various revenue villages from all the four Districts, *i.e.*, North, East South and West of Sikkim (Fig.2) representing 12 ethnic groups which have been categorised according to their religion *i.e.* Buddhism and Hinduism, as follows: The Buddhist group comprises three

Scheduled Tribes, viz. the Lepchas, Bhutias and Sherpas; along with the ethnic group, Tamangs. The Hindu community comprises seven ethnic groups and the Scheduled Castes. The seven individual groups are the Brahmans, Chhetris, Pradhans (Newars), Rais, Limboos or Limbus (Subbas), Gurungs, and Mangars. All the measures have been computed for all twelve individual groups; Buddhists Total, Hindus Total and Sikkim as a whole. They have been further compared with each other at group level with respect to their religion, state etc. Wherever differences and similarities have been found, they have been highlighted. From North District of Sikkim, Lepchas and Bhutias have been analysed separately, (Bhasin, Veena, 1990a).

A detailed study has been carried out among two tribes-Lepchas and Bhutias of North Sikkim. They are situated in distinct physical environments, and it appears reasonable to assume that geographic factors may be a major cause of their distinctiveness. The Lepchas of Dzongu live in hilly-forest terrain: the Bhutias of Lachen-Lachung are inhabiting a high-altitude environment with scanty vegetation and few domesticated plants. Different ecological factors are responsible for economic arrangements improvised by the population. Lepchas living at lower altitude practise agriculture, and Bhutias at high altitude mixed farming and pastoralism though in varying degree. Lepchas, the original inhabitants of Sikkim state, now a minority are generally confined to Lepcha's Reserve Dzongu. Bhutias of Lachen and Lachung who were among the isolated Buddhist colonies whose traditional links with Tibet have been severed by recent political events (Bhasin, Veena, 1989).

Both the areas have remained isolated for a long time. The geographical position of Dzongu has accentuated its isolation from the rest of Sikkim. The Lachen and Lachung area has a special status with regard to settlement, land revenue and local administra-

tion, they have their own traditional local government system. The provisions of the 1965 Panchayat Act are not extended to this area. This study, therefore, records an archaic culture in an intact state that lies wholly outside of Hindu culture and ideology. These people are just now becoming involved in the government sponsored development programmes (For details see Bhasin, Veena, 1989).

The number of households collected in the State of Sikkim are 646. The number in each group are: I *Buddhists*: Lepchas (North District)-53, Lepchas (East, South and West-Districts)-42, Lepchas (Total)-95; Bhutias (North District)-59, Bhutias (East, South and West District)-88, Bhutias (Total)-147; Sherpas-35; Tamangs-41; Buddhists (Total)-318

II *Hindus* : Brahmans-48; Chhetris-58; Pradhans (Newars)-45; Rais-49; Limboos/Limbus (Subbas)-32; Gurungs-30; Mangars-27; Scheduled Castes-39; Hindu (Total)-382 (For details see Bhasin, 1981, 1984, a,b,c,d,e, 1985; Bhasin et al., 1983, 1984a,b, 1986,1987, 1989; Bhasin, V., 1989, 1990a,b; Bhasin and Bhasin, 1992; Bhasin, V. and Srivastava, 1990 a,b, 1991; Kangarot et al., 1983, 1984a,b, 1985 a,b,c, 1986; Venu and Bhasin, 1990; Venu et al., 1984, 1986, 1990 a,b).

Methodology

The data were collected with the help of interview schedules. Apart from the schedules, observations were made and other general informations about the community concerned were collected from elder members of the community, libraries, etc.

THE ISSUES OF DEVELOPMENT: PROBLEMS AND RECOMMENDATIONS

Development, modernisation are significant and necessary goals for most of the under developed and developing countries. Human interference in terms of developmental

efforts in any area should not be however, promoted, at the cost of the community and environment. The economy of Sikkim is overwhelmingly rural and agricultural. Industry, whether small or large scale is insignificant. The traditional human interaction with the environment experienced by the entire Sikkim State had always remained with one another that developed into a totality and a closed system. The ecological conditions finite resource base had limited production abilities, but the scattered village communities were self-sufficient with its agro-pastoral subsistence level economy and had almost fixed out-put of grains and livestock products. The development programmes in the state were directed towards improving conditions in the villages, where most of the Sikkimese live. No society remains change less; it always changes because of its self-propelled forces. But if directed and planned change has to come it must be beneficial and ameliorative to all. Recent development efforts in Sikkim have been designed for improving living conditions and for encouraging survival and growth of economic activities through investment in infrastructure and other economic development. The process of planned economic development in Sikkim was initiated in 1954. The political integration of Sikkim with the rest of the country has incited the processes of economic development in the state. It was observed that there is no region in the entire Sikkim state where the impact of human activities was not felt; but there is regional disparity and inequality in economic growth. The clear discernible regional differences and peculiar cause and effect relationship is a matter of concern and need some explanation. Answers to these questions are related to geographical, historical and cultural factors of the state.

Sikkim is divided into numerous small valleys with an uneven distribution of population, and with inadequate communication facilities. Agricultural land is limited to nar-

row, rugged mountain valleys. The settlement pattern consists of dispersed hamlets on the lower slopes above the agricultural lands. The lower Himalayan region is more thickly populated as compared to the higher areas. The high hills are inhabited by a self-sufficient transhumant population. The lower hills, bordering the plains, have more diverse economic activities.

The village in all the zones are small, few having a population of more than a thousand. The development and extension of motorable roads has facilitated the growth and development of some of these villages as markets and administrative centres. The fields are invariably terraced in all the ecological zones. The principal crops of Sikkim are maize, cardamum, paddy, wheat, barley and potato. Paddy is an irrigated crop, the only irrigation source being spring channels. The *Kodo* crop is not taken up as an independent crop, but is raised along with maize. Other crops like soyabean, oranges, apples, ginger, and beans are raised in small areas.

The economy of Sikkim is overwhelmingly rural and agricultural. Industry, whether small or large scale, is insignificant. The state of Sikkim is practically self-sufficient in rice and other foodgrains, but finds it necessary to import rice in order to feed the large "transient population", including traders, tourists and the army. The major export commodity is cardamum, which is exported in large quantities to Arab and Middle-Eastern countries. In addition, apples and oranges are grown in the north for export to other parts of the country. Sikkim is also well-known as producer of alcoholic beverages. It has very limited industrial potential—copper mines at Rangpo and Dikchu, fruit processing, jewels and distillery are the important industries at Singtam.

TRADITIONAL RESOURCE MANAGEMENT

Land and livestock are the natural resour-

es exploited by people of Sikkim to make a living. In the regions where cultivation is possible, it is broadly true to say that agriculture is the main occupation. People of Sikkim have adapted the basic system of agriculture to the mountain conditions. Basic food requirements are provided by grain crops. Proteins are supplied by pigs and poultry, a sort of recovery unit coupled to the decomposes system, and by goats, a browser able to profit from the unpalatable shrubs.

The other resources are provided by sheep flock (wool for spinning and weaving) and the forest for collecting minor forest produce. Cash for buying goods is supplied primarily through the sale of wool, mule breeding, labour in the forest and road building. Supplementary, but nonetheless of considerable importance, is the income from non-traditional sources.

Sheep are the main tool for managing the phenological differences of pastures along altitudinal gradients (transhumance) and for interconnecting mountain subsystem by means of manure.

Draught cattle provide the main power of working in the fields and carrying materials. Their food in winter is provided mainly by the straw residue from the grain crops. The main breed of the sheep in Sikkim is well adapted to transhumance; sub-alpine and alpine grasslands with poor conditions of (constituting 20 per cent of land area of Sikkim); and the stubble and fallow following harvesting of grain crops. About 8000 to 10000 sheep and 3000 yaks are grazed here.

The main occupation of the people of the State is agriculture in which a large number of men, women and children are employed. A few are employed as clerks and state officials, teachers, petty traders and the rest are labourers and domestic servants. Sweepers, washermen, barbers and cobblers who are conspicuously absent among the local people, are usually outsiders. Artisans are also few. Table 4 shows the percentage working force

in different sectors according to the 1981 Census in Sikkim, and India.

Production Rules

Land and certain technological inputs such as irrigation canals, walls, fences, and terraces are resources which must be renewed unless they are to degenerate and threaten the resource base of the household. Maintenance of these resources is essential. In Sikkim, field fallowing and crop rotation are followed, to supplement rejuvenating power of the land. During the fallow periods, land is used for grazing. The mixed agropastoral use of fallow land is essential to its regeneration. It has been a stable adaptation for centuries, helping to reduce erosion and landslides. Along with fallowing, other agricultural activities like planting, manuring, weeding, harvesting, rotation of crops and grazing are coordinated. Production rules are created and enforced through the socio-political infrastructure of the village. The assembly or the meeting of the household heads is called by local Panchayat as and when the occasion arises. The Panchayat provides a face-to-face discussion and consensual decision making. These include the scheduling of agricultural tasks, the construction and maintenance of irrigation channels, and the evaluation, of the innovations recently introduced by Government agencies.

Labour requirements of the household are generally met through personal network of social relations of the head of the household. For tasks where large labour pool is required, mutual-aid-groups come to rescue. These mutual-aid-groups are network of individuals involving reciprocal exchange of particular goods or services. These groups include family members, neighbours and friends based usually on residential propinquity or proximity of working area. This collective sphere of production is an important complement of the household sphere. Through the village community, land, water, pasture and collect-

ing rights are allocated to individual households, which have overlapping interests, territorial, political and ritual which binds the household together.

The primitive and conventional methods of agro-pastoral activities and operative technologies did not generate enough surplus for export except for local and to certain extent inter-regional trade limited mostly to barter system. Therefore, incapacity to sustain high population growth leading to a relative population homeostatis were ensured through social custom such as polyandry and monastic life. The peculiarity of the unchanged traditional system were also manifested in the dominance of religion in daily life, in the preservation of old customs and values and the terrain offering little mobility enhancing isolation.

However, the system of totally and self-subsistence with all its ethos began to show signs of stress and degeneration due to the following principal reasons:

- (i) The Chinese occupation of Tibet which severed the traditional links between Sikkim and Tibet;
- (ii) The integration of Sikkim with Indian Republic brought about changes in the temporal role of religion and also in the social system giving more emphasis on the individual rather than the social achievements;
- (iii) The discontinuance of the system of polyandry among Lepchas and Bhutias and reduction in the number of Lamas brought about an increase in population which the rudimentary economic system could not absorb.
- (iv) The numerical increase in Nepali immigrants; and
- (v) The various development measures initiated by the government in key economic sectors leading to drastic changes in ecological, socio-economic and cultural spheres.

DEVELOPMENT PROGRAMMES

The development programmes in the state are directed towards improving conditions in the villages, where most of the Sikkimese live. The process of Planned Economic Development in Sikkim was initiated in 1954 when a seven year plan from 1954 to 1961 was formulated with the help of a technical team of the Planning Commission. This was followed by three Five Year Plans namely the plans for 1961-66, 1966-71 and 1971-76. Sikkim became a part of the Indian Union in April, 1975 when the Fourth Plan was drawing to close. The fifth plan thus started from 1-4-1976. It was expected to terminate in the year 1979 and consequently the plan would have been only of a three year duration. However, the fifth plan had to undergo change in its duration in accordance with the changes affected in the rest of the country when the plan was terminated in 1978 and the rolling plan from 1978 to 83 was formulated. This has now again been modified and consequently the plan from 1976-77 to 1979-80 is deemed to be the fifth which would thus have a duration of four years for the state.

The political integration of Sikkim with the rest of the country has incited the processes of economic development in the state. The main emphasis had been on the development of infrastructure mainly under Roads and Transport since 1954 onwards. Out of a total expenditure of Rs. 324 lakhs in the first plan Rs. 156 lakhs was spent on building the infrastructure. It amounts to 48.2 per cent of the total, which decreased gradually and has reached 27.6 per cent of the total investment. This is because of the increased expenditure on rural development in general and agriculture in particular. Investment in industrial sector was also increased to 20 per cent in 1979-80 including small scale and village industries. The thrust of economic development has thus steadily changed from

communication sector to a build up in agriculture and its allied sectors.

Spatial Imbalance in Development

The population of Sikkim (316385 according to 1981 Census) with working force of 46.60 per cent is small and scattered over difficult terrain. Both these factors, smallness of population and rugged terrain have affected the development of Sikkim. There is spatial imbalance in development issues. Terrain, historical and economic factors have been responsible for this. The eastern and southern part of the state are easily approachable by roads making the exchange of raw material, finished products, services and facilities, convenient. The northern and western parts of the state are not easily approachable by roads. Till 1954, the northern part of the state was not accessible by metalled road. The mountainous terrain and severe weather conditions—low temperatures all year round with heavy snow fall during the winter has hampered the growth of transportation and markets. In other parts, the heavy snowfall sometimes exceeding 250 cm per year, causes frequent landslides and breaches, makes construction and maintenance of roads a difficult job.

The pinnacle of progress in Sikkim is in eastern region as Gangtok, the state capital, Rangpo and Singtam (industrial area) occupy this region. Gangtok is the Municipal corporation administration and marketing unit, and it is from here other development programmes are executed at a different level. Urbanisation in Sikkim is a recent phenomenon, affected primarily by the recent change in the socio-economic system. There are only seven towns in Sikkim, with an urban population of 51000. It is interesting to note that 43268 people are living in urban localities of the East district which has a total population of 138762; this fact suggests that the major concentration of urban population is in East District. In 1961, the population of East Dis-

trict was 56704 which increased to 85621 in 1971, ultimately reaching to 138762 in 1981. The population increase and urbanization are closely interlinked with economic activities.

Singtam and Rangpo are situated on national highway, 51 km from Gangtok. Both the areas are classified under the category of notified Bazaar Committees, the civil administrative status. Both the towns have protected water supply, the source of supply being tap water, drawn from service reservoir with a capacity of 25 lakh litres. Both towns have electric supply with more commercial connection than the domestic ones. The electric supply has helped in setting up of industrial units. Installation of Government Fruit Preservation Factory (G.F.P.F) in Singtam, Sikkim Wood Working Centre in Bordang, Sikkim Hume Pipe (Bagey *Khola*), Sikkim Wood Industries (Bagey *Khola*), Sikkim Mining Corporation (Rangpo), Sikkim House Factory (Rangpo), Sikkim Distilleries (Rangpo), Himal Match (Rangpo) has changed the occupational structure and more people are working in industries.

More people are engaged in service and other household industries catering to the total needs as well as the seasonal horticultural exports. Population growth rate is less in Rangpo as compared to Gangtok and Singtam. The diversion of the Rhenock-Rangpo route and movement of the orange business to Singtam has played its part in curbing the growth rate of Rangpo. In 1971, the population of Rangpo was 1785, increasing to 2452 in 1981. The increase was only 37 per cent while in Gangtok and Singtam, the increase was 176 per cent and 110 per cent, respectively. Rangpo town has highest proportion (12.72 per cent) of scheduled caste population followed by 11.90 per cent in Singtam town, indicating a presence of migrant Nepali labour.

Majhitar is another area sandwiched between Singtam and Rangpo accessible by different roads. Presence of Sikkim Tannery and

Tobacco company in Majhitar has changed the occupational structure of the people as more people are working in tertiary sector.

The area exports agriculture and forest produce and imports manufactured goods. The important commodities imported included rice, oil, textiles, cement, petroleum products while the commodities exported are vegetables.

The process of industrialization and economic development of this area has not benefitted the local population of Bhutia and Lepcha, as they do not work on construction and other works on wage labour. Demographic picture of the area changed, as labour required to work in factories and in road construction has come from outside. Nepalis are immigrants to new areas as a result of over exploitation of cultivable land in their original home in Eastern Nepal and others move from villages in Sikkim colonized earlier owing to the pressure of population.

Ecological imbalance is generally caused, when a community is not able to keep pace with the changing environment, both physical and human. Before the advent of industry the economy of the area was simple, non-structured and self contained. Before the Nepalis, came to this area Lepchas and Bhutias were at a lower level of economic activity and had a closed community structure. Geographical barriers provided protection and helped them in maintaining a separate identity. Immigrants brought with them new ideas and cultural traits. The household as a unit for production changed and exploitation of resources increased with population pressure.

On the other hand, North district, the most prominent on the map of Sikkim with an area of 4226 sq km is sparsely populated with a density of 6 persons per sq. km. The district is more thinly populated towards its northern side due to geographic position and climatic rigours. More than three quarters of the entire area is totally uninhabited because the

average altitude is more than 6000 meters. Human habitation is thus confined to approximately 25 per cent of the entire area the main concentration of the population is in and around the Mangan district headquarter which has emerged as the only urban area in North Sikkim. During 1971-81, the population of North Sikkim increased from 13014 (12683 rural and 331 urban) to 26455 (25675 rural and 780 urban). North district has registered an increase of 103.28 per cent (102.44 for rural and 135.65 per cent for urban).

The district headquarter is located at Mangan 70 kilometres from Gangtok, the state capital, and is connected to it by a motorable road. It is the only town and market centre for the North District. People have to travel long distances to reach Mangan to dispose of their cash crops of cardamum, apples and potatoes. Outsiders need permit to go beyond Mangan.

Due to the strategic position of the district and military settlements, the district is traversed by a well maintained motorable road (high way) which passes through Mangan, Chungthang, Lachen, Lachung and Yumthang. The many suspension bridges on the high way are maintained by General Reserve Engineer Service Force. The area and revenue blocks not lying on the highway, still have poor transport facilities. There is a regular bus service between Mangan and Gangtok.

The principal communities inhabiting the area are scheduled tribes, namely Lepchas, Bhutias, Sherpas, Doctapas and others. The Lepchas are mostly found in the Dzongu area. Bhutias are spread throughout the district. However, one sect of Bhutias called Lachenpas is found mostly in Lachen and another sect called Lachungpas is mainly found in the Lachung area. The Sherpa and Doctapas tribal groups are mainly found in a few pockets in the Kabi-Tingda area. Apart from these, transient Nepali labourers are also residing in the area. Strict restrictions

are imposed on immigrant Nepali labour wanting to settle permanently in the area, so as to maintain the ethnic balance. Though they have lived in this area for a long time, they are not allowed to purchase land.

North Sikkim is neither culturally nor environmentally homogenous. Agricultural and pastoral areas lie close. Agriculture is practiced on valley slopes and nearby forests or mountains serve as pasture for livestock.

Most people in the North district are cultivators; few are pastorlists. However, recently, some have started earning money from non-traditional sources like schools, the forest department, local offices and the border road organization. Most of them are small land owners and eke out their living from their landed possessions. They supplement their income by working as road labourers and in other construction projects. The most important crop of the regions, as stated early is cardamum which is grown over 3694 hectares. The main food crops are maize, paddy, wheat and barley, along with some amount of Buckwheat (*Phapper*), millet (*Kodo*) and potatoes. Vegetables like cabbage, redishes, cauliflowers, turnips, carrots, beans etc. are also grown in small farms generally in front of the house. Food crops are grown primarily for consumption. Cash crops of the area are cardamum, potatoes and apples, which are disposed of in the Mangan market.

As compared to East District, the South and West District are under development. Being farther placed from the state capital, their development is not being accelerated. Inhabited by 75976 persons, South District is divided into 145 revenue blocks and two towns. According to the Census 1981, the decadal increase in South District is 42.85 per cent in total, 35.89 per cent rural and 39.03 per cent in urban area. Increase in urban population is the highest of the State. As said earlier that industrialization has not made much of a headway in South District.

South district is lacking in material resources for industry like forest, mineral, agriculture and livestock. Apart from this, the existing material resources are not being fully exploited. The forests in this zone predominate in the hardwood and Sal which have not been fully exploited. However, the area is rich in medical plants like *Ban*, *Mara*, *Harchur*, *Bhoi Zampa*, *Buds*, *Okhate* and *Abhi-Zhale*; and all of them need to be documented for their ethnomedical properties. Large area of South District has not been brought under cultivation. For instance, 24 per cent of the Rabangla is not under cultivation.

The South District has three major road links— (a) Nayabazar-Namchi road; (b) Temi-Namchi road; and (c) Melli-Namchi road. All these roads are linked to the district headquarter, Namchi. All the roads are not jeepable and motorable, but are mule tracks. The roads here run along the north-south axis, so longer routes are followed even for place close together. An efficient transport system is a prerequisite for the development of an area, and since South District has been lacking it, its development compared to other parts has remained thwarted.

Generally people live in *Kaccha* houses; it is only in areas in and around market that one may see people inhabiting *Pucca* houses. The *kaccha* house do not have separate latrines and bathrooms. In Namchi, the system of sewage depends on the pit system and open surface drains. There are two public latrines and 200 private latrines. The chief method of disposing night soil is through septic tanks. As a result of lack of facilities and slackening development, people in this part suffer from various ailments. The incidence of pulmonary diseases and tuberculosis is very high because of lack of regular treatment, people cannot buy medicines from the market and the supply of medicines is not regular in the primary health care centres. Unprotected water supply cause a large number of

gastric disorders. As a result of drinking habit of people, liver ailments are common. The cases of food adulteration can not be adequately checked because of the absence of the mobile administrative staff. As for the ambulatory services, the state government tries to provide sufficient facilities, but life of these ambulances is short due to the rough and weary roads. An ambulance needs to be replaced after every five years. The existing medical and public health services are underutilized because of lack of transport facilities.

To take care of the development of the people, South Sikkim has nine multipurpose co-operative societies, which seek only rupees one for granting membership to a person. Having a working capital of around Rs. 2 lakhs, advances loans to people for various agricultural and allied activities like cattle breeding, fisheries, horticulture, dairy farm, nurseries etc. Loans are provided to the farmers and economically backward population. These multipurpose co-operatives are financed by the State Bank of Sikkim. But even these services remain underutilized mainly because of the distance between different parts and the absence of a good transport system linking them.

The West District with an area of 1166 sq km is inhabited by 75192 people. Gyalshing and Nayabazar are the two class VI towns with 745 and 952 people, respectively. These towns are notified as towns by a Bazaar Committee but no governing council is there for the towns. The West District has registered a decadal variation of the order of 29.59 per cent for the total population, 29.16 per cent for rural and 54.84 per cent for the urban population. There are very few industries in the West District like an oil mill (in Gyalshing), three rice mills (Damtan, Soonbaria and Soreng), and a carpet weaving centre. Some areas in West District are high in natural deposits, for instance, in Jagtumb near Chakung, there is noteworthy occurrence

of sulphide deposits; lesser known sulphide occurrence is also seen in Sirbang Kani *Khola*, Sisnai *Khola* (near Chakung). Like the South District, the West is equally cut-off from the developed areas: the nearest railway station to West District is Siliguri about 122 kilometers. Western portion of the district are snow bound. In the Third Five Year Plan, a piggery was established at Gyalshing for breeding and distribution. In the sixth plan, it was further expanded.

Having a total area of 42981.76 hectares, the District has 13 panchayat units, two Village Level Working Centres and two Sub-regional Centres. There are 19 milk producers Co-operative Societies Ltd., four Consumers Co-operative Societies, one other Co-operative Society, 11 Multipurpose Co-operative Societies and three fair price shops. In terms of other facilities available to people in this district, there is only one bank, there are no agricultural or non-agricultural credit societies, and no important commodity is manufactured here. In the Second Five Year Plan, there was a proposal to start a ham and bacon factory at the Gyalshing Piggery Farm. Since the plan did not materialise, it was abandoned. A goat farm has also been established at Rhotak in the West District for improving the quality of existing stock. It has the largest area under maize cultivation and food grain crops. There are two veterinary hospitals in West District, one at Gyalshing and the other at Soreng.

In conformity with the industrial policy of Government of India, December 1977, a District Industrial Centre (D.I.C.) was set up at Jorethang covering South and West Districts of Sikkim State in August 1978.

The D.I.C. located at Jorethang is providing considerable help and assistance such as identification of suitable schemes, preparation of feasibility reports, arrangements for supply of machinery and equipment, provision of raw materials, credit facilities and inputs for marketing facilities etc. to the en-

trepreneurs/artisan for South and West Districts. During short span of its establishments, 31 units have been registered and 11 units have already gone into production, manufacturing items like bread and biscuits, soap cakes, automobile repairing and servicing, rice husking-cum-wheat grinding etc. These units provide employment for 128 persons. A large number of artisans have also been assisted financially for the purchase of improved tools and equipment and to meet the portion of their working capital requirement for setting up their self employment ventures. In addition to these three training courses – cutting, tailoring and knitting were also conducted for women. As a follow up measures, these trainees were provided with knitting, sewing machines to supplement their income.

Since entrepreneurs in South and West Districts are still in a latent stage and people are shy to take up new ventures, various promotional schemes like entrepreneurship development programme, information and publicity, training to rural artisan etc. are supposed to be promoted.

The small size of Sikkim's population in itself is not sufficient to constitute market for modern industry. Further, the population is dispersed mostly in South District of the state, in scattered, isolated communities. Sikkim population is increasing at a growth rate of five per cent per year. Forest cover 36 per cent of the total land area. Forest clearings in Sikkim have been extensive, resulting in degradation of mountain environment. The problem of soil erosion and landslides are related to the destruction of forest cover in South District. The forest cover in the North District at higher elevation is in good condition. At places the forest cover is depleted because of the practice of grazing the cattle in the reserve forests. Encroachment in *Khas* (village forest) and *Gorucharan* (grazing areas) forever have taken place. *Khas* land is without trees but un-

dergrowth is there and *Gorucharan* is without grasses but some trees are there.

Only 11 per cent of the total land is cultivated. The per capita cultivated land amounts to 0.25 ha in Sikkim. Domestic output (59211 tons) is supplemented with about 10000 tons from outside the state.

Steep slopes have been cultivated, which results the soil erosion, and permanent loss of good soil cover. Sikkim's Sixth plan (1980-1985) emphasized the development of an optimum land-use pattern-greater use of high-yielding seeds, fertilizers, and pesticides, the conversion of large tracts of land into orchards, scientific management practices for commercial crops, strengthening the extension services and conservation practices. Although the incidence of diseases and pests is high due to high rainfall and humidity, plant protection measures are yet to be established, tried and tested in the field. Agriculture department is encouraging the development of fodder crops in the areas where because of lack of grazing land, the animals are to be stall fed.

The land as yet has not been overworked, because the population size and resource exploitation has not exceeded the resource potential. The Sikkimese are experiencing the rapid development of a monetary economy, the long term effects of which remains to be projected. Generally, these processes have both negative and positive effects. Changes in the value system, and increasing dependency on cash, effects the other facets of culture.

The second problem is the ways and means of communication. Sikkim has network of roads. The density of road for each 100 sq km is 12. Sikkim's development programme has emphasized the maintenance of existing roads connecting bridges and slope protection of roads which are in danger from landslides and erosion. Unplanned road construction, without detailed geological and geographical knowledge of the areas has

caused several ecological problems. Each year an estimated 550 m³ of debris produced by landslides per km of road. The mountainous terrain and Sikkim's geographic isolation inhibit the development of other means of transportation such as by rail or by air.

Besides improving ways of communication and agricultural practices, the process of industrialization and economic development has also engaged the attention of Government of Sikkim for sometime. The traditional arts of the people were blanket and carpet weaving and wood carving. Four large units-Sikkim Distilleries, Government Fruit Preservation Factory, Sikkim Mining Corporation and Sikkim Time Corporation were established in the East District. Though, these units are comparatively small but have forced structural change in the area. Before an advent of the industry, the economy of the area was simple, nonstructured and self contained. The people were drawing their sustenance from the natural environment depending on the outside world for a very small part of its requirement. The structure of local economy is dependent on natural resource availability, pressure of population and the level of individual skill.

The social, economic and institutional system of industrial community is quite different from the existing one. The central industrial activity is supported by ancillary functional services like shops, recreation houses. The industrial unit draw its sustenance from the immediate surroundings. The industrial society is an amalgam of different groups and individuals drawn from a large area. Very few people living in the immediate surroundings work in factories. The migrants who come to work have no social code of conduct for them. They enjoy anonymity as a member of crowd. To maintain law and order, police station and law courts have been established in the area. The local community in the area was not able to provide ordinary services or even offer agricultural and animal

products required by the industrial society. This was generally done by the migrant communities which have become a part of that area. The resultant population increase has dispossessed the local community's command over local resources. Though they have been paid compensation for land, but that is not enough, as the local people lack skills for any other work. It is also true that economic activities like vegetable cultivation, dairying, piggery etc., have been taken over by the migrants. And therefore they compete with local population for grazing grounds, and even for valuable land. All the supporting services are managed by migrants. There is visible prosperity in the area, but the local population which has been drawing its sustenance from the region, remain poor. The local population cannot benefit from technology that is completely alien to their present skills and capacities. Such technology and other inputs should be provided with which till local population can cope and consequently obtain benefit therefrom.

Besides these changes in the socio-cultural environment of the area, the biological environment is also being polluted by the refuge of the factories, and use of pesticides, chemical fertilizers etc. Undoubtedly, biological environment has been contaminated, but since earlier studies of biological variables are not available, comparability is ruled out.

The Government's education and health programmes are also the potent agents of change. In a way education is necessary infra-structure for taking up the development programme. While it may be possible to plan the change process to some extent, education acquired an autonomous character and behave as an independent variable having large impact on the local community. There is an important autonomous sector of inter-actions with decisive influences. The outside contact brings new ideas, new situations and new knowledge.

In Sikkim state, population growth rate is

contained and the size is manageable. This is encouraging immigrants, creating special problems. There is severe shortage of trained manpower in all fields. With no facilities for higher education, they have to go to other states for manpower training. This is both costly and time consuming. Dependence on external expertise for endogenous development does not work well.

For a total development of an area, the development should be holistic, indigenous, culture specific and all round. For the total development of Sikkim, South and West Districts should be equally developed. The towns of South and West districts, Gyalshing and Namchi are relatively removed from the main centres of Sikkim-Gangtok and Rangpo. These ill developed areas should be developed into growth centres by investments and proper planning. These densely populated districts will provide the required labour pool to fulfil the needs of an expanding business. Areas cut off from the advantage of development needs a specific programme, for them and the development should be just and equal.

The poverty of southern section require agriculture reorganization and the development of settlements in this traditional region. Jorethang, Nayabazaar, Namchi, Rhenok and Rangli can be developed as core areas and absorptive cells, to transform the neighbouring smaller settlements.

THE ECOLOGICAL MANAGEMENT OF DEVELOPMENT IN SIKKIM

On the the basis of the knowledge from the macro-and micro-studies, it is observed that the development activities have started off, but the over-all progress is very slow and sometimes, unfortunately, the impact is negative. Therefore, if development is to be given an impetus, firm and active policies in almost all the sectors right from soil conservation to providing different amenities should be made instead of mere understand-

ing and forwarding the proposals. Various schemes and projects which continue to spill over the successive plan periods, needs to be completed within the stipulated period.

There is deficiency in selection, training and motivation of the personnel invested with responsibility of introducing the programme into the area. Although the programme has been running in this area for the last twenty-five years its success has touched only fringe of the people. However, inspection of records filed by village level workers to higher authorities would lead one to think it was a total success. But in practice its effectiveness has been greatly limited by lack of personnel, lack of funds, inadequate roads, corruption and lack of interest on the part of both the officials and people. Some short-sighted programme have however retarded the progress.

Why rural development in mountains areas is so difficult? First of all there are constraints which arise from the geographic situation and difficulties in building up the necessary infrastructure like the roads, railways, appropriate communication system, and the complete social infrastructure, including education, health and public administration. In Sikkim, there are no economic incentives which justifies the building-up of such infra-structure. The availability of mineral or other natural resources which could be exploited or industrial sites which could be subject to further development are basic requirement for investment in infrastructure. In Sikkim, the main resource is wood, which is used as fuel or timber, and its exploitation results in the denudation of the forest areas, thereby threatening the ecological imbalance. This aggravates the already existing problem of soil erosion by upsetting the water/soil equilibrium. As the processing of timber takes place, the local population is hardly benefitted.

1. Agriculture

The main source of livelihood of Sikkim

state is predominantly agriculture. Efficiency of the existing system can be increased in several ways. The strategy for the development of agriculture in these hill areas is to increase the productivity of agriculture crops. The major thrust for increasing agricultural production will be through the following measures:

- (a) implementation of intensive and improved cultivation practices, provide better input facilities with extension and training support, so that productivity per unit of area increases, particularly in the higher hills;
- (b) make diversification into oilseeds, soyabean, pulses, spices etc., and introduce high yielding varieties of wheat, rice, barley and other coarse cereals (major crops of the area);
- (c) sponsor training and visit programmes under the integrated watershed management programmes;
- (d) to increase cropping intensity further provide better irrigation facilities, introduce advanced agricultural practices and scientific management of land and water resources and take integrated soil and water measures;
- (e) a package of services (improved seeds, chemical fertilisers, know-how of organic manures, sprinkling irrigation) in easy reach of the villagers; and
- (f) intensify agriculture research, introduce cold resistant seeds and teach management of rainfed agriculture.

In view of the ecological and environmental importance of the region, efforts should be directed towards bringing steeper slopes under perennial shrubs and trees, and waste land should be developed. Integrated development of agriculture on a catchment basis, micro-planning at the village level for formulating cropping plans, with proper soil and farm management and people's involvement in the optimal use of the land should be introduced. Agricultural research institutions

should be involved in quality seed production, dressing and applying result oriented research programmes, ensuring a laboratory-land-relationship, particularly for varied soil and differing climatic conditions of the hilly areas of the region.

2. Horticulture

Horticultural development should be assigned a high priority to ameliorate the economic conditions of the people of the area, to provide them additional income and to encourage proper land use, especially on steep slopes on which crop production is discouraged. Efforts should be made on consolidating the horticultural infrastructure and maximising the capacity utilisation of services and facilities so far created. The integrated development of horticulture, with proper linkages between strong, grading, packing, marketing and processing support should also be envisaged. The major thrust for this will come from:

- (a) increasing the area given to horticulture by developing compact areas. Stress should be laid on fruits, off season vegetables, spices etc.;
- (b) increasing productivity per unit area of the existing orchards through better scientific management, the application of inputs and the adoption of modern packaging practices;
- (c) strengthening the existing infrastructure to provide better extension services, advance research and training programmes;
- (d) providing marketing facilities, grading and packing, storing and processing facilities to ensure a proper return to the growers;
- (e) expanding bee-keeping programmes;
- (f) intensifying certified potato and vegetable seed production;
- (g) providing credit and subsidy facilities to the growers;
- (h) evolving preventive measures for viral diseases (Chirkey and Furkey) of

- cardamum;
- (i) evolving better drying methods or improved kiln for cardamums, so that wastage of firewood, almost double the amount of curing material can be prevented in traditional kilns;
 - (j) replacing local high fibre and low oil content ginger varieties by Nadia and Rio-de-Generic varieties, and cultivation of ginger in more areas of South, West and East District having favourable conditions;
 - (k) planting tea in other areas with soil condition and slope like Temi-Tarku region; and
 - (l) Setting up of plant protection organisation for effective control of pests which affect fruit crops.

3. Waters

Waters are slightly alkaline in contrary to soils with pH ranging between 7.4 and 8.6. This pH range is ideal for either fish growth or for the growth of any aquatic flora. But unfortunately waters contain high amounts of total solids which is detrimental both in human health and for fish growth. Soil conservation measures are the only solutions to reduce the solid content in water. To reduce the sediment run off the following improvements can be made.

- (a) Drainage of water from road side must be given top attention and the necessary system for the same should be constructed to lead the run offs to natural water courses.
- (b) Suitable interceptor and catch water drains must be provided above the cut slopes for the speedy and safe disposal of water.
- (c) The drains constructed also should have gentle slope to carry flows safely without erosion.
- (d) Water filters should be supplied by the government not only in urban areas but also to rural population, in order to avoid gastric troubles due to solids found in drinking waters.
- (e) Though calcium levels are optimum, other bi-or trivalent metals such as copper, zinc, and aluminium levels are reasonably high. Biological control should be evolved by introduction of some submerged aquatic weeds that accumulate these metals in higher concentration.
- (f) Hardness of the water could be significantly reduced by introducing few ion exchange resins.
- (g) With abundance of streams in the area, these resources could be appropriately exploited for hydel power generation. Only six hydel power projects are available at present, the number is quite less compared to the exploitable streams present in the area.
- (h) Sikkim waters do not produce much fish. The only reason for their meagre growth is the fast flow of water. Research programmes should be initiated to find out the adoptable species.
- (i) Commercial species such as trout, and common carp have been found to adept well in high altitudinal waters of the state. A hatching and rearing unit like that of Mamen Chu (East Sikkim) can be established at Chhanggu and Kupup lakes with similar physico chemical characteristics.
- (j) Control of fresh water abuse by prohibiting release of contaminated water in the form of human faeces, urine, kitchen waste, and washing of clothes in to various streams and river Tista in the East District.
- (k) The sewage contamination is leading to outbreak of water borne diseases such as cholera and dysentery. Chlorination of drinking water to kill bacterias.
- (l) Another threatening contamination of natural waters is through leaching of fertilizer, insecticides and pesticides in Agricultural operations. Though these

chemicals dilute in the down-stream, these chemicals are non-degradable in nature and run into food chains. Thus effort is necessary on the part of the Government to ensure application of only required amounts of chemicals in enhancing the agricultural production.

- (m) Few trout hatcheries developed at high altitudes are subjected to heavy fertilizers inputs. This results in eutrophic condition in these lakes and disrupts orthogrades developed for oxygen curves. Balanced manuring is needed to avoid eutrophication as well as oxygen imbalance.

4. Soil and Water Conservation

The hills and mountains in these areas are subjected to significant erosion. The enormous quantities of sterile detritus are washed off the mountain sides silting harbours, riverbeds and spreading over prime agricultural lands in the rainy season. The primary reason for the increasing floods and soil erosion is the human and large livestock population inhabiting these areas have resulted in depletion of the forest cover.

The main approaches for the soil and water conservation programme should be through:

- (a) The protection of agricultural land and the reduction of soil erosion; and
- (b) the reclamation of denuded and degraded land through an integrated watershed development programme.

Watershed Management

The strategy of the watershed management programme envisages ecological regeneration and the optimal utilisation of land, water and human resources in a scientific way. Under this programme, the main thrust is on integrating various development activities having a bearing on the ecological balance, and the development of the potential resources of the mountain areas, through afforestation, soil

and water conservation, agriculture, horticulture, animal husbandry, minor irrigation works etc., with a multidisciplinary approach. Under this programme efforts are being directed towards ensuring optimal utilisation of land, water and plant resources on the one hand and the human and animal resources on the other.

- (a) to minimise soil erosion and surface water run-off afforestation on denuded hill slopes should be started;
- (b) production of domestic timber, wood for fuel and fodder consistent with the requirement of local people should be a priority;
- (c) to ensure socio-economic development improved seed minikits, good animal health services, with feed and fodder minikits, minor irrigation facilities and by maximising efforts for increasing the productivity of agriculture, as well as evolving a proper land use pattern should be provided;
- (d) employment opportunities for both skilled and unskilled labour and educated unemployed persons should be created; and
- (e) the participation of the people, and re-orienting their productive efforts through training and a visit system should be engaged.

6. Animal Husbandry

The topography and agro-climatic conditions prevailing in these areas offer better scope for livestock development activities. Livestock play a vital role in the economy of these areas. The main objective of the animal husbandry programme is to increase productivity per unit of cattle, sheep, goats and poultry, eliminate poor livestock in order to reduce pressure on the land and forests, and encourage the occupational diversification of the people by providing subsidiary occupations to marginal and small farmers, landless labourers, and the weaker sections of the society.

In order to achieve these objectives an integrated approach towards the improvement of genetic potential of local livestock should be made. Feed and fodder resources should be increased, adequate health cover and extension services should be provided, applied research should be conducted, training should be given in marketing livestock and livestock products, and adequate credit provided to marginal and small farmers.

The animal population is greater than the carrying of the area, in view of available feed and fodder resources. Efforts are therefore needed to reduce the population by suitable measures.

In view of their adverse effects on the ecology, goats should in general be discouraged in these areas.

In view of demand of eggs and chicken from army, poultry farming should be encouraged.

7. Forestry

The heavy dependence of human and animal population on the forests in respect of timber, fuel wood and fodder has led to depletion of forest resources. Soil erosion and consequent floods are posing a serious threat not only to hills but also to plains. In view of these objectives, the major emphasis in ecological management will be to:

- (a) ensure ecological security, environmental conservation and resources base;
- (b) undertake afforestation programmes with emphasis on multistoried forests;
- (c) create energy plantation with minihydro-electric power generation, wind mills, solar energy, smokeless stoves etc;
- (d) cultivate and upgrade grasses, fodder herbs and medicinal plants;
- (e) develop pastures;
- (f) cultivate grasses, fodder and fuel areas in fallow and agriculture waste and particularly in vacant or marginally productive agricultural lands;
- (g) encourage the use of non-conventional

sources of energy;

- (h) reduce "waste" at all stages of production, requires modern felling and logging techniques;
- (i) improve off road and on road transport system for full utilisation of high altitude coniferous forests in Zongri, Bakhim of West-Sikkim;
- (k) plant soil binding species like *Agava* to control land sliding;
- (l) encourage large scale plantation of wild food plants like *Sechium edule*, *Manihot esculentus* and *Arundnaria*; and
- (m) encourage cultivation of dye yielding plants, such as *Rumex nepalensis*, *Juglana regia* and *Rubia cardifolia*.

Besides the prime importance of regenerating the ecology, the forestry programmes also cum at providing the mountain population with sustainable supplies of fuel, fodder and timber for their needs. Appropriate reafforestation of bare, degraded and denuded village forest areas should be undertaken. Fuel and fodder plantation on waste and marginal lands should be encouraged. The regeneration of bad areas by providing grass cover should be envisaged. Stress should be laid on obtaining subsidiary forest products such as nuts, fruits and silkworms from surplus land and marginal cultivated land and steep slopes.

Environmental degeneration has resulted in drying up of hill springs or decline in discharges. This will have adverse consequences for mountain flora and fauna. Creating of "Spring sanctuaries" in areas around the springs will help to regenerate the springs.

For affective co-ordination in social forestry and a massive planting programme with the people's participation, education and training programmes to generate awareness, conserve natural resources and maintain the ecological balance should also be established.

8. Co-operation

In these areas, the organisation of co-operatives is not strong. In order to link develop-

ment programmes, the restructuring and strengthening of co-operative societies should be undertaken. Valuable herbs and medicinal plants are becoming scarce due to unscientific collection. The co-operative structure will also provide for scientific collection, processing and marketing of herbs and medicinal plants.

9. Power

Power is one of the most important infrastructural elements for economic and social development. The availability of power reduces the pressure on forests to provide fuel in these areas. A high priority, therefore should be assigned for accelerating the pace of power development especially rural electrification, and optimal utilisation of hydro-potential through micro-hydro electricity schemes. At present there are hydal power stations in Sikkim. Since the area is hilly, it would be difficult to provide transmission lines from one hill to other. This calls for maximum number of mini and micro hydal systems rather than having a big central power plant.

Needs of fuel energy should be supplemented by subsidising cooking and heating equipment and electric power should be provided for the development of cottage industries in the villages. Renewable or alternate sources of energy, namely bio-gas, water power and water mills, solar and wind power should be developed. Consumption of soft coke, kerosene oil, cooking gas, etc. should be encouraged by providing financial incentives through transport and cost subsidies. Ways and means for conserving energy should be devised.

10. Rural Industries

The topography and the fragility of the mountain environment, together with lack of infrastructural facilities, go against the establishment of the heavy industries in the mountain. In these areas resource-based cottage industries compatible with environment should

be developed. In view of the importance of weaving and spinning of wool in the economy of Sikkim, improved tools and equipment should be introduced. Advanced technology and the development of the industry on modern lines should be presented for economic betterment of people. Minor improvements should be made in the designs to improve the quality of production. Raw material should be made available to people through co-operatives.

Financial aid should be made available for utilising the idle capacity of the people. Marketing facilities should be provided in the *Tehsils* itself to avoid exploitation by the middlemen.

Fruit processing industries should be started in the area.

11. Transport and Communication

The development of the road network is a precondition for the opening up of the economy and utilisation of the natural potential of the area. In these areas, instead of concentrating on arterial motor roads, the main emphasis should be on main motor roads, feeder roads and bridle paths. All-weather arterial roads connecting key potential areas of horticulture, markets and hospitals etc. should be developed. The stress should be made on a large coverage of villages by developing feeder roads and bridle paths. The clusters of villages should be connected with rural roads, aiming at complete coverage.

A suitable technology of road construction compatible with the need for maintenance and regeneration of the ecological balance of the region should be evolved. Both engineering and biology should be used to arrest soil erosion caused by road construction and other factors causing ecological degradation.

An adequate number of footbridges for connecting remote and accessible areas should be provided.

The road system should be supplemented by suitable gravity ropeways for transporting

are imposed on immigrant Nepali labour wanting to settle permanently in the area, so as to maintain the ethnic balance. Though they have lived in this area for a long time, they are not allowed to purchase land.

North Sikkim is neither culturally nor environmentally homogenous. Agricultural and pastoral areas lie close. Agriculture is practiced on valley slopes and nearby forests or mountains serve as pasture for livestock.

Most people in the North district are cultivators; few are pastorlists. However, recently some have started earning money from non-traditional sources like schools, the forest department, local offices and the border road organization. Most of them are small land owners and eke out their living from their landed possessions. They supplement their income by working as road labourers and in other construction projects. The most important crop of the regions, as stated early is cardamum which is grown over 3694 hectares. The main food crops are maize, paddy, wheat and barley, along with some amount of Buckwheat (*Phapper*), millet (*Kodo*) and potatoes. Vegetables like cabbage, redishes, cauliflowers, turnips, carrots, beans etc. are also grown in small farms generally in front of the house. Food crops are grown primarily for consumption. Cash crops of the area are cardamum, potatoes and apples, which are disposed of in the Mangan market.

As compared to East District, the South and West District are under development. Being farther placed from the state capital, there development is not being accelerated. Inhabited by 75976 persons, South District is divided into 145 revenue blocks and two towns. According to the Census 1981, the decadal increase in South District is 42.85 per cent in total, 35.89 per cent rural and 39.03 per cent in urban area. Increase in urban population is the highest of the State. As said earlier that industrialization has not made much of a headway in South District.

South district is lacking in material resources for industry like forest, mineral, agriculture and livestock. Apart from this, the existing material resources are not being fully exploited. The forests in this zone predominates in the hardwood and Sal which have not been fully exploited. However, the area is rich in medical plants like *Ban*, *Mara*, *Harchur*, *Bhoi Zampa*, *Buds*, *Okhate* and *Abhi-Zhale*; and all of them need to be documented for their ethnomedical properties. Large area of South District has not been brought under cultivation. For instance, 24 per cent of the Rabangla is not under cultivation.

The South District has three major road links— (a) Nayabazar-Namchi road; (b) Temi-Namchi road; and (c) Melli-Namchi road. All these roads are linked to the district headquarter, Namchi. All the roads are not jeepable and motorable, but are mule tracks. The roads here run along the north-south axis, so longer routes are followed even for place close together. An efficient transport system is a prerequisite for the development of an area, and since South District has been lacking it, its development compared to other parts has remained thwarted.

Generally people live in *Kaccha* houses; it is only in areas in and around market that one may see people inhabiting *Pucca* houses. The *kaccha* house do not have separate laterines and bathtooms. In Namchi, the system of sewage depends on the pit system and open surface drains. There are two public laterines and 200 private laterines. The chief method of disposing night soil is through septic tanks. As a result of lack of facilities and slackening development, people in this part suffer from various ailments. The incidence of pulmonary diseases and tuberculosis is very high because of lack of regular treatment, people cannot buy medicines from the market and the supply of medicines is not regular in the primary health care centres. Unprotected water supply cause a large number of

- (g) introducing multi-purpose health workers in remote areas to look after the preventive and curative aspects of medicine, especially for children and women;
- (h) improving nutritional standards and providing adequate immunization services;
- (i) introducing a school health education programme; and
- (j) the mountain areas suffer from an acute scarcity of drinking water. Many water-borne diseases are being caused in the mountains because of the pollution of the water sources. The primary necessity is to provide potable drinking water. This can be done if springs are tapped at source and if the catchments are protected from pollution. A high priority should, therefore, be given to provide drinking water free of contamination. Though safe drinking water has been included in "Minimum Needs Programmes", the study conducted revealed that 130 panchayats are lacking this facility ventilation and sanitation should be improved in the houses.

People's Participation

With a view to gaining direct benefit from development activities, stress should be laid on people's participation in the formulation and implementation of programmes for which voluntary agencies (co-operatives, local level statutory organisations responsible for managements of forests, village and block level committees) should be actively involved in the planning and implementation process. For proper co-ordination and linkages of various activities, particularly in soil conservation, forestry and watershed management programmes, extensive extension support, training, organisation and motivation of the local people for specific development should be emphasized.

For the creation of truly appropriate development, the importance of *Indigenous Technical Knowledge* (ITK) cannot be ignored.

The critical issues that emerge from the close observation of both communal and individual resource management systems should be highlighted. An understanding of local resource users perceive, react to, and ultimately manage land and forest ecosystem is essential. It is important to work programatically with local people to maintain, conserve, and ultimately sustain the local resource base, Messerschmidt (1990) at the risk of sounding trite, advocates practicing what he calls the: "2-by-4 test". It consists of carefully applying the two "L's" of *Listening and Learning* from the locals, and the four "E's" of *Engaging, Encouraging, Enabling and Empowering* the locals.

It is a fact that local people know a great deal and have plenty to tell us about their natural environment and resource use. They have an incredibly rich store of indigenous technical knowledge gained from generations of trial and error. It is useful to gather such knowledge and incorporate into resource education systems, technician training and development planning.

Women are the backbone of the economy in these areas. Women are burdened with the responsibility for gathering fuel, fodder and water along with taking care of the children. Women are also responsible for agricultural and livestock activities, and various domestic chores. The primary role of the development should be to reduce their burden. The direct involvement of women in the planning, implementation and operation of projects that are of their immediate concern, specially in matters relating to fuel, fodder, timber and drinking water, etc. will go a long way towards effective implementation of development programmes. It is through their active participation that the family welfare and planning programmes can progress. A special programme for extensive child development services taking care of children below the age of five and pregnant and lactating mothers; for education and training would go a

long way towards protecting the ecosystem.

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