# CHAPTER - II

# POPULATION DYNAMICS AND SOCIO-ECONOMIC CHARACTERISTICS

# INTRODUCTION

The people in general living together in a community is said to have been living in a society. Individual is the basic unit of a society without which one cannot assume an aggregate. Socio economic characteristics normally refer to the economic structure of an individual collectively representing the social entity as a whole. Socio economic characteristic is a complex phenomenon as it involves physical and social action.

Moreover the study of human groups, social union and their functional relations effect natural environment in different ways. The study of dynamic relationship between unresting man (cultural environment) and unstable earth (natural environment) is must in finding out the socio economic condition of different social groups.

Therefore socio economic characteristics of population manifest the geographical phenomenon of earth surface that are directly related to human activity in an eco-system.

Sikkim lies in northeastern mountain belt therefore identifying socio economic characteristics of its population are significant to understand mountain and human adjustment. It is pertinent to observe nature of relationship between nature, society and human being because each of the element is interrelated and coexisted at a given place and time.

The level of society and human behavior generally controls the factors of environmental degradation. For example in rural area, there is a tradition to get out of home every morning in search of fodder and firewood, a dead man in pyre is burnt by piling firewood of not less than one tree. All these cultivated traditions are directly or indirectly deserting the natural environment at large.

In mountain eco-system the characteristic features of physical or natural environment is essentially studied to understand human response.

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The interplay of these two forces often creates a unique blend of nature and culture in a given area. Socio economic characteristics explain the social phenomenon such as life style, customs, traditions, dress code, food habits, occupational structure, ethnicity and other social practices. On the other hand economic characteristics normally refer to the economic structure, which are measured by the rate and magnitude of human developmental activities in a given area. However social, economic and natural activities are interrelated in defining the existing environment. The social advancement is determined by the intensity and degree of mobilization of regional resource.

The present study attempts to trace out the socio economic characteristics of three distinct communities of Sikkim namely the Nepalese, Lepchas and the Bhutias. Though customs and traditions of these distinct ethnic groups vary yet there exist uniformity in social adjustment as a result, beautiful cultural syncretism has evolved in Sikkim. Nevertheless, there exist spatial variations in their social practices, customs and traditions etc, which can be measured by the prevailing lifestyle displayed in a social milieu. Their environment concern and indigenous knowledge system is largely governed by their culture, tradition and way of life.

Demography is a statistical and mathematical study of human population in relation to size, distribution and composition of population. The element and component of demography include fertility, mortality, migration and other minor attributes of population studies. The composition such as birthrate, death rate, migration, sex ratio, density of population and growth rate have been incorporated in this chapter. Human activities their progress and advancement is studied with respect to education, agriculture, livelihood, occupation health etc.

# 2.1 POPULATION IN SIKKIM-AN OVERVIEW

Sikkim has recorded a total population of 5,40,493, which amounts to 0.05% of the total population of the country. It occupies 0.22% of the total geographical area of India. The total population of Sikkim in 1891 was recorded 30,458, which grew up to 5,40,493 in 2001. The annual growth rate

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of India records 2.13%, which is lower than 3.29% of Sikkim during 1991-2001. The sex ratio has drastically reduced from 912 females per thousand males in 1891 to 875 in 2001. Literacy rate of the state is 69.68, which is higher than the national average. The rate of urbanization is slow, only 11.11% population lives in urban centers.

Sikkim has reached 24.4 times growth of population from 1891 – 2001. For the last three decades, rapid growth has taken place. With a mere 22,152 in 1891, State population alarmingly went up to 540493 in 2001, Except for 1911 – 1921 where the growth had declined, rest of the decades have shown phenomenon increase in population. The natural increase however is not accelerated with growth. The rapid rate of growth is due to influx but birth and death rates have been reduced. In the year 1981 birth rate was 31.0 per milli, which was reduced by 24.3 per milli, in 1993, (natural growth rate declined) from 22.1 to 17.4 per milli respectively during the decade 1981 - 1993. The high growth rate recorded during the decade 1971 - 81 may be attributed to its merger in Indian Union. However in West Sikkim growth rate is low which may be attributed to slow migration due to lack of infrastructure facilities. The uneven growth rate of population since 1901 is revealed with 49% in 1911 -1921 and 34% in 1921 - 31. The decades of 1931 - 41, 1941 - 51, and 1951 - 61 have registered a phenomenal growth of 10.67%, 13.34% and 18% respectively. During 1961 – 71 growth rate accelerated to 29% may be due to the onset of developmental work in Sikkim, further, during 1971 - 81 rapid increase with 51% growth rate was measured (Rai Tamang 1998). The annual growth rate of 3.29% in Sikkim during 1991 - 2001 is greater than 2.13%, an annual growth rate of India. Even in 1911 – 21 the average growth rate is higher than in India. The district level decadal variation shows rapid expansion in population in the eastern region, wherein population of 85,621 in 1971 suddenly went up to 178,452 in 1991. Same trend is followed in south district where population of 53,185 suddenly went up to 98,604 in 1991. Whereas in north Sikkim, 13,014 persons were recorded in 1971, which grew in number to 31,240 in 1991, which is comparatively slow rate of expansion.

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## 2.1.1 Population growth

The population dynamics from 1891 to 2001 exhibit a growth of 24.4 times in Sikkim (Table 2.1). It is mainly due to rapid natural growth of population and migration. For the past three decades there has been uncontrolled growth of population.

It is (Table 2.1) depicted that the rate of population growth has been fluctuating in the State. There has been negative growth of population during 1911-1921. This could possibly be due to famine, plaque and epidemic of 1917 and partly due to the death of Gurkha warriors from Sikkim during the First World War. From 1921 to 1971 growth of population has increased steadily. During the decade of 1971-1981 substantial increase at a rate of 5.07 percent per year is noticed in the urban areas.

Year	Male	Female	Total	Sex ratio (females per '000 males)	Decadal % variations	Density of population Km <sup>2</sup>
1891	11589	10563	22152	912	-	-
1901	39795	28219	59014	709	166.4	8
1911	45059	42861	87920	951	48.98	12
1921	41492	40229	81721	970	-7.05	12
1931	55825	53983	109808	967	34.37	15
1941	63289	58231	121520	935	25,42	17
. 1951	72210	65515	137725	907	13.34	19
1961	85193	76996	162189	904	17.76	23
1971	112662	97181	209843	863	29,38	30
1981	172440	143945	316385	835	50:76	45
1991	216427	190030	406457	878	28.48	57
2001	288217	252276	540493	875	32.98	76

TABLE 2.1: TEMPORAL CHANGES IN POPULATION OFSIKKIM: 1891 2001

Source : Census of India, 1981, 1991 and 2001; Sharma and Sharma 1997

This could be mainly due to in-migration that took place after 1975, when large number of job hunters poured into the state. In the year

(1981-1991), population grew at lower rate of 2.85% per year.<sup>1</sup> However in the year 1991-2001, growth rate was high, at 3.29 percent per year. This increase may not be the natural increase in population rather it could be due to inmigration to work in various developmental activities like road constructions and hydro-power projects undertaken by NHPC. The district- wise population growth shows uneven character throughout. With the exception of West District, for which high growth rate was attributed, remaining districts had recorded fall in the decadal growth rate of population between 1981 and 1991. The North District recorded the highest decennial increase by nearly 104 percent in the decade 1971-1981 and the lowest increase of 18 percent during the year 1981-1991 respectively.

According to Risley (1894), Nepalis with 56 percent (including Murmi) constituted a majority of the population followed by the Lepchas (19 percent) and Bhutias (16 percent). There were other constituents like the Khambus and slaves. More than a hundred years later the share of Lepcha population has gone down to 14 percent whereas that of the Nepalis climbed to almost 70 percent with the Bhutias constituting more or less the same proportion (Lama, 2001). All these three ethnic groups have their own language, culture and social practices and have strong socio-cultural bond among themselves (Risley 1894).

# 2.1.2 Rate of natural increase in population

Broadly the difference between birthrate and death rate is the net increase of population. The net increase therefore is the natural increase of population. The growth of population due to migration is not taken into account while calculating natural increase. When fertility is greater than mortality, natural growth is higher.

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The comparative study has been done (Table 2.2) where death rate has always remained lower. This is due to access to improved medical science and proper health care. The crude birth rate in Sikkim has always been lower than the all India average, except 1983,87,88 & 89, in which it has been slightly higher. In the year 1990, there was a sharp declined natural

growth in Sikkim. Comparatively the crude death rate also has been relatively lower in Sikkim.

		INDIA	1101120101		SIKKIM	<u> </u>
•			Natural Growth		i	Natural Growth
YEAR	Birth rate	Death rate	Rate	Birth Rate	Death Rate	Rate
<u>1981</u>	33.9	_ 12.5	21.4	31.0	8.9	22.1
1982	33.8	11.9	21.9	31.6	9.5	22.1
1983	33.7	_11.9	21.8	<u>34.</u> 5	10.9	23.6
1984	<u>} 33.9</u>	12.6	21.3	31.7	10.2	_21.5
<u>1985</u>	32.9	11.8	21.1	33.1	10.7	22.4
1986	32.6	11.1	21.5	32.1	<u>· 11.7</u>	<u>20.4</u>
1987	32.2	10.9	21.3	33.3	10.3	23.0
1988	31.5	11.0	20.5	33.8	10.1	<u>23.7</u>
1989	30.6	10.3	20.3	31.4	. 9.1	<u>22.3</u>
1990		9.7	20.5	26.3	7.3	19.0
1991	29.5	9.8	19.7	22.5	7.5	15.0
1992	29.2	10.1	<u> </u>	22.0	5.8	16.2
1993	28.7	9.3	19.4	24.3	6.9	<u>17.</u> 4

TABLE -2.2: BIRTH DEATH RATES FOR INDIA & SIKKIM (1981-93)

Source: Sample Registration Bulletin Vol. 29 No. 2, July, O/o the RGI.

The natural increase in the year 1983, 87,88 & 89 has been slightly higher and in the year 1990, there was a sharp declined natural growth in Sikkim.

# 2.1.3 Distribution of population

Unevenness is the main characteristic of population in Sikkim. The main factors affecting population distribution include relief, drainage, climate, soil, vegetation, natural resource, agriculturable land etc. Owing to suitable physiography, climatic conditions and land availability for agriculture, East District has remained most populous till 2001. According to Census 2001, out of the total population, East District constitutes 2,44,790 persons followed by 1,31,506, 1,23,174 and 41,023 in South, West and North District respectively. The total male and female population in the state accounts to 2,88,217 and 2,52,276 respectively. The majority of males over female are found in all the four districts of Sikkim.

Owing to its harsh climatic condition and meager land available for cultivation, the North District is sparsely populated in comparison to other Districts. The decadal growth rate in North District (Table 2.3) shows substantial increase to 31.32% during 1991-2001 from 18.09% during 1981-1991

# 2.1.4 Districtwise distribution of population

The East District is the most populated district, which contributes almost 50% of the State population. The annual growth rate during 1991-2001 has been highest in the East District, which amounted to 3.7%. The decadal growth rate of West District showed a decline from 30.55 % to 25.48% during 1981-91 to 1991-01. Whereas in South District, there has been considerable increase from 29.78 to 33.37 % during the same period.

TABLE 2.3: POPULATION DISTRIBUTION (PERCENTAGE DECADAL GROWTH RATE, MALE-FEMALE RATIO AND DENSITY OF POPULATION IN DIFFERENT DISTRICTS OF SIKKIM)

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State/ District	Population in 2001			Perce decada ra	Sex ratio (females per '000 males)		Density of Population per km²		
	Total	Male	Female	1981-91	1991-01	1991	2001	1991	2001
Sikkim	540493	288217	252276	28.47	32.98	878	875	57	76
North.	41023	23410	17613	18.09	31.32	828	_752	7	10
West	123174	63835	59339	30.55	25.48	915	930	84	106
South	131506	68227	63279	29.78	33.37	892	927	131	175
East	244790	132745	112045	28.60	37.17	859	844	187	257

Source : Census of India, 1981, 1991 and 2001

District wise distribution of population over the geographical area reveals that North Sikkim covering 4226 sq. Km. land is the largest in area but smallest in human population with 41,023. Whereas the East District with 954 Sq. Km. area contributes highest number of population estimating 2,44,790 persons. South Sikkim though smallest in size yet placed in second rank with the population of 1,31,506.

# 2.1.5 Age composition

According to 1991 census the proportion of children within the age group of 0 - 4 years constituted 39.23%, age group within 15 - 59 years constituted 54.94% of the total population and more than 60 years of age constituted 4.56% population. The total share of dependent population directly or indirectly is around 43.82% and the rest are productive in nature. Total of 54.94% population falling under working group (Census of India, 2001) are the major human resource available with the state at present. However, after attaining the age of 60 years and below 14 years, few numbers may constitute to working class.

# 2.1.6 Sex ratio

The only state in India with females outnumbering male is Kerala with 1036 female per thousand males (1991). India has experienced ever declining sex ratio with the only exception in the years 1901, 11, and 21. An uneven sex ratio is recorded in Sikkim. The sex ratio of Sikkim is 875 in 2001, which has slightly declined from 878 in 1991. The district wise sex ratio reveals the record increase of sex ratio in the West and South Sikkim from 915 to 930 and 892 to 927 in the decade 1991 and 2001 respectively. (Table 2.4) The sex ratio had decreased from 912 to 709 during 1891-1901, which again went up to 970 in 1921 and later showed sharp decline to 835 in the year 1981. The findings reveal an increase by 43 females i.e. 878 in 1991 compared to 835 in 1981. In 2001, this has also been decreased to 875. Comparison of the sex ratio shows that the North District has the lowest sex ratio. (752 females per 1000 males). The ratio was above 900 in the West and South Districts.

District	Years							
	1981	1991	2001					
North	789	828	752					
East	797	859	844					
South	854	892	927					
West	906	915	930					
Sikkim	835	878	875 .(					

TABLE: 2.4: DISTRICT WISE SEX RATIO IN SIKKIM (1981 - 2001)

Source-Census of India, 1991, provisional totals of 2001

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# 2.1.7 Density of population

The number of person per Sq. km estimates the density of population. The density of population in Sikkim is 76 persons per km<sup>2</sup>, which is lower than the national average. (Table 2.5) The main feature of district-wise density showed that density in all the districts have gone up and highest density of 257 persons per km<sup>2</sup> is recorded in East District followed by South and West districts. North Sikkim exhibits 10 persons per km<sup>2</sup>, which could mainly be due to inhospitable climatic conditions characterized by forest and snow cover.

Year	North	East	West	South	Sikkim
1991	7	187	131	84	57
2001	10	257	175	106	76

2.5 DISTRICT WISE DENSITY OF POPULATION / KM<sup>2</sup>

Source-Census of Sikkim, 2001

In the year 1901, the density of the population per km<sup>2</sup> in the state was around 8, which increased to 76 in 2001. It is evident that there has been remarkable increase from mere 57 persons per km<sup>2</sup> in 1991 to 76 persons per km<sup>2</sup> in 2001. In Indian context the density of population increased from 77 persons in 1901 to 267 persons in 1991.

The density of population in four districts have increased during 1991 to 2001. As in the case of West District, an increase is noted from 84 to 106 persons per km<sup>2</sup>. In South District, it increased from 131 to 175 persons per km<sup>2</sup>. The East District recorded highest increase from 187 to 257 persons per km<sup>2</sup> from 1991 to 2001 respectively. The North district having nearly 60% of the total geographical area accounts for hardly 7.6% of the total population in 2001. The density of population recorded is 10 persons per km<sup>2</sup>, rating lowest in the state.

#### 2.1.8 Literacy rate

Progress and development of a nation depend on the total number of literates contributing to productive human resources. The state has 69.68% literates, trend of increase in 1981, 1991, and 2001 were 22.20%, 46.76%,

and 69.68% respectively. The literates in urban centers constitute 84.82%, which has increased from 69.85% in 1991. The number of literates in rural area constitutes 67.67%, which subsequently increased from 44.14% in 1991. It is estimated that the highest literacy rate is recorded in the East District with 75.57% followed by North, South and West districts with 69.11%, 68.12%, and 59.31% respectively. Among the urban centers, Gangtok recorded with 10,012 persons literates. On an average. Sikkim is positioned in better place than the national standard (Census, 2001) in rate of literates.

#### 2.1.9 Migration

Of the three components of population growth viz, birth rate, death rate and migration, the third component has played a significant role in accelerating the growth of population in Sikkim. Migration normally refers to the movement of people from one place to another. The term migration and out migration are used for internal migration, where no national boundaries are crossed, emigration and immigration refers to international migration. Besides, rural--urban, urban--rural, rural--rural, urban--urban migration, seasonal, innovative, intra migration etc. are the basic categories.

The growth of population in Sikkim after merger from 1975 is mainly due to various infrastructure developmental activities. As per census record, Sikkim during 1971 – 1981 recorded about 30% in migration. The rate of male migration is higher than the females. In 1991, the percentage of migrant to the state decreased from 19% to 13% (according to place of birth) and from 16% to 9% by place of last residence.

#### 2.1.9.1 Types of migration

The various types of migration are Immigration and Emigration, in migration, out migration, regional migration, rural and urban migration etc.

Immigrants				Census `	<u>rear</u>				
From		1971			1981		7	1991	
	Р	м	F	P	м		P	M	ŀ
Birth Place									
Other states/Uts	11.345	7,876	3,469	33,822	20,780	13,042	31,992	17,948	14,044
of India	(53.88)	(60.74)	(42.89)	(57.45)	(57,38)	(57.58)	(62.58)	(61.69)	(63.74)
Other Countries	9.710	5,091	4,619	25.046	15.436	9,610	19,132	11.144	7.988
of the world	(46.12)	(39.26)	(57,11)	(42.55)	(42.62)	(42.42)	(37.42)	(38.31)	(36.26)
Total	21.055	12,967	8,088	58,868	36,216	22,652	51.124	29,092	22.032
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)
Place of last Residence	e								
Other states/Uts	11.551	8,007	3.544	30,660	18,655	12,005	23.319	13.067	10.252
of India	(55,07)	(62.03)	(43,93)	(62.28)	(62,24)	(62.34)	(64.05)	(63.10)	(65.31)
Other Countries	9,424	4.901	4.523	15,570	11.317	4.253	13.087	7.642	5.445
of the world	(44.93)	(37.97)	(56.07)	(37,72)	(37.76)	(37.66)	(35.95)	(36.90)	(34.69)
Total	20.975	12.908	8.067	46.230	29.972	16.258	. 36,406	20,709	15.697
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

# TABLE 2.6: IMMIGRANTS FROM OTHER INDIAN STATES, UNION TERRITORIES/OTHER COUNTRIES

Source- Census of 1971,81,91, Migration table. (Value in parenthesis indicate

percentage) (P=Population, M=Male, F=Female)

In the context of Sikkim, in-migration has been noticed in the vear 1962 and after 1975, Firstly it is due to geopolitical problem arising out of Sino-India war and subsequent immigration of Tibetans from Tibet. Secondly, after Sikkim joined the mainstream to become the 22<sup>nd</sup> state of Indian Union in 1975. During this phase various developmental activities started in Sikkim. Various Institutes and offices were opened and it generated large number of employment avenues. Since the local residents were uneducated, people from nearby states poured into Sikkim to join various institutions and establishment. Further, various central offices were opened and large-scale commercial business also started in this period. The available data on migration, which primarily covers migration by place of (i) birth and (ii) last residence, between 1971 and 1981, Sikkim, recorded a very high level of inmigration, which amounted nearly to 35%. However, in 1991 the percentage of migrants to the state of Sikkim decreased in both categories, viz 19 to 13 percent by place of birth, and from 16 to 9 percent by place of last residence. It is interesting to note that the proportion of male in-migrants exceeds

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women. Further it reveals that during 1981 and 1991 a sharp decline was recorded which moved from 61% in 1981 to 57% in 1991).

The study based on the origin of migrants in the 'by birth' category reveals steady decline in the proportion of in-migrants from neighboring countries. The figure indicates that the general decline took place from over 46% in 1971, to 43% in 1981 and 35% in 1991 respectively. Here a distinct line has been drawn where the proportion of in-migration from within the country has gone up from 54% to 65% between 1971 and 1991. Hence, (Table 2.6) by the year 1991, the total percentage of in-migration from within India stood higher than that of in-migrants from the neighboring countries such as Bhutan, Nepal etc.

#### 2.2 WORKFORCE

The concept of workforce is associated with productivity, GDP and economic activities. It is an indicator of economic development of a State. The percentage and rate of workforce availability in a given region describes the degree of well being of that region. Further, quality of human resource and its economic importance also are the indicators of development.

In terms of job undertaken, the population of a place may be distinguished as workers and non-workers; the workers can be further classified into main workers and the marginal workers. A person who has worked for a period of 6 months or more is treated as a main worker and the one who has worked for less than 6 months is a marginal worker. A non-worker is the one who has not worked for any of the above two periods.

The cultivators, agricultural laborers, industrial workers and daily wage earners comprise the main workers while students; household dependents, pensioners and casual workers are non-workers. The Census data of 2001 shows that the total workforce in Sikkim is 48.72% and the remaining 51.28% are non-workers. The available workforce is further divided into 49.9% as cultivators, 6.4% as agricultural laborers, 1.2 % engaged in household industries and the rest 42.4% falls in other categories.

(Table 2.7) There is a gradual decline in the number of cultivators during the period 1971 - 2001 from 81% to 49%.

Sectors		1971			1981			1991 `		
	Male	Femal e	Total	Male	Femal	e Total	Male	Femal e	Total	
Cultivators	74.53	92.28	81.00	50.16	79.52	60.10	50.96	71.74	57.84	
Agricultural laborers	4.12	3.16	3.77	3.45	3.06	3.31	8.04	7.37	7.81	
Livestock, forestry, hunting, fishing & plantation orchards & allied,	0.60	0.48	0.55	1.93	0,92	1.59	2.99	1.58	2.53	
Mining & quarrying	0.09	0.00	0.05	0.17	-	0.11	0.30	0.05	0.22	
Manufacturing, Processing, servicing and repairing.										
(a) Household industries	0.50	0.04	0.34	1.25	0.74	1.08	0.99	• 0,33	0.77	
(b) Other than household industries	1 31	0.26	0.93	3.14	1.29	2.51	3.94	1.88	3.26	
<sup>;</sup> Construction	4.85	0.87	3.40	10.47	4.98	8.62	8.84	3.54	7.09	
Trade and commerce	3,09	. 0.48	2.14	5.08	1.00	3.70	6.79	2.08	5.23	
Transport, storage & communication	2.27	0.42	1.59	1.55	0.07	1.05	2.62	0.24	1.82	
Other services	8.64	2.01	6.23	22.80	8.42	17.93	14.53	11.19	13.43	
Total workers % of main workers to total population	100.00 70933 62.97	100.00 <i>40644</i> <b>41.28</b>	100.00 <i>1115</i> 77 <b>53.1</b> 7	00.00 97508 56.55	00.00 49928 <b>34.69</b>	100.00 <i>147436</i> 46.60	100.00 <i>10</i> 9994 <b>50.82</b>	00,00 54398 28.63	100.00 <i>16</i> 4392 <b>40.45</b>	

TABLE 2.7: TEMPORAL CHANGES IN THE OCCUPATION STRUCTURE BY SEX IN SIKKIM (1971 TO 1991)

Source : Census of India, 1971, 1981 and 1991(Bold Number indicate Percentage) Note : Values in italic are the total number of workers

It is further interesting to note that the number of agricultural laborers came down sharply from 3.8% in 1971 to 3.31% in 1981 but again increased to 7.81% in 1991. In terms of employment, the other services has substantially increased from 6.23% in 1971 to 17.93% in 1981, but again decreased to 13.43% in 1991. It is a universal fact in the context of Sikkim that after merger in 1975, a large number of vacancies under Government departments were

filled up which ultimately changed the prevailing pattern of workforce in Sikkim.

# 2.3 ETHNICITY AND ENVIRONMENT

The study of specific community reveals that the developmental activities take place in accordance with their prevailing indigenous knowledge system. An attempt has been made to elucidate the socio-cultural set up of the three communities in Sikkim. Ethnic variations are guided by religious philosophy of an individual. Some communities are nature worshipper and their guardian deities are rivers, mountains etc. that help preserve the mountain environment to a great extent.

# 2.3.1 The Lepchas

The Lepchas are one of the earliest tribes of Sikkim. They have a legend which says that they originated from *mayel Lyang*, a mythical land at the foothills of Mount Kanchendzonga in Sikkim itself. (Gowloog, 1998) Human interaction with natural environment is as old as evolution of human civilization on the earth but spatial variations exist in them. The factor affecting adjustment is religious practices, nature of economic pressures and fundamental knowledge on natural environment. Due to diverse socio-economic factors, impact on natural environment also varies from place to place. The adjustment pattern of the Lepcha tribe on natural environment is a subject for research because the Lepchas have been dwelling in jungle; riverside and hilly regions in the extreme climate ever since dwelling took place in Sikkim.

The original religion of Lepchas is known as mon bongthing. They indulged in animal sacrifices to placate the various deities of clan, villages, forest, river, wind etc. they are the lover of nature and worshippers of nature especially the Mount Kanchendzonga and believe the role of supernatural elements. Worshipping in jungle is their traditional religious practice but now such practices are vanishing slowly. The lepcha people are mostly concentrated in highland of north Sikkim. The northwestern part of the state is

highly elevated and therefore remains under snow cover almost throughout the year. Adaptation to such elevated area may cause a kind of illness or sickness known as hypoxia, which is caused by the deficiency of oxygen in the tissues of the body. As oxygen deficiency is the major problems. Nevertheless, the Lepchas people are found adapted to this environment.

The above study proves that people bank directly upon nature for spiritual and religious contemplations. Therefore, there exist every possibility of degradation of environment due to excess and uncontrolled use.

# 2.3.2 The Bhutias

The Bhutias also have similar characteristics to those of the Lepchas. This similarity is in terms of their adoptive responses to the natural environment as Bhutias are generally highlanders. They prefer joint family rather than nuclear one. In the very beginning the lifestyle of the Bhutias was somehow similar to that of the Lepchas. The rapid economic improvement brought about drastic changes in their life. The level of educational attainment is also high and as a result they started to lead higher standard of living. Expansion of economic growth among the Bhutia has abruptly segregated the Lepchas from their milieu. They started to occupy the fertile land of more advanced region and slowly shifted from remote corner to better places. Moreover, interaction with environment is similar as Lepchas, as they both prefer cold climatic region of high-elevated land for living.

# 2.3.3 The Nepalese

Nepalese population in Sikkim is found in majority and is spread all over the regions. They introduced agriculture and gradually transformed the nomadic society of the Lepchas. The Nepalese are said to be industrious and hardworking (Kuhn Delia, 1962). It is significant to note that the Nepalese have not only influenced the economic activities of this region but also has put impact on social, natural and cultural environment to a great extent. During the land holding system, mass agricultural land was transformed to individual holding and massive environmental changes were recorded. The land was put

to agricultural use and development activities were started even in the remote corner of the State. As a result, new socio-cultural and natural environment came into existence in the state of Sikkim. This phase can be called as the introductory age of environmental degradation. With a view to increase revenue of the state, large jungle were cleared for housing and infrastructure development activities.

# 2.4. ECONOMIC INDICATORS

Per capita income, productivity and access to natural resources are the basic determinants of economic growth of a region. In Sikkim, people are engaged in multi economic activities for their livelihood. Around 50 % of its population is engaged in primary activity from the very beginning. There is no structural change in the shift from primary to the secondary sector in Sikkim. This sectoral constrain is due to lack of job opportunity in private and public sectors. In Sikkim, the structural shift in economic activities has been slow and stable. (Figure 2.1) The trend in structural shift in the Sikkimese economy of different years show significant structural changes from one sector to the other. The occupational structure reflects slightly increasing trend in primary sector, recording 51.59% in 1980-81 to 52.03% in 1995-96 with a negligible increase of 0.44% only. The comparative figure shows almost non-existence of secondary sector. The secondary (Fig. 2.1) sector reveals marginal decrease from 18.10% in 1980-81 to 13.65% in the year 1995-96. Though tertiary sector show bulky volume yet no phenomenal increase is being noticed in the occupational pattern of its people.



Fig-2.1 Occupational structure

# 2.4.1 Per capita income

Per capita income is one of the indicators that help exhibit ones social status and economic well being. In areas with high per capita income, the level of consumption is also high and there exist scope of developing industries and services. Besides per capita income, productivity of a region will also help to examine the socio-economic characteristics of a society. Economically well to do region have higher level of productivity.

The per capita income (Fig. 2.1) for the state of Sikkim in the year 1980 was recorded Rs 1,57100 at constant price. The same increased to Rs 34,9,200 in 1991-92. The race for attaining high per capita income is taking place at the cost of existing environment.

# 2.4.2 Domestic products of Sikkim

The steady economic growth at macro level is reflected both in terms of Gross Domestic Product and per capita income. In Sikkim, both the indicators at constant price have recorded a steady increase (Table 2.8) during the year 1980-1992. The highest growth is recorded in the year 1987 with 20.61 percent.

Years .	Domestic product Rs (thousand)	Annual growth rate (percentage)	Per capita. Income Rs. (thousand)	А. <b>G.</b> R (%)
1980-81	489,800		157,100	
1981-82	521,900	6.55	161,100	2.55
1982-83	588,200	12.70	175,000	8.63
1983-84	614,200	4.42	175,800	0.46
1984-85	694,600	13.09	191,,900	9.16
1985-86	755,900	8.82	201700	5.11
1986-87	891,700	17.96	229,700	13.88
1987-88	1,075,500	20.61	267,800	16.59
1988-89	1,149,000	. 6.83	292,400	9.19
1989-90	1,228,900	5.51	311,800	6.63
1990-91	1,353,200	10.11	336,900	8.05
1991-92	1,442,900	6.63	349,200	3.65

Table 2.8: NET STATE DOMESTIC PRODUCT & PER-CAPITA INCOME AT CONSTANT PRICES

Source : Ministry of Finance, Economic Survey, Government of India, Various issues.

# 2.4.3 Human Resource

Occupational structure of a population is other fundamental aspect in analyzing the socio-economic characteristics and environment. These characteristics of population provide valuable information on relative density of productive and unproductive population in a society. Availability of population in dependent or unproductive (children below 15 years of age group, old and elderly person 60 years and above) and population in working age group i.e independent or productive population (between the age of 15-59 years) is vital for obtaining the variety of socio-economic characteristics and environmental position in a society. According to the specialization of workers or division of labors, the working population can be categorized into main workers and marginal workers, which depends upon the nature of their economic activities.

The main worker (Table 2.9) accounts for 80.7 % as compared to marginal workers with 19.3% only. The workers are engaged in exploiting, mobilizing, and utilization of resources. Hence their working pattern has close affinity with the natural and social surrounding. As a result, surrounding environment and landscape is constantly changing in Sikkim.

	Number of workers								
Districts	Main	%	Marginal	%	Total				
East	92465	79.2	24337	20.8	116802				
West	45169	85.1	7962	14.9	53131				
North	17572	74.4	6062	25.6	23634				
South	57272	82.2	12481	17.8	69753				
Sikkim	212478	80.7	50842	19.3	263320				

#### TABLE NO 2.9: DISTRIBUTION OF WORKERS IN SIKKIM 2001

Source: Sikkim Provisional Totals (2001)

#### **2.5 SOCIAL INDICATORS**

Education, health and social security are the most vital social phenomenon that acts as indicators to identify socio-economic characteristics of a given society. Each individual's level of educational attainment, state of health and assessment of social security help in measuring the level of satisfaction and prosperity. The social status of people will improve with the improvement in the basic services required in various level of human development. Hence an educated, healthy and secure society provides solid impetus for economic growth. It is necessary for a person to be literate before he becomes educated. Higher level of education provides dynamism to helps in improving social upliftment. Socio-economic society and characteristics differ from society to society, which primarily depends upon the literacy rate and level of educational attainment of its population. So it is important to examine the literacy rate and level of education of the people in order to find out the socio-economic characteristics.

The health of a society reflects the health of environment and his surrounding. Therefore the level of environmental destruction is closely related with level of human development. An attempt further has been made to correlate the various parameters of social indicators with the level environmental consciousness.

It is a fact that higher percentage of literacy rate (84.82%) is shared by urban areas, in all the districts of Sikkim and female rate is comparatively lower than male in all the cases. In rural area, 32.3% are illiterates (Census,

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2001) and they depend mainly on nature for their livelihood and their little knowledge on environment may further deteriorate the environment. The progress in the literacy rate is very encouraging in the state but due to absence of further scope for employment in the Governmental sector, the unemployment rate also shows corresponding increase. As a result, the unemployed population again gets back to natural resource for their livelihood. At this point of time further natural destruction may occur at large scale. This has become a menace in every sector of Sikkim's economy.

#### 2.5.1 Health infrastructure development

Health and education are the fundamental necessity of a society. The successive government in the state has given top priority to improve the health and hygiene of Sikkim. Both preventive and curative measures have been adopted to improve the health scenario in Sikkim. The basic development of health infrastructure has been taking place all over the State. Over the years, attention was paid in establishing health institutions of different types, developing health manpower, and launching different (Mukhopadhyay, 1998) health programmes in the State. Consequently, expenditure on health and family welfare has also been consistently increased.

Owing to difficult and inaccessible terrain in some part of the state, it had impact in terms of unmet health targets in the state. In Sikkim year1979-80 showed considerable increase in the number of health institutions are witnessed with a view to provide adequate primary health care services to its rural as well as urban population. The recent data of 2001-02 reflects 5 hospitals, 24 Primary Health Centers (PHC) and 147 Primary Health Sub-Centers (PHSC) in the state. Several efforts have been made to minimize the infant and maternal mortality, in conformity with strategies to achieve goal of health for all. Nevertheless, traditional way of treatment and medicine has continued to play an important role in the state. Many of the modern day health workers including the health worker in the primary health centres are also traditional faith healers. They have still faith on treatment of illness and

disease by super-natural powers rather than medicine. Hence in a typical blend of tradition and modernity, they work in hospital or health center during the day but perform the traditional tasks of a faith healer in the evening. Such practices prevail especially in rural areas.

Moreover establishment of hospitals and primary health centers even in the far-flung areas of Sikkim has brought about some changes in health infrastructure. Despite some proportion of rural society in Sikkim are still in the grip of fallacious traditional system of medicine.

The next significant aspect that can identify socio-economic characteristics is social security. Every society has a number of people who are incapable to perform multi-economic activity. These include sick, old, disabled, orphans, widow and unemployed persons. Under the social security programme, proper assistance should be provided to them. In Sikkim, the government is implementing such type of programs in order to provide social security for them. Among them old age pension, financial assistance for disable persons and widowers and distribution of rice free of cost for people below poverty line are implemented by Sikkim Government is noteworthy.

Since the rural people still have faith on supernatural power and the tradition of practicing herbal medicine is maximum there seems encroachment in medicinal plants. People usually collect medicinal plants either from forest or from close natural base. In such a scenario, it is expected that there is a danger of extinction of valuable species of medicinal plants.

#### 2.5.2 Food habits

Food is derived from nature and cultivation of such food for consumption is carried out in accordance with the traditional system of local people. Food habit accustomed to particular ethnic groups can help in examining existing environment and social set up. The dietary system of Sikkimese people whether be Lepcha, Bhutias or Nepalese, their exist uniformity in the major ingredients of food. This paragraph attempts to analyze the indigenous fermented foods of the Sikkim Himalayas. Such food provides basic components of diet in the various forms of nutrition, flavour and texture.

The traditional fermented foods consumed by the people of Sikkim are *Kinema, Gundruk, Sinki, and sukako masu.* The fermented beverages prepared at each household are widely used by Nepalese, Bhutias, and Lepchas. Indigenous fermented foods are either alcoholic or non-alcoholic (Tamang, 1998) depending upon the custom of People. The basic foods of Sikkimese society include *Momo, thukpa, sel roti, rice* etc. The intake of rice is highest amongst all the communities. All such foods are prepared from the available resource; hence, food habit becomes an element of environment According to food habit, cultivation is carried out in the available land, for example millet and wheat is cultivated for food and alcoholic beverages. Due to rigorous cultivation, the topsoil erosion washes soil nutrients in many ways. For rearing cattle, goat, sheep, yak, fodder plants are not sufficient therefore clearing of grass, shrub, and trees have been taking place thereby endangering the existing mountain environment.

# 2.5.3 Education

Educational attainment is one of the most significant social phenomena of a society. The two parameters are applied in studying the level and rate of educational attainment and progress.

- 1. The first parameter is the teacher taught ratio, lower the teacher taught ratio, better is the quality of education. Because in such a situation, teacher can make his approach or pay personal attention to individual student and there will be indifference between teachers and students.
- 2. Secondly, the measurement of reading, writing and understanding. The population commission of United Nations considered the ability to read and write a single message with understanding in any language is a sufficient basis for classifying population as literate.

In Sikkim, development of education infrastructure took place only after 1975 when Sikkim merged with the Indian union. It is evident that most of the schools are build up within the walking distance. There are total of 1099 schools (Fig 2.2) catering to the needs of students.



Figure- 2.2 Educational Institutions

Further it can be stated that Government has been paying more attention towards improving the standard of education in the state. Besides the above institutions, a large number of other institutions are imparting primary education, higher education, technical education and vocational education. These helped to improve the quality of education. At present there are three degree colleges, one law college, one research institute of tibetology, one teachers training college, one teachers training Institute, one technical industrial institute, fifty monastic schools, twelve sanskrit pathsalas and one blind schools established in Sikkim. In accordance with the increasing number of educational institutions in the state, there records corresponding increase in the number of teachers as well as students' enrolment.

# 2.5.4 Land use

Land is the most valuable resource for the survival of life on planet earth. The problems of land in India are indeed comparatively more acute. India has 16% of the world's population in just 3% of the geographical area. The cattle population is 13% of the world's with just 0.5% of the grazing lands.

Nearly one-fourth of cattle depend on grazing in forests and pastures. Annually about 220 million tones of fuel wood and 24 million tonnes of fodder are harvested for use. The overall productivity of forest is only 0.7 m<sup>3</sup>/ha as against the world's average of 2 m<sup>3</sup>/ha. Crop productivity is one-third in India compared to one-half in many countries of the world. Therefore there is immense pressure on the land resources in the country, which is quite evident on the above statistics. As a consequence it is estimated that nearly 40% of the land area (Dhar 2001) in the country is at present degraded in one form or the other and has either already turned into or is steadily turning into, waste lands.

# 2.5.4.1 Landuse dynamics

Land-use in the state of Sikkim are categorized into nine different classes namely, forest, barren land, paşture and grazing land, current fallow land, uncultivated land excluding fallow, fallow other than current, land not available for cultivation, cultivable waste land, and net sown area. The area covered by forest in 2001 is recorded at 44% but in 1990-91 the area under forest cover was 42% of the total geographical area of Sikkim. The area under barren land is 25.37%, pasture and grazing land is16.95%, and the net sown area is 8.91%. As studied, the land under agriculture is 12.3%. There has been slight increase in the cultivable wasteland, fallow other than current fallow and current fallow. The net shown area has shown (Fig. 2.3) a decrease of 0.23% in between 1976-77 and 1990-91



Fig 2.3 – Landuse Pattern

Study showed (Table 2.10) that large areas are transformed and put to agricultural purposes. It is to mention here that vast land in the North Sikkim is under forest cover and remain under the perpetual cover of snow. Therefore increase in population is resulting in shifting of habitation towards higher altitude. Such a scenario may result in glacial receding and loss of natural habitat may cause ecological disturbances.

# 2.6 FOREST

It is observed from the study that land is under tremendous pressure from overpopulation. The resources are not sufficient to meet the growing demand of firewood, fodder, etc. In the meantime, Government has formulated a policy to encourage investors in industry sector. In such a scenario, industrial effluents and pollution of discharged wastes may create hazard in the locality. Further, no employment opportunity is available with the government and the role of private sector is virtually nil in the State. As a result, people are directly depending upon natural resources. Thus, there remain every chances of forest depletion in Sikkim Himalayas. Classification of forest area by legal status (Table2.11) shows 82% of total geographic area under various categories of forest land.

TABLE 2.10:	CHANGES	IN LAND	USE (KM <sup>2</sup> )	. 1976-77 TC	) 199 <mark>0</mark> -91
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Land use	1976- 77	%	1980- 81	%	1990- 91	%	% change in 14 years per land use	% change in 14 years of the total land area
Forest	693.80	37.96 -	2619.83	36.92	2980.00	42.00	+10.62	+4.03
Barren Land	040.10	28.75	1802.50	25.40	1800.00	25.37	-11.76	-3.38
Pasture and Grazing	571.48	22.15	1582.99	22.31	1202.99	16.95 <sub>.</sub>	-23.45	-5.19
Current fallow	5.01	0.07	44.28	0.62	39.06	0.55	+679.64	+0.48
Uncultivated land excluding fallow	49.25	0.69	45.60	0.64	108.30	1.53°	+119.89	+0.83
Fallow other than current	9.44	0,13	94.74	1.34	92.04	1.30	+875.00	+1.16
Land not available for cultivation	66.13	0.93	116.04	1.64	143.00	2.01	+116.24	+1.08
Cultivable waste land	11.53	0.16	6.81	0.09	98.07	1.38	+750.56	+1.22
Net sown area	649.26	9.15	783.21	11.04	632.54	8.91	-2.58	-0.23

Reporting (+) Increase, (-) Decrease Source-Sharma and Sharma, 1997

Geographic Area Km <sup>2</sup>	Reserved Forests Km <sup>2</sup>	Reserved Forest (Khasmal) Km <sup>2</sup>	Protected Forest (Gaucharan) Km <sup>2</sup>	Recorded Forest Km <sup>2</sup>	% Of State's Geographic Area
7,096	5452	385	104	5841,40	82.32%

TABLE 2.11: THE RECORDED FOREST AREA IN THE STATE

Source- Statistical Profile, 2004

The recorded forest area statistics include reserved forests (including tree forest, pasture, alpine shrub and uncultivable Alpine regions such as perpetual snow, glacier and alpine lakes etc.) occupying 5452.40 sq.km and record estimated total forest area is 5841.40 Sq.km. (82.32% of total geographical area of the state). However, as per the revised figure, forest cover records 31.93 Sq.km and tree cover amounts to 39.42 Sq.km. The total forest and tree cover is 46% of total geographical area (Forest Dept. 2003). It is further studied that hydropower projects have been started along the Tista and Rangit rivers. In the North Sikkim, massive hydropower units are coming up. Along the dam and surrounding areas, merciless cutting of trees are taking place. Soil erosion and earth cutting is voluminous, the entire face of the earth has been disfigured due to landscape cutting. Further, road and building construction is on in the dam and station area. As a result the mountain environment and ecology have been completely replaced by concretes of cements.

### 2.7 AGRICULTURE

Agriculture is one of the most important factors for determining socioeconomic characteristics. Agriculture being a major economic activity of the people of Sikkim Himalayas, it cannot be excluded while examining socioecological environment. Most of its population is earning their livelihood from agriculture. Agriculture still is the mainstay of Sikkim's economy and agriculture contributes maximum gross domestic product of Sikkim.

Diverse physiographic features of Sikkim have provided a spatial variation in agricultural practices too. The variation in elevations with rainfall and

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temperature regimes allows diverse crop cultivation up to 2000m above mean sea level.

It is an established fact that environment is directly or indirectly affected by the process of agricultural development. The practice of agriculture in the higher altitude is related to soil erosion and other environment degradation problems. Therefore it is a must to justify as to what extent environmental considerations are taken into account while practicing agriculture in Sikkim. In the steep slope, terrace cultivation is practiced by traditional farming system. Such system of farming is responsible for massive erosion of topsoil and manure. In fact Sikkim is the first State in India to introduce organic farming. Steps are being taken to preserve the land and soil fertility but nature is taking its own course in modifying the environment.

# 2.7.1 Cropping pattern, crop yield and utilisation

It is a notable fact that land under forest cover is 46%, and 12% of geographical area is put to cultivation. Due to adverse climatic condition and rugged terrain, major part of the land remains unfit for cultivation. However, cardamom has helped in preserving the trees in this alpine belt. The type of crop to be grown in the Sikkim Himalayan region is determined by relief and the degree of slope, vegetation type, climatic factor such as precipitation in the form of rain, snow, hailstorm etc. irrigation facility, accessibility and remoteness.

The people of Sikkim have been trying to adopt themselves with the recent trend and demand and have started growing high value cash crop of medicinal importance. The floriculture and other crops, fruits growers have marked their initiatives in the recent years. The changes in cropping pattern have been noticed and area under cereal has declined from 70.16% in 1975-76 to mere 52.16% in1995-96. Wheat, maize and millet cultivation have virtually been stopped in Sikkim. This could be due to shift of farmers from food crop to cash crop. The cultivation of rice is limited to the low lying area of Martam, Mangley, Namphok, Namli, Ranipool Daramdin etc. The cultivation of fruits and vegetables have shown considerable improvement where orange

cultivation is on improving side. The area under vegetables also increased from 0.92% in 1980-81 to 4.17% in 1995-96. Of the important cash crop ginger is widely cultivated in the lower part in Sikkim.

The remarkable change (Table 2.12) in the cropping pattern of cereals, maize, rice and wheat is seen in the nook and corner of the state. The production of pulses and oilseeds have shown increasing trend. Sikkim is favorable for the cultivation of large cardamom and its production has achieved the sixth five-year target of 4.5 thousand metric tones. In 1996-97, the production of ginger has gone down by 4 thousand metric tones mainly because of diseases problems. Besides, production of vegetables oilseeds and fruits, have gone up. In the context of Sikkim, ginger is the main source of earning. The production of ginger increased from 3.2 thousand metric tones in 1980-81 to as much as 29 thousand metric tones in 1995-96.

After 1975 remarkable increase in production of maize, rice, and finger millet is noticed. The horticultural crops, such as oranges, potatoes, and other vegetables showed slow rate of growth in terms of yield. There is remarkable increase (Table 2.12) of large cardamom production from 1975-76 onwards with an exceptional decline in 1991-95. This could be attributed to the disease called *phurkey* and *chirkey*, which is common in Sikkim. However, the yields of major cereal crops such as maize, wheat, and rice, have sustained in the terrace of Sikkim land. The use of chemical fertilizers such as nitrogen, phosphate, and potassium in Sikkim is negligible which is recorded at around eight kilograms per hectare compared to 32 kg in Himachal Pradesh and 72 kg at the national level. Where as in Arunachal Pradesh and Nagaland, the consumption of chemical fertilizers was 1.2 and 4.5 kg per hectares. It is mainly due to government decision to ban on use of fertilizer and encouragement to farmers towards practicing (Pradhan *et all*, 2003) organic farming.

Hence it can be stated that maximum possible use of land has been put to agriculture and tremendous pressure mounting on land is observed. The use of fertilizer and pesticides has polluted the soil nutrient and constant degradation of land is seen due to land wash and landslide.

(1973-70 10 1990-97) 000 TONNES						
Crops	Years					
	1975-76	1980-81	1985-86	1990-91	1995-96	1996-97
Rice	10.00	10.63	17.05	22.04	21.68	22.06
Wheat	0.15	10.30	11.22	13.08	15.30	14.81
Maize	16.50	28.93	49.25	57.60	56.56	56.63
Finger Millet	3.20	384	4.30	4.62	4.75	4.71
Barley	0.50	0.46	1.30	1.18	1:57	1.56
Buckwheat	0.80	1.38	1.38	1.42	1.74	1.61
Total Cereals	31.15	55.54	84.50	99.94	101.80	101.38
Urd	0.60	2.92	2.90	3.05	3.23	3.30
Other Pulses	0.10	0,10	1.70	2,38	2,70	2.69
Total Pulses	0.70	3.02	4 60	5.43	5,92	107.37
Rape Seed and Mustard	0,20	0.90	2.30	2.65	4.39	4.24
Soya bean	0.50	1,81	3.10	3.02	3.21	3.36
Other Oil Seeds		-	0.15	0.04	0.04	0.04
Total Oil Seeds	0.70	2.71	5.55	5.71	7.63	7.64
Orange/Citrus Fruits	3.60	7,35	12.10	15.45	8.70	9.00
Other Fruits	1.10	3,00	6.10	8.05	3,30	3.50
Total Fruits	4.70	10.35	18.20	23.50	12.00	12.50
Vegetables	5.00	3.40	23.90	35,00	. 28.00	30.00
Potatoes	8.00	6,64	26.40	34.97	24.00	27.80
Large Cardamom	2.30	3.50	3.90	3.60	3.60	4.58
Ginger	2.00	3.20	10.90	16,00	29.00	25.00
Rhizomatic Crops	0.10	0.20	1.10	3.00	1.60	1.00
Total Miscellaneous	12.40	13.54	42.30	57,57	58.20	58.38

TABLE 2.12: TEMPORAL CHANGES IN THE PRODUCTION OF MAJOR CROPS <sup>14</sup> (1975-76 TO 1996-97) 1000 LONNES

Source : Department of Agriculture, Government of Sikkim, Gangtok, Sharma & Sharma 1997 & Lahiri 2001.

# 2.7.2 Crop production

Agricultural development is determined by the ability to produce more crops in a year. Crops production normally refers to the total amount of crops that are produced either from net sown area or from gross sown area. The state is facing insufficiency in supply of crops. It is due to non -suitability of land for agricultural purpose, due to rugged and mountain topography.

	PRODUCTION IN TONNS					
Sl.No.	Districts	Maize	Rice	Wheat	Barley	Pulses
l.	North	4.1614	2.0593	1.6498	0.2070	0.0661
2.	East	13.4730	9.9500	4.3100	0.5000	1,5500
3.	South	17.4000	3.4300	2,5900	0.3000	2.0500
4.	West	18.2000	8.0000	4.3000	0.6700	2.2800
5,	Sikkim	52.8344	23.4393	12.8498	1.6770	5,9461

TABLE NO: 2.13: DISTRICTWISE DETAILS OF CROP PRODUCTION- (1999-2000)

Source: Agricultural Department, Govt. of Sikkim

According to excerpts from Agriculture department, district wise estimation of food grain production indicated that West District topped in the rank of production of cereal crop. It alone shared about 34.5 %, and production from East, South, and North is recorded at 30.0%, 26.5% and 8% respectively. A unique practice prevailing in Sikkim is that the food grains are often used as beverages and often fermented for alcoholic consumption. On the whole, there has been a remarkable growth in the production of food grain in Sikkim. (Table 2.13) However the growing demand still remains unfulfilled due to rapid multiplication of empty bellies.

#### 2.8 ANIMAL HUSBANDARY

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Agriculture and animal husbandry go hand in hand in the state of Sikkim. The economic activity in Sikkim started with slash and burn cultivation, herding, trance humane, grazing and landed up with the domestication of animals. The rearing of animals depend primarily on the availability of land for pasture and supply of fodder. The Government of Sikkim has put a permanent ban on the grazing of animals in the forestland. The vacant land for fodder plantation is meager and there is a growing demand of milk and meat in the market. In such a scenario, deforestation is bound to happen.

#### 2.8.2 Grazing land

According to S. Palzor, out of the total 7096 Km<sup>2</sup> land area, about 1,62,392 hectare i.e. 22% is available for fodder production and pasture development in the state as compared to 15% of the total land available for cultivation. The details of the land area (Fig 2.4) and type of grazing ground of Sikkim shows that large chunk of grazing land is covered under alpine pasture (65.92%) and the remaining area under Khasmal land and Gaucharan accounts to nearly 34% only.





The district wise availability of area (Table 2.14) under alpine pasture shows that North Sikkim records highest in the land availability for pasture in alpine higher altitudes. It accounts to 73% land under alpine pasture. Other districts have negligible area under alpine pasture. This is due to location of North Sikkim in the higher altitude and land being unfit and unsuitable for agriculture.

#### 2.8.3 Alpine pasture land in Sikkim

The alpine pasture land in Sikkim is found in the North district (Table 2.14) of the study area. The pasture is in the form of khasmal and gaucharan.

TABLE 2.14: DISTRICTWISE AREAS OF ALPINE PASTURES	(KHASMAL AND
GAUCHARAN LAND IN SIKKIM.)	•

ALPINE PASTURE IN HECTARE					
District	Alpine	Khasmal	Gaucharan	Total	Percentage
North	90861	21607.23	1200.15	113668.38	73
South	3032	9777.57	1081.96	13891.38	9
West	6487	9188.80	1086.35	16762.15	11
East	6 23	10499 56	902.13	11407.92	7
Total	100386.23	51073	4270.59	155729.82	100

Source-Department of Forest Govt. of Sikkim , 1995

# 2.9 LIVESTOCK FARMING

The cattle population is highest (Table 2.15) in Sikkim. Besides, poultry goat and sheep contribute lion share in livestock distribution.

Total population of livestock is 8,51,308 in the year 1992.Sikkim with the population of nearly 5.5 lakhs humans have nearly 8 lakhs livestock population. The domestication of animal in each of the rural houses areas is mainly to meet the scarcity of manure, milk, meat and money. In the colder regions, animals like sheep, yak and yeti, cattle, goats are kept in open field for grazing. As a result, many endemic species of plants and grass of medicinal value are lost forever. These are the example of how environment is degraded in the alpine zone.

#### 2.9.1 Livestock population

The variation of livestock population of Sikkim in the year 1977 and 1992 shows an increase of 66% i.e. an increase to 8,51,308 from 5,12,778. The number of buffaloes however decreased by 46% but other livestock number increased during this period. There has been an increase in pig and poultry (Table 2.15) population as well. Cattle population also increased by 27% while yak figure went up by 34% in the same period.

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Livestock	1977	1992	Increase /Decrease in %
Cattle	157546	200035	26.97(+)
Buffaloes	5438	2932	46.08(-)
Sheep	16104	16268	1.02(+)
Pigs	18596	44477	139.18(+)
Goats	88986	114707	28.90(+)
Horses	1186	1789	50.84(+)
Poultry	220927	465751	110.82(+)
Yak	3995	5349	33.89(+)
Total	512778	851308	66.02(+)

#### TABLE 2.15: LIVESTOCK POPULATION OF SIKKIM

Source-Paljor, 1998

The number of indigenous cattle population decreased by around 34% during the year 1977 to 1999. Where it was 14,2,45 in 1977 and came down heavily to 9451 in 1997. This could be due to farmers started selling milk and cross breed replaced (Table 2.16) the indigenous species.

TABLE 2.16 GROWTH RATE OF CROSSBRED CATTLE POPULATION (IN COMPARISON TO INDIGENOUS CATTLE POPULATION IN NORTH DISTRICT)

Year Number of crossbred		Number of indigenous	
1977 Nil		14245	
1982	1852	11651	
1987	2930	11684	
1997	3390	9451	
Trend in growth	(+) 100	(-) 33.65%	

Source-Paljor, 1998

# TABLE 2.17 LIVESTOCK MIGRATION AND MANAGEMENT PRACTICES ADOPTED IN CHHO-LHAMO, (NORTH DISTRICT)

Month	Location	Livestock	Activities
February	Chora below Gurudongmar	Sheep	Lambing
March	Phago	Sheep	Lambing
April	Donkung		
May	Lasher area	Yak	Reno Calving
June	Lasher area	Yak	Calving
July	Lasher area	Sheep	Servicing
		Reno	Servicing
August	Donkung	Yak	Servicing
September	Donkung	Sheep	Servicing
October	Donkung		
November	Donkung	Livestock	Slaughter
December	Chho-Lhamo		
January	Chho-Lhamo		

Source-Paljor, 1998

About 22% of the total area in Sikkim is available for fodder production and pasture development. The three main categories of land available are alpine pasture, khasmal, and gaucharan, which come under the preview of state forest department. The details of migration routes of grazing and different livestock management activities adopted in this region (Table 2.17) predict that the movement of livestock at such high altitude brings about some alteration in the existing ecology of a region. The animal tamper in the barren Tand causes great loss of flora and fauna, resulting great ecological loose in a given region.

### 2.10 ENVIRONMENT CONCERN

In the above paragraphs detail discussion is made whereby one can conclude that in the high altitude areas of Cho lamu and Gurudongmar, rearing of livestock is a permanent feature. It is also known that the grazing lands are open and depending upon the season, shifting takes place from one

place to another. Under such circumstances, ecological disturbances are bound to happen. The high altitude plants are prone to degradation in these regions. The movement of livestock at such high altitude brings about some alteration in the existing ecology of a region. The animals tamper in the barren land which causes great loss of flora and fauna, therefore in a given region ecological changes take place.

# CONCLUSION

Sikkim, a small mountainous state in the Eastern Himalayas has its own identity of social structure, economic life and cultural values. Diversified physiographic features of Sikkim provide structural diversity in the ethnic population, which is an interesting subject matter for future scope of study. There exist bond of relation between Himalayan population and diverse environmental conditions. The study has been carried out to find out the socio-economic characteristics of this Himalayan people and pressure exerted on environment. The adaptive strategies of particular people in highland and their physiological adjustment and cultural adjustment are unique, so it becomes a food for thought Three main ethnic groups of Sikkim i.e Lepchas, Bhutia and Nepalese are cited here in order to trace out their socio-economic characteristics in relation to man and environment adjustment. This study has given more emphasis on adaptive responses of people of high altitude. All the three ethnic groups are found adapted to such high altitude despite of their typical dietary culture. The Sikkim Himalayan people have provided a diverse nature of socio-economic characteristics and this diversity is measured in terms of their social status and economic structure. However the developmental activity comparatively seems to be taking its shape in economic passion and social organisation for successive years. There lies fluctuation in annual growth rate of both net state domestic product and per capita income at constant price. However there is an increase in literacy rate. Hence this phenomenological study provides detail information about various aspects of socio-economic characteristics of Sikkim Himalayan people. However the study also covered food habit or dietary culture of different ethnic

population of Sikkim. The uses of several types of indigenous fermented foods are consumed habitually by its population. Hence it can be said that socio-cultural set up is closely linked with human dependency with nature. With the growth of human and animal population, number of houses is multiplying day by day. In general, living organisms are directly depending upon natural resource, be it crops or fodder. In order to support growing population, infrastructure development is taking place and massive forest depletion is vivid everywhere. Having analyzed the socio-cultural and economic set up of Sikkim, it is revealed that population is growing in numbers followed by rapid development of infrastructure development. The socio-economic characteristics of people are discussed here for clear understanding of the study area because environment encompasses wide range of parameters varying from human behavior, natural elements and cultural confrontations. Having described the history and socio economic condition of study area, further attempt has been made to highlight major tourist destinations in the next chapter.