CHAPTER I
INTRODUCTION
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1.1 Background

Indian agriculture started dating back to ten thousand years and the agriculture was and is a way of living. In India about two third of its population is dependent on agriculture sector. This sector in India, as also in several other developing countries, is still in the evolving shape, and the sector poses a variety of challenges. Sikkim is a land of villages and agriculture is the main occupation of population. This is the reason for selecting the topic of farming sector by the researcher. The contribution of women in this noble sector is enormous but is still invisible and does not get counted for much. The increasing male out migration further feminizes the rural poverty. There is great potential to improve the economic status of female farmers through farming sector. Nowadays, with voluminous amount of public expenditure on women empowerment schemes, we cannot ignore this issue thus making it unavoidable to empower them also with the intention to fully utilize their calibre in this field. The researcher then thought of studying it in the State of Sikkim in North-Eastern India because it is found in literature survey that social science research in the state of Sikkim is inadequate despite several incentives provided by the state government. The topic of the researcher is “Role of female labour in farming sector: a study of state of Sikkim”. Thus, before proceeding for the study, it is very important to understand the characteristics of location of the study area, for the simple reason that the areas do determine economic and occupational distribution of the inhabitants and their participation in home and farm activities. Moreover, every natural environment has an impact on the civilization that inhabits it and studies on mountainous regions all over the world have substantiated this claim. The impact on life of the people relates to the isolated nature of living on mountains, the need to stand together, to have better security, less access to governmental welfare schemes and resources, the subsequent poverty caused by geographical remoteness and the greater insecurities, caused by life on the borders of nations. The present study has analysed the present status of females involved in the farming sector and animal husbandry and related activities in the rural areas of Sikkim, situated in North-Eastern India. Thereafter, the researcher has made some suggestions to improve the socio-economic conditions of the women working in the farming sector and also for the up-liftment of the beneficiaries.
1.2 Structure of the Thesis

This thesis is organized into five chapters:

**Chapter I.** It contains the introduction of the thesis, which includes location and characteristics (the geographic, demographic and general) of the study area i.e. Sikkim, characteristics of the agriculture sector, challenges of it in India in particular and in the developing nations in general, their remedial measures, Agriculture sector in Sikkim, different allied agriculture sector and the extension services. Furthermore, the chapter winds up by expounding about the status of women, female labour in agricultural sector and the research question.

**Chapter II.** Consists of the literature survey which is subdivided into five categories that include gender wise participation/ownership in farm/animal and related activities, females in decision making in farming, access of rural women to productive resources in farming, women in agriculture and allied sector, challenges faced by women while working in farms. Finally, the chapter concludes the literature survey followed by the research gap. The survey covers the developing countries (India, Nepal and Bangladesh) of the Asia and some countries of the Africa.

**Chapter III.** The methodology used during fieldwork undertaken from March to September 2011 of all districts of Sikkim is described and a detailed description of the methods employed for data collection and its analysis is included.

**Chapter IV.** Result analysis and findings of the primary data collected is covered in this chapter which is based on the statistical tools applied and the validation of the acceptances or rejection of the hypotheses. The chapter also includes the model and the flow diagram of integrated low investment rain-water harvesting.

**Chapter V.** This chapter contains conclusion of the findings of the research and justifies it with the references of the assorted authors from literature review of India and other countries. The chapter wraps up with the suggestions for women from agriculture and its allied sectors for possible directions for future research.
1.3 Location and Characteristics of the Study Area

1.3.1 Indian Himalayan Region (IHR)

Glaciers play an important role in maintaining ecosystem stability as they act as buffers and regulate the run of water supply from high mountains to the plains during both dry and wet spells. The Himalayan glaciers account for about 70% of the world’s non-polar glaciers and affect the lives of millions of people in several countries: China, India, Pakistan, Afghanistan, Nepal and Bangladesh. Their runoff feeds two of the oldest rivers in the world, the Indus and the Ganges, whose tributaries carry precious water for 500 million people on the northern Indian plains. Most of the glaciers in the Himalaya are of a summer accumulation type that is major accumulation and ablation take place simultaneously during summer (Fujita et al., 1997).

On the basis of the mode of occurrence and dimensions, glaciers have broadly been classified into three categories: valley glaciers, piedmont glaciers and continental glaciers. Himalayan glaciers fall in the category of valley glaciers. It has been estimated that an area of about 32 thousand km² is under permanent cover of ice and snow in the Himalaya (Negi, 1991). This amounts to about 17% of the total geographical area of the Himalaya. Higher concentrations of glaciers in the Himalaya lies in the regions with the highest mountain peaks, that is, Nanga Parbat, Nun Kun, Kinner Kailash, Nanda Devi, Nanda Kot, Annapurna, Mt. Everest, Makalu and Kanchenjunga. There are number of small, medium and large size glaciers in the Himalayan ranges with typical land form features.

It is matter of concern that the Himalayan glaciers are receding at the fastest rates in the world due to global warming, threatening water shortage for millions of people particularly in India, China and Nepal. For instance, the Gangotri glacier is receding at an average rate of 23 meters per year (Anonymous, 2005, website).

The Himalaya is the youngest mountain chain on the planet and is believed to be still evolving, and thereby, is unstable geologically and geo-morphologically. Because of its extremely active geodynamic condition, even small tampering with the geo-ecological balance can initiate environmental changes that may eventually lead to alarming proportion (Valdiya, 1993, 1997, 2001; Gaur, 1998).
The Himalaya, lying in Indian Territory, is spread over a length of about 2,500 km and a width of 220 to 300 km. It has a total geographical area of approximately 591 thousand km² and is inhabited by about 51 million persons (Rao and Saxena, 1994). It covers partially/fully twelve states/provinces of India viz., Jammu and Kashmir, Himachal Pradesh, Uttrakhand, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, Assam and West Bengal. Physio-graphically the Himalayan region is grouped as the northern mountains and this group is further identified as (a) Western Himalaya (Kashmir Himalaya and Himachal Himalaya); (b) Central Himalaya (U.P. (now Uttrakhand Himalaya) and (c) Eastern Himalaya (Darjeeling-Assam Himalaya and Purvanchal) (Singh, 1971).

In the 1960s, the hill areas of India were divided into two categories (i) self-contained politico-administrative units co-terminating with the boundaries of the states/Union Territories which have their own Five Year Development Plans to take care of their development needs.
These are referred as special category states and include Jammu and Kashmir, Himachal Pradesh, Uttarakhand and seven Northeastern states including Sikkim; (ii) the hill areas forming parts of larger composite states confined to the states of Assam and West Bengal are covered by Hill Area Development Programme (HADP), which forms a component of Five Year Plan formulated for the entire state.

According to this classification, Sikkim is a Special Category State. Central assistance for its development plans is pre-empted from the divisible pool before making allocations from it to the other States categorized as ‘non-Special Category States’. Central assistance is also given on a liberal basis with 90 per cent as grant and 10 per cent as loan to Sikkim as compared to 30 per cent as grant and 70 per cent as loan to other non-Special Category States.

1.3.2 Topography/Geomorphology of Sikkim

Latitude, altitude and continentally are the most influential factors regulating the climatic attributes over large areas in the mountains. Effectiveness of the regional determinants is moderated by the local topographical influences (Barry, 1992). Himalayan Mountain System, instead of running parallel to east-west direction (as is the trend of the mountain system in a general), runs from north-west to south-east direction. The western ranges of Kashmir are located around 360°N while the eastern ranges of Arunachal Pradesh are located around 270°N. Thus, western region including the mountainous areas of Jammu and Kashmir, Himachal Pradesh and Uttarakhand have stronger temperate influences compared to eastern sector including Sikkim and Arunachal which for being closed to the equator exhibit more tropical influences. Because of proximity of the Eastern Himalaya to sea (Bay of Bengal) and the unique directions of monsoon originating from the Bay of Bengal and Arabian Sea, Eastern Himalaya receives more rainfall as compared to the Central and Western Himalaya. The topographical/geomorphologic variations do not straightaway correlate with the latitudinal or continental trends. Indeterminate configurations of valleys and peaks with respect to their length, breadth and altitude result in immense variation in climatic attributes over short distances. Since latitudinal, continental and topographical factors influence the climate in different ways, altitudinal gradient in climatic elements (Baumgartner, 1980) is not likely to be the same all across the Himalaya.

Sikkim is a small Himalayan state lying between 27 to 28 degrees North latitude and 88 to 89 degrees East longitude. The state being a part of inner ranges of the mountains of Himalaya has no open valley and no plains but carried elevations ranging from 300 to 8583 meters above
means sea level consisting of lower hill, middle and higher hills, alpine zones and snow bound land, the highest elevation 8583 meters, Mt. Kanchendzonga is on the top of the mountains and it rises in the elevation northward.

1.3.3 Geography of Sikkim

The mystical land under the foothills of the Himalayas, where Mount Kanchendzonga, the guardian of the five treasures, which is considered the guardian deity by its people is the land called Sikkim. Sikkim, meaning "The Valley of Rice" provides a spectacular view of mountains and landscapes and bio-diverse culture.

Sikkim is the second smallest state in India with total area equal to just 115 km by 65 km. It is barely 7,096 sq. km. in size, situated in the Eastern Himalayas spread below the world's third highest mountain Kanchendzonga (8585m). The thumb shaped state borders the kingdom of Nepal in the West, Chumbi Valley of Tibet-Autonomous Region of China to North and East, the kingdom of Bhutan in South-East and Darjeeling district of W.B. of the Indian state to its South. The State is divided into four districts—South, North, East and West (Registrar General of India, 1989).

**Figure 1.3- Districts of Sikkim**

1.3.3.1 East District

With a geographical area of 954 sq., km, East District consists of two sub division 45 gram panchayat units, and 144 revenue blocks. With the capital city of Gangtok situated here, East district is the hub of all administrative activity in Sikkim. Due to its altitude Gangtok enjoys a neither hot nor
too cold climate throughout the year. The temperature does not rise more than 21 degrees centigrade in the summer. The winter can be cold during January. The temperature falls down to zero degree centigrade. The identity of this town is largely depended upon natural beauty and ethnic people, which combine with the modern city life.

1.3.3.2 West District

Total geographical area of the district is 1116 Sq. Km. The district comprises of two sub-divisions viz. Soreng and Geyzing and six blocks. The districts share its boundaries with Darjeeling district of West Bengal in the South, South District of Sikkim in the East, North district of Sikkim in North East and kingdom of Nepal in the West. The district is watershed of the River Rangit and its tributaries. Three ethnic community viz. Lepchas, Bhutia and Nepali are the inhabitant.

Agriculture in the district is well established. Agricultural land is situated at an elevation of 300-3000m from MSL but most of the cultivated land is below 1800m elevation. Agricultural on 30-50% slope is common but at altitude above 1500m, land with >50% slope has also been brought under cultivation. The climate of the district varies from sub-tropical to alpine depending upon the elevation of the place. Within the same catchment watershed of a stream, subtropical climate observed at the lower elevation while temperate climate prevails in the upper reaches of the stream. Rainfall is heavy and well distributed from May–September, July being the wettest. Rainfall is moderate in other month; sometimes dry spell may prevail from the month of December-March. Within the district some portion receives almost half the rainfall received at high rainfall zone.

1.3.3.3 North District

With a geographical area of 4226 sq. km, North District consists of two sub divisions and one town. North district occupies the largest area in the state but most of the areas are covered by high hills. Snow Mountains and cultivable area counts less than 11% (State average) of the geographical area. The district has the diverse agro climate zone right from sub-tropical to alpine. The district is largely inhabited by the tribal population and the agriculture /horticulture mixed with livestock is the main source of livelihood. At present district is coming to be a very renowned tourist destination. The Himalayan range, glaciers, alpine lakes and incomparable pris-tine natural scenic beauty of the district cannot be found in the other districts of the state.
There is good jeepable road from the state capital to the interior part of the district. Infrastructure required for the tourism industry is fast coming up.

Climatically the district is very much suited for the Agriculture/Horticulture and Livestock development programmes. Because of the diverse agro climatic zones the district is very suitable for different agro climatic based crops and can go for crop production programme throughout the year. The special feature of the district is that it has a traditional apple growing belt in the upper reaches of the district. Mid hills area is covered by cardamom plantation which is highest in the state. The production of off-season vegetable is the strength of the district.

1.3.3.4 South District

The South District is a very small district of the hill state of Sikkim. This district covers an area of 750 Sq. km. The district with the headquarters at Namchi comprises of two sub-divisions of Namchi and Ravongla. There are 45 Gram Panchayats units and 26 revenue blocks (including 10 special forest blocks). The district is a part of inner ranges of mountains of Western Himalayas consisting of higher hills, alpine zones and snow bound areas. The terrain is hilly with narrow incised river valleys with elevations ranging 300 to 5000 m. the slope varies from 80m, to more than 600m per kilometre. The district is almost encircled by the three rivers viz., Great Rangit in the South, Rangit in the West and Tista in the East. These rivers are the main channels of natural drainage.

The temperature varies with altitude and slope. The maximum temperature varies between 15 and 30\(^{\circ}\)C during July and August and the minimum between 2 and 10\(^{\circ}\)C during December and January. The annual rainfall varies from 2000 to 3000 mm. The district is predominantly agricultural with gross cropped area of 75000 ha. The irrigated area of the district is about 5,270.14 Ha, maize is the main crop followed by rice, wheat, pulses, potato and vegetables, which are predominantly grown in hill terraces. In addition to these, a few commercial crops play an important role in the economy of the district. The main occupation of the people is agriculture.

The district is industrially backward with only a few small and medium scale agro based and consumer goods industries located mainly in Melli, Majhitar, Manpur and Jorethang area. The handicraft centres of Namchi and Ralong are producing high quality carpets and other products.
Temi is famous for Tea and earns foreign exchange. By and large, the district is rich in agriculture and natural resources and has potentialities for socio-economic development.

The northern portion of the state is deeply cut into steep escarpments, and except in the Lachen and Lachung valleys, is not populated. Southern Sikkim is lower, more open, and fairly well cultivated. This configuration of the State is partly due to the direction of the main drainage which is southern. The physical configuration of Sikkim is also partly due to geological structure. Major portion of the state is covered by Precambrian rock and is much younger in age. The Northern, Eastern and Western portion of the state are constituted of hard massive gneissose rocks capable of resisting denudation. The central and southern portion is formed of comparatively soft, thin, slaty and half-schistose rocks which denude very easily. Chief ridges run in a more or less north south direction. The Rangit and the Tista which form the main channels of drainage, run nearly north-south. The valleys cut by these rivers and their chief feeders are very deep. The valleys are rather open towards the top, but usually attain a steep gorge like structure as we approach the bed of the rivers. There are 180 perennial lakes of different altitudes. Many hot water springs i.e. Phur-Cha, Ralang Sachu, Yumthang, Momay are also found in the state. The Perpetual snow line in Sikkim may be approx. at 16,000 ft. Average annual rainfall was found to vary from 1800 mm to 2600 mm over an area of 30 km² in Sikkim Himalaya (Sharma et al., 1992).

1.3.4 Zonation of Sikkim

Sikkim can basically be divided into five ranges climatically viz. – Tropical-below 610 meters, Sub-Tropical-610 to 1524 meters, Temperate-1524 to 2743 meters, Sub-Alpine 2743 to 3962 me-ters and Alpine 3962 to 5182 meters. Sikkim can basically be divided into three zones in describ-ing the aspects of vegetation viz. - Tropical-from sea level to 1700 meters, Temperate- 1700 to 4300 meters and Alpine 4300 to 5000 meters. .Soil is all acidic, having PH ranging from 4.3 to 6.4 with mean value 5.37(Agriculture Department (soil), Government of Sikkim).

1.3.5 Demographic Features

Sikkim is a multi-ethnic state. Broadly, the population can be divided into tribal and non-tribal groups. Lepchas, Bhutias, Sherpas are categorized as Scheduled Tribes. The Lepchas are the original inhabitants of the state. Compared to other ethnic groups, the Lepchas still maintain many of their traditional ways. The Bhutias comprise the Sikkimese Bhutias and Bhutias from
Bhutan and Tibet. The Sherpas are a marginal ethnic group in the state. Over 70% of the population consists of Nepalese. They are the dominant ethnic group in the state. The people from the plain mostly involved in trade and services represent a marginal group. As per the 1991 census of India, the total population of the state was 4,06,457, whereas in 1981 it was 3,16,385 only. Decennial growth came down in that decade, as in 1971-81 it was 50.77% whereas for 1981-91 it was 28.47% only. In the same census overall density of population in the state was 57 per sq. Km. Sex ratio (females per thousand male) in 1981 was 835, whereas it improved in 1991 to 878.

According to 2011 census, Sikkim has a total population of 607,688 persons (which is 0.05 percent of total population of India) of which 3,21,661 are males and 2,86,027 are females (census, 2011). From the year 1991-01 to 2001-11, decadal population variation recorded was 33.07 to 12.36 percentages, while India’s figure for the same is 17.64. In 2011 rural population consists of 4,80,981 people while urban population consists of 59,870 people. Sex ratio (females per 1000 males) also known as Gender Ratio, in the same decade has shown a little improvement i.e. from 875 to 889 but still lags behind India’s, which is 940. Though population density per sq. km. has increased in the same decade from 76 to 86 but is much less than national population density per sq. km. which is equal to 382. Literacy rate in 2001 was 68.81 which rose to 82.20 in 2011 which is above national average of 74.04 percent. This decade has seen an increase in male literacy rate from 76.04 to 87.30 as against all India’s rate which is 82.14 and female literacy rate also shows increased figures i.e. from 60.41 to 76.43 as against all India’s rate of 65.46.

**1.3.5.1 District Wise Demographic Features of the State**

According to 2011 census, **East District** has a total population of 281,293 persons, of which 1,50,260 are males and 1,31,033 are females. This is the most populated districts of the state and comprises 46.29 percent of the total population. From the year 1991-01 to 2001-11, decadal population variation recorded was 37.32 to 14.80 percentages. Sex ratio has improved in the same decade from 844 to 872 and Population density per sq. km. in the same decade increased from 256 to 295. Literacy rate in 2001 was 74.68 which rose to 84.67 in 2011. This decade has seen an increase in male literacy rate from 81.20 to 89.22 and female literacy rate from 66.81 to 79.41.

According to 2011 census, **West District** has a total population of 136,299 persons, of which
702 25 are males and are 660 74 females. This district was ranked third by comprising 22.43 percent of the total population. From the year 1991-01 to 2001-11, decadal population variation recorded was 25.57 to 10.59 percentages. Sex ratio has improved in the same decade from 929 to 941 and Population density per sq. km. in the same decade has also gone up i.e. from 106 to 117. Literacy rate in 2001 was 58.81 which rose to 78.69 in 2011. This decade has seen an increase in male literacy rate from 66.82 to 84.86 and female literacy rate from 50.10 to 72.12.

According to 2011 census, **North District** has a total population of 43,354 persons, of which 24,513 are males and are 18,841 females. This is the least populated district of the state and ranked fourth by comprising 7.13 percent of the total population. From the year 1991-01 to 2001-11, decadal population variation recorded was 31.34 to 5.67 percentages. Sex ratio has improved in the same decade from 752 to 769 and population density per sq. km. in the same decade remained same i.e. 10 to10. Literacy rate in 2001 was 67.21 which rose to 77.39 in 2011. This decade has seen an increase in male literacy rate from 75.69 to 83.03 and female literacy rate from 55.39 to 69.92.

According to 2011 census, **South District** has a total population of 146 742 persons, of which 766 63 are males and 700 79 are females. This is the second most populated district of the state and comprises 24.15 percent of the total population. From the year 1991-01 to 2001-11, decadal population variation recorded was 33.39 to 11.57 percentages. Sex ratio has declined in the same decade from 927 to 914 and population density per sq. km. in the same decade increased from 175 to196. Literacy rate in 2001 was 67.31 which rose to 82.07 in 2011. This decade has seen an increase in male literacy rate from 74.29 to 87.06 and female literacy rate from 59.73 to 76.58.

### 1.3.6 General about Sikkim

Sikkim is land of villages. Agriculture is the main occupation of people. By and large its wealth is derived from agriculture and forests. Agriculture therefore, like rest of the country, plays an important role in Sikkim also. With 80 per cent of the people of the State directly or indirectly dependent on limited land resources for a livelihood, the rural and agriculture sector is naturally top on the priority list of the government. In fact, 70 per cent of the total Plan Budget is set aside for the rural sector. The total cultivable land in the State is around 79,000 hectares with the average size of land holdings being 1.17 ha. Under the given circumstances, the State depends on multiple sources of agriculture, horticulture and animal husbandry. Mixed farming is practiced,
which in addition to providing food and nutritional security, facilitates rapid economic develop-ment. (Chattopadhyay S. S., 2006.)

Sikkim is the 22nd state in the Indian Union. It became a state of the Indian union under the constitution (thirty eight amendment) Act, 1975. Sikkim has the largest area and highest production of large cardamom in India. Under the unicameral legislature, it has been allocated one seat in each of both chambers of India’s bicameral legislature, the Lok Sabha and Rajya Sabha. There are a total of 32 state assembly seats. The Sikkim High Court is the smallest high court in the country.

1.3.7 Panchayati Raj Institutions (PRI)

This is an age old concept in Sikkim and panchayats have been the backbone of Indian villages. These institutions work as “self-government” as far as implementation of various social and economic programmes for the development of rural areas is concerned. The traditional institution of Dzumsa in the remote areas viz. Lachen and Lachung of North Sikkim is the living example of such social evolution. The role and functions of the Panchayats have been clearly defined in the Sikkim Panchayat Act, 1965. Sikkim has a two-tier system of (PRI) with Zilla Panchayat at the District level and the Gram Panchayat at the village level. It has 9 sub divisions, 92 Zilla Panchayat wards, and 159 units of Gram Panchayat.

There are 50 Gram Panchayat units in East, 49 in West, 20 in North and 45 in South Districts. Various centrally sponsored programmes are being implemented involving PRIs in the districts.

1.4 Agriculture

1.4.1 History and Characteristics of Agriculture

Agriculture in India has a long history, dating back to ten thousand years. Indian agriculture began by 9000 BC as a result of early cultivation of plants, and domestication of crops and animals (Gupta page-54, Wikipedia). With the development of agricultural implements and techniques settled life soon started (Harris and Gosden, Lal R., Wikipedia). Double monsoons led to two harvests being reaped in one year (agriculture, Wikipedia). Till the establishment of the British Rule the Indian economy was known for self-contained village community for centuries. The
village communities consisted of agriculturists, cottage industrialists, village craftsmen, artisan professions, unskilled workers and village officials. These communities played a major role in meeting not only the needs of the village economy but were also able to produce and export various products to foreign countries. During those times agriculture was a way of living and the farmer produced merely for his self-consumption. The most important crops were food crops like wheat and rice. Since plants and animals were considered essential to their survival, people started worshipping and respecting them (Gupta page 57, Wikipedia).

The middle ages saw irrigation channels reach a new level of sophistication in India and Indian crops affecting the economies of other regions of the world under Islamic patronage (Iqtidar and Shaffer, Wikipedia). Land and water management systems were developed with an aim of providing uniform growth (Palat and Kumar, Wikipedia). However, during British period, when industrial revolution was going on in England (1780-1820), the Britishers forced the farmers to switch over to commercial crops like cotton, indigo and started providing financial assistance to farmers through zamindars, and British agents to export the surplus cash crops to England. There was continuous exploitation of natural resources and economic wealth from India till Independence was achieved. Due to this economic drain, there was permanent loss of India’s national income and national wealth. The result was that by mid-nineteenth century, the traditional handicrafts were completely wiped out and the artisans lost their hereditary occupations. This led to their migration to agriculture for their livelihood and it made this sector overcrowded, this process was called ‘de-industrialization’, which in turn led to stagnation in the Indian Economy. Despite some stagnation during the later modern era, the independent Republic of India was able to develop a comprehensive agricultural program (Roy and Kumar, Wikipedia). The first agricultural census was started by Government of India in the year 1970-71 (July-June) as the reference year as part of the 1970 World Agricultural Census Program sponsored by FAO. It collects agricultural information such as number, area, tenancy, land utilization, cropping pattern and irrigation particulars of different sizes.

The Indian Agricultural Research Institute (IARI), established in 1905, was responsible for the research leading to the "Indian Green Revolution" of the 1970s. The Indian Council of Agricultural Research (ICAR) is the apex body in agriculture and related allied fields, including research and education (Objectives, Wikipedia). The Union Minister of Agriculture is the President of the ICAR. The Indian Agricultural Statistics Research Institute develops new techniques for the design of agricultural experiments, analyses data in agriculture, and specializes in statistical
techniques for animal and plant breeding. Recently Government of India has set up Farmers Commission to completely evaluate the agriculture program (Farmers Commission, Wikipedia). However the recommendations have had a mixed reception.

Agriculture provides gainful employment to nearly two-third of the population and contributes about 30% to the national income. This sector supplies raw material to various agro-based industries and also helps in earning foreign exchange. Today, India ranks second worldwide in farm output. India is the largest producer in the world of fresh fruit, anise, fennel, coriander, tropical fresh fruit, jute, pigeon peas, pulses, spices, millets, castor oil seed, sesame seeds, sunflower seeds, lemons, limes, cow's milk, dry chilies and peppers, chick peas, cashew nuts, okra, ginger, turmeric guavas, mangoes, goat milk and buffalo milk and meat (Agriculture sector, Wikipedia). Coffee. It also has the world's largest cattle population (281 million) (Lester, Wikipedia). It is the second largest producer of cashews, cabbages, cotton seed and lint, fresh vegetables, garlic, egg-plant, goat meat, silk, nutmeg, mace, cardamom, onions, wheat, rice, sugarcane, lentil, dry beans, groundnut, tea, green peas, cauliflowers, potatoes, pumpkins, squashes, gourds and inland fish. It is the third largest producer of tobacco, sorghum, rapeseed, coconuts, hen's eggs and tomatoes. India accounts for 10% of the world fruit production with first rank in the production of mangoes, papaya, banana and sapota (Indian agriculture, Wikipedia).

Despite all these things, though the share of agriculture in the GDP is declining, still it is the largest economic sector and plays a significant role in the overall socio-economic development of India. India's population is growing faster than its ability to produce rice and wheat and as most of India’s population depend on rural employment for a living, which is a cause of concern for policy makers (Sengupta, Wikipedia).

Rural sector, as part of any economy, has untapped potential. There are several difficulties confronting the effort to fully explore it. This sector in India, as also in several other developing countries, is still in evolving shape, and the sector poses a variety of challenges.
1.4.2 Challenges of the Agriculture Sector*

In order to understand the challenges faced by agriculture sector in developing nations, some of the common problems faced have been discussed here.

1.4.2.1 Rudimentary Infrastructure and Policies Lead to Slow Agricultural Growth

Slow agricultural growth is a matter of concern as most of India’s population is dependent on rural employment for a living. Current agricultural practices are neither economically nor environmentally sustainable and India's yields for many agricultural commodities are low. Poorly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible. Farmers’ access to markets is hampered by poor roads, rudimentary market infrastructure, and excessive regulation ("India Country Overview 2008", Wikipedia).

India has inadequate infrastructure and services because of low investment in it. Farming equipment and infrastructure are scarce outside the provinces of Punjab and Haryana. Because many of the farms are so small in India, the farmers cannot afford irrigation systems that would increase productivity. In India most of the big farms are family owned and run, and they do not take advantage of economies of scale (Economies of scale is the concept that the cost per unit falls as output quantities increase), because the problem of land absenteeism prevalent in big farms is a great hindrance in the development of land and increasing the productivity and the tenant who actually cultivate the land takes little or no care for its development and increasing its productivity.

Low investment in both types of farms (big and small) led to lower production and inefficiency, resulting in higher costs to Indian consumers. This is one of the causes of food inflation in India. According to World Bank, India's large agricultural subsidies are hampering productivity enhancing investment such as agricultural research and extension, as well as investments in rural infrastructure, and the health and education of the rural people. Though trade reforms in the 1990s helped to improve the incentive framework but overregulation of agricultural domestic trade has increased costs, price risks and uncertainty, undermining the sector’s competitiveness. Government intervenes a lot in labour, land, and credit markets.

1.4.2.2 The Average Size of Land Holdings is Very Small

The average size of land holdings is very small (less than 20,000 m²) and is subject to fragmentation due to land ceiling acts, and in some cases, family disputes. Such small holdings are often over-manned, resulting in disguised unemployment and low productivity of labour.

1.4.2.3 Poor Socio-Economic Condition of the Farmers

Illiteracy is the root cause of poor socio-economic condition of the farmers and should be tackled at the war footing level. Though the government is taking initiative by adopting the policies like universalization of education, but despite large expenditures in these types of schemes and rural development, a highly centralized bureaucracy with low accountability and inefficient use of public funds limit their impact on poverty. Accompanied by this, lack of technical knowledge and awareness are some of the problems responsible for low productivity of the farmers, adding to the problem of poverty of the farmers. In addition to this, slow progress in implementing land reforms and inadequate or inefficient finance and marketing services for farm produce, inconsistent government policy are the others which add fuel to the fire. Agricultural subsidies and taxes often changed without notice for short term political ends.

1.4.2.4 Use of Technology is Inadequate

Adoption of modern agricultural practices and use of technology is inadequate, hampered by ignorance of such practices, high costs and impracticality in the case of small land holdings. In India, the farming practices are too haphazard and non-scientific and hence need some forethought before implementing any new technology. However screening of technology is important since all innovations are not relevant or attractive to all areas. Hence it is important to screen them according to the geographical area and the local context of agriculture and use it for the local Kisan Vigyan Kendras (KVKs) to promote. There is, thus the requirement of adoption of appropriate technologies, which would suit the local farming system.

1.4.2.5 Lack of Proper Management of Irrigation

Irrigation in India can be broadly classified into two parts
The issues related to each of these are completely different. As far as surface irrigation is concerned, there are a few major problems. Irrigation facilities are not only inadequate but the problem of system management also is there. We do not effectively manage water bodies, in terms of how much water is stored, how much is being used for irrigation, or what value we can add to this water. The result of which is that the farmers still have to depend on rainfall, specifically the monsoon season. A good monsoon results in a robust growth for the economy as a whole, while a poor monsoon leads to a sluggish growth. The other is groundwater; the major problem is of equity. Those who have better abilities to extract water take away disproportionately from groundwater aquifers. This gives rise to various problems. One is that if groundwater is closer to the coastal area, groundwater may get mixed with salt which affects everybody and is a negative externality. In many other places, groundwater level goes down drastically and often the wells go dry, making it difficult to get even drinking water. At the same time over pumping made possible by subsidized electric power is leading to an alarming drop in aquifer World Bank also says that the allocation of water is inefficient, unsustainable and inequitable. It creates dual problems - related to availability of drinking water as well as access of ground water to the poor.

1.4.2.6 Agriculture Sector Faces the Disastrous Consequences of Hazards

Indian agriculture is prone to all possible hazards which often end up in disasters. Unique geo-climatic conditions make the country vulnerable to hazards and disasters, which are both natural and human, induced. The common natural hazards in India are floods, cyclones, landslides, forest fires, avalanches and pest/disease out brakes in plants and animals, besides earthquakes (experienced while conducting this study in Sikkim on 18 September, 2011 measuring 6.9 on richter scale) and Tsunami. Besides, the manmade disasters are fire, incidence of spurious seed, fertilizers and pesticides and price fluctuations. While natural hazards are instant events that occur within hours due to nature’s fury with disastrous consequences; drought, which is characterized by lower than normal precipitation and slow in onset is a progressive phenomenon caused by soil conditions and atmospheric changes over a period of time which impact not only crops but also livestock and human beings as well as non-agriculture sector which are dependent upon it. In
such scenario, with inadequate risk mitigation support and almost negligible non-farm employment, farmer’s life (especially of small and marginal ones) has become very complex and difficult. One cannot have any control over natural disasters. But with better preparedness, we can help in mitigating manmade disasters and the losses of the farmers.

About 60% of the landmass is prone to earthquakes of varying intensities, over 40 million hectares is prone to floods, about 8% to cyclones and 68% to drought. The super cyclone in Orissa in 1999, the Bhuj earthquake in Gujarat in Jan. 2001, Sikkim earthquake on 18 September, the Tsunami in Bay of Bengal in Dec. 2004 and recent floods in Punjab and Haryana are the examples of large scale disasters in recent times (Ghosh and Chowrasia, 2010). The consequences of them are even more disastrous that sometimes farmers compromise the willingness to take risk in farm entrepreneurship.

1.4.2.7 Dependence of Agriculture on Weather

Agriculture not only in India, but world over especially in developing countries, depends on monsoon, because in these countries irrigation facilities are not fully developed. In case monsoon fails or it rains heavily untimely, it ruins the agricultural production. Agriculture has become a gamble not only for monsoon but also for temperature nowadays. With increase in temperature than what a particular crop requires, it affects negatively the productivity of that crop. The present insurance system in India also does not cater much for any loss of crop failure due to any unfavourable and unavoidable climatic conditions or pest epidemics. Small farmers who have taken loans to raise the crops come under heavy debts in such situations and if this situation prolongs for many years it further forces the poor farmers to starve and sometimes this leads to suicides by aggrieved farmers as reported in Maharashtra and Andhra Pradesh.

1.4.2.8 Vicious Circle of Climatic Change

The Flow Diagram of Vicious circle of climatic change is depicted at Fig 1 below.
For the sake of industrialization and urbanization, more and more trees have been cut, leading to global warming and causing imbalance in climatic conditions thereby making farming occupation even harder. It also makes the land barren. The barren land is caused by -

either

a) Soil erosion due to deforestation activities causing imbalance in climatic conditions leading to heavy downpour or flash floods.

or

b) Dry land and drought due to monsoon failure.

The barren land forces the farmers in distress selling of it to traders and builders, who earn money by reselling it at exorbitant prices for commercial purpose like urbanization and industrialization. The world which is already facing the problem of global warming, it further gets aggravated by such practices. From this, again the vicious circle starts. The shrinking of farm land paves the way to food security problems. There is no denying the fact that a dry land is not nature made but manmade. When one goes on cutting trees, over a period of time the area becomes barren and unproductive due to absence of surface water and ground water recharge. (Prabu M. J., 2010).

1.4.2.9 Disasters Leading to Rural Poverty

There has been continuous increase in rural poverty. It has twin characteristics -

(a) Poverty of rural human beings
(b) Poverty of weather prone rural area

Reason for degradation of natural resources and poverty can be any –
a) It can be a drought/flood because of global warming
OR
b) Modern farming methods

**It affects the land negatively and ultimately making the rural people poor.**

The first one leaves the land barren and the second one, which though is costly but leads to large scale economies. Because of high returns, farmers get tempted towards it without giving a second thought to its ill effects. The poor who cannot afford it further fall into the trap of poverty because, they cannot compete with the rich farmers and casual labours even lose their jobs with introduction of mechanization. So, to remove rural poverty there is a need that small farmers and women to be integrated in the development effort, so that they also contribute in the removal of poverty.

**1.4.2.10 Climate change will lead to increased hardship for India's poorest women**

Himalayan glaciers are also receding at the fastest rates due to global warming, threatening water shortage for millions of people particularly in India, China and Nepal. Climate change will lead to increased hardship for India's poorest women. Women in India, especially in rural areas, are often responsible for providing daily essentials such as food and water. When climate change related disasters strike, researches have shown that the workload of women and girls increases, thus leading to their exclusion from opportunities like education and a diminishment in their equal participation in development. For example, deforestation increases the time women need to spend looking for fuel. Research has further shown that women have fewer means to adapt and prepare for extreme weather conditions. Many poor women are also actively engaged in agricultural activities, including paddy cultivation and fishing, that will be affected by changing weather patterns in India; loss of livelihood will increase their vulnerability and marginalization (UNDP 2007/8).

*Understanding of the Problem in the Right Perspective*

Before going for finding out the solution for our problems of rural deprivation, it is very important to understand the problem first. We should be very clear about the direction we want to proceed with - removal of rural poverty or fast tracking neo-liberal rural development? If we want to move ahead with the second one, then we all are also a part of contemporary version of the ancient cult-ritual, i.e. human sacrifice (Narbali).
There are 2 ways of looking at the problem. A glass half full or half empty. If we look from half-full side and understand that water is not a problem but a solution of our problem i.e. by innovating the ways of farming which give good result with scanty water and innovating the ways to conserve soil and water, then only we can move forward on the sustainable path of development to remove rural deprivation.

1.4.3 Remedial Measures

The pressure which comes with the continuous increase in human demographic statistics exerts itself first on the best land and tends to marginalize extensive production. Accordingly, the integration of crop farming and livestock husbandry i.e. mixed/ integrated farming becomes imperative. Mixed farming improves the employment opportunities and standing of small farmers in rural areas. In the present study, mixed farming is defined as a system of farming in which both crop and livestock farming are combined for the purpose of meeting family requirements and profiting from both enterprises. It is also an important strategy to increase the income of resource-poor farmers.

1.4.3.1 Integrated Farming

Integrated farming system (IFS) or integrated agriculture is a commonly and broadly used word to explain a more integrated approach to farming as compared to monoculture approaches. It refers to agricultural systems that integrate livestock and crop production and may sometimes be known as Integrated Bio-systems. For example-

"Pig Tractor" systems where the animals are allowed to graze in crop fields well prior to planting and "plough" the field by digging for roots.

Poultry used in orchards or vineyards after harvest to clear rotten fruit and weeds while fertilizing the soil.

Sikkim has a hilly terrain and small size of land holdings, therefore integrated agriculture is the best suited for this type of area.

1.4.3.1.1 Functioning of Bio-digesters in an integrated farming system

The use of tubular plastic bio-digesters for anaerobic digestion to convert organic matter to
biogas and effluent (Botero and Preston 1995) is a very simple and practical system that is flexible and uses low-cost materials (Preston and Rodriguez 2002; Mette 1998; Bui Xuan An et al 1997) when compared to other types of bio-digester (Mikkle et al 1996; Timothy and Gohl 1996). It is an agricultural system that provides a way for effective and efficient recycling of farm and animal nutrients producing fuel and fertilizer in the process. The effluent from the bio-digester is a replacement for chemical fertilizer for use on land crops, or in ponds for production of water plants and fish (Preston 2000; Barbara 2000).

Fig 1.5-The flow diagram of an integrated farming system (Source: Preston 2000)

The result of the anaerobic digestion is the production of a biogas mixture of methane and carbon dioxide. The composition of biogas varies depending on the raw materials, the organic load applied, the time and temperature. On average, it is about equivalent to the following: methane (CH4) 55-65%, carbon dioxide (CO2) 35-45%, nitrogen (N2) 0-3%, hydrogen (H2) 0-1% and hydrogen sulphide (H2S) 0-1%. Biogas is about 20 percent lighter than air and has an ignition temperature in the range of 650 to 750 ºC. It is an odourless and colourless biogas that burns with a blue flame similar to that of Liquefied Petroleum Gas (LPG) (Sathianathan 1975). The effluent from the digester has from 60 to 80% less BOD (Biological Oxygen Demand) compared with the input material (Arthur 2000). It has been shown to be a high quality fertilizer (Preston and Rodriguez 2002; Le Ha Chau 1998a, b).

In research in Cambodia, it was observed that with daily loading of 5 kg manure solids, one cubic meter of digester capacity (liquid volume) would produce about 1.61 m³ biogas daily (San Thy et al 2003). Thus for a family of 6 in the developing world, digester systems of liquid capacity
of 4 to 6 m³ can meet the daily biogas requirements. A similar conclusion was reached by (Luitweiler, No date, website). Along with household consumption this energy can be used to light livestock sheds as well as pond sites.

The changes that take place in the substrate during the digestion process have received less attention and have been concerned mainly with environmental and health issues. Thus the degree of reduction in the Biological Oxygen Demand (BOD) and in the concentration of pathogenic micro-organisms has been major areas of interest (Chara et al 1999; Vieyra 2000).

Recently, attention has focused more on the fertilizer value of the effluent and specifically on comparisons of the effluent with the raw manure used to charge the digesters. Thus (Le Ha Chau 1998a) showed that the biomass yield and the protein content of cassava foliage were significantly increased when biodigester effluent, derived from either pig or cow manure, was used to fertilize the cassava as compared with the same amount of nitrogen applied in the form of the raw manure used to charge the biodigester. Similar findings were reported for duckweed grown in ponds fertilized with the effluent or the raw manure (Le Ha Chau, 1998b). (Kean Sophea and Preston 2001) recorded a linear response in biomass yield of water spinach (Ipomoea aquatica), which reached 2.4 tonnes dry matter/ha in a 28 day growing period with a level of effluent equivalent to 70 kg N/ha. Studies show that recycling manure through earthworms also improves the fertilizer value. Maize plants grew at twice the rate on worm compost compared with the original manure (Nguyen Quang Suc et al 2000). A report from research in Vietnam from April to December 2004 (Chat Tran Hoang et. al., 2005), has confirmed the superior value of compost from earthworms to urea in promoting biomass growth and crude protein content of water spinach and further added on that the most economical level of N is 40 kg/ha applied over the 28 day growth period. The study also validated that in contrast to use of urea, application of worm compost had beneficial effects on soil fertility when this was measured biologically and chemically.

Reports from China claimed higher productivity in fish ponds when biodigester effluent was used in comparison with raw manure (Ding Jieyi and Han Yujin, 1984). A report from research in Cambodia (Pich Sophin and Preston 2001), has confirmed the superior value of effluent from a biodigester charged with pig manure compared with the same manure applied directly to the pond at comparable levels of nitrogen.
1.4.4 Agriculture Policy Initiative of State Government

The draft plan document for 11th plan (2007-2012), prepared by the state Government, has been tentatively approved by the planning commission, Government of India. The draft approach paper of the plan for agriculture aims at:

1.4.4.1 Agriculture Policy in Sikkim

a) Organic farming to be popularized with emphasis on improved rural and vermin composting technologies and use of bio-fertilizers.

b) Increasing production of food grains by adopting suitable crop management technologies and introduction of intensive cultivation.

c) Adoption of dry-land farming technologies and mixed farming.

d) Production and distribution of quality seeds.

e) Cultivation of commercial crops with adoption of multiple cropping patterns.

f) Adoption of farm mechanization for improving productivity and efficiency in agriculture.

g) Development of water harvesting structures for irrigation.

h) Creation of additional storage facilities for agricultural produce.

1.4.4.2 Farming Strategies Adopted by the Agriculture Department in the State

The state has a target of converting it into a fully organic state by 2015. In this regard, the Department has started a lot of measures to replace the chemical fertilizers by using bio-fertilizers and organic manures. Effective Microorganism (EM) technology in production of compost and bokashi and bio-pesticide is being propagated among the farmers in technical collaboration with MAPLE ORTECH, Dehradun to give boost to organic farming in Sikkim. Integrated Pest Management (IPM) technology is being practiced to control the pests. Predators are produced in Sikkim State IPM Lab and are released in the farmers’ field as and when required. The Government has set up a livelihood school also on organic farming at Tadong, Gangtok. This is first of its’ type in the country. Participants will be given 3 months training on organic farming processes. Trained youths will go to villages and assist farmers at village level. Popularization of HYV seeds, production of quality seeds, mixed cropping, pest management through Farmers Field
Schools (FFS), recycling of farm waste for compost production, soil reclamation by liming, seed treatment campaign and integrated farming through watershed approach are some of the strategies adopted by the Department in the state.

1.4.4.3 Mechanization has Varied Connotations.

While in the developed world it tends to be synonymous to automation but in developing countries, like India especially in hilly areas, mechanization means any improved tool, implement, machinery or structure that assists in enhancement of workers’ output, multiplies the human effort, supplements or substitutes human labour, avoids drudgery or stresses that adversely affect human mental activities leading to errors, imprecision and hazards and eventually loss of efficiency. It also means automation and controls that assure quality and hygiene. Agricultural mechanization in a limited sense relates to production agriculture.

Farming with machinery in Sikkim is almost non-existent. However power operated Thresher, Hand Winnower, Hand Maize Sheller, Iron Plough and other gender friendly machineries have been introduced on experimental basis. Sprinkler and drip irrigation has been taken up on demonstration basis. Agriculture in the state is mainly rain fed. Farm mechanization here in Sikkim is meant for increasing the production and productivity, comfort and safety, return and profitability to farmer.

In rural areas various central government sponsored programmes-Swarnajayanti Gram Swarojgar Yojna (SGSY), Indira Awas Yojna (IAY), Sampoorna Grameen Rozgar Yojna (SGRY), National Rural Employment Guarantee Scheme (NREGS), Prime Minister’s Employment Generation Programme (PMEGP), Margin money scheme of The Khadi and Village Industries Commission (KVIC) are being implemented involving PRIs in the State/districts.

The Prime Minister’s Employment Generation Programme (PMEGP) is the result of the merger of two schemes - Prime Minister’s Rojgar Yojna (PMRY) and The Rural Employment Generation Programme (REGP). Under the scheme, the beneficiary is required to invest his/her own contribution of 10 per cent of the project cost. In case of Schedule Castes/Schedule Tribes and beneficiaries from other weaker sections, the beneficiary’s contribution is 5 per cent of the project cost. The remaining 90 and 95% as of the project cost, as the case may be, is granted by banks specified under the scheme.
1.4.4.4 Minor Irrigation: (Surface Water)

Sikkim is a mountainous State with steep rugged hills, narrow valleys and rocky terrain. The topographical condition does not favour major or medium irrigation schemes and as such all irrigation schemes in the State fall under surface flow Minor Irrigation Schemes category. As the cultivable command areas to be covered by individual schemes are much less than 2,000 Hectares, which is also the minimum coverage, required to be created under any Medium Irrigation Schemes as per the national norm. Because of this constraint, the possibility of taking any scheme under medium/ major irrigation is not feasible in Sikkim.

1.4.4.5 Agriculture and Allied Sector

Agriculture and allied' industry is further divided into several segments, namely: - horticulture and its allied sectors (including fruits and vegetables, flowers, plantation crops, spices, aromatic and medicinal plants); fisheries sector; animal husbandry and livestock; and sericulture. Agriculture and allied sectors have contributed 25.2 per cent to the gross state domestic product (GSDP) of Sikkim (http://business.gov.in/agriculture/animal.php).

1.4.4.5.1 Animal Husbandry and livestock in Sikkim

In a predominantly rural economy such as Sikkim, animal husbandry activities form an extremely important element in the effort to bring about substantial improvements in living standards. In hilly areas, availability of land to agricultural practices is not sufficient. Most of the land is occupied by forests and pasture lands. On the other hand, burden of population on agriculture is tremendously increasing. The overall area available for agriculture operations in Sikkim is limited to about 15% of the geographical area of the state accompanied by small land holdings in the State as is seen in the above figures and secondly because of the policy of the State Government, deforestation for the sake of agriculture is not allowed. So, with the increasing population, per capita land availability has been consistently declining. It is therefore, essential, that supplementary sources of income are developed in order to provide not only the much needed support to the rural families but also to make available an increasing quantity of protein rich food items such as milk, egg and meat. Adequate number of livestock like cows, pigs, sheep, goats, yaks and few other are reared in Sikkim and their number is increasing over a period of time.
especially of small animals. As we can see from the Table 1 below, there is an almost 50% increase in the population of pigs, goats and poultry from the census 1997 to census 2003.

### Table 1.1 Livestock Population

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Livestock</th>
<th>Census-1997</th>
<th>Census-2003</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cattle</td>
<td>143024</td>
<td>160932</td>
<td>12.52</td>
</tr>
<tr>
<td>2</td>
<td>Buffaloes</td>
<td>1970</td>
<td>2118</td>
<td>07.51</td>
</tr>
<tr>
<td>3</td>
<td>Sheep</td>
<td>5023</td>
<td>5746</td>
<td>14.39</td>
</tr>
<tr>
<td>4</td>
<td>Pigs</td>
<td>26975</td>
<td>40938</td>
<td>51.76</td>
</tr>
<tr>
<td>5</td>
<td>Goats</td>
<td>82980</td>
<td>123841</td>
<td>49.24</td>
</tr>
<tr>
<td>6</td>
<td>Poultry</td>
<td>219552</td>
<td>321919</td>
<td>46.63</td>
</tr>
<tr>
<td>7</td>
<td>Yak</td>
<td>4731</td>
<td>5719</td>
<td>20.88</td>
</tr>
</tbody>
</table>

Source: Department of AH and VS, Government of Sikkim

Dairy farming, piggery, sheep rearing and goatery are the traditional activities in the state, which fulfil the demand for milk, wool, mutton and pork as well as to improve the socio economic condition of the people of the state. Poultry farming is undertaken on small scale by small farmers and SHGs. The state Government has also announced the Poultry Mission, 2009-2012 with provision of subsidized inputs, development of infrastructures etc.

- **Animal Husbandry and Dairying**

Animal Husbandry and Dairying is a State subject and the State Governments are primarily responsible for the growth of the sector. Dairying has become an important secondary source of income and employment for millions of rural families. The Indian Dairy Industry acquired substantial growth momentum from 9th Plan onwards, achieving an annual output of 97.1 million tons of milk during 2005-06 (Entrepreneurship in Agriculture & Allied Sectors, website). Government of India is making efforts to increase the productivity of milch animals. Most of the milk is produced by small, marginal farmers and landless labourers who are grouped into cooperatives at the village level.

The Department has been providing assistance to the State Governments for the control of animal diseases, scientific management and upgradation of genetic resources, increasing availability of nutritious feed and fodder, sustainable development of processing and marketing facilities and enhancement of production and profitability of livestock. State Government has set up separate department which is responsible for development of animal husbandry and dairying in the State.
Over the last few years, there has been an increasing trend towards rearing cross-bred cows which give high milk yield. It is an important source of organic manure for crop production, which holds a great importance especially in the state of Sikkim, which is striving towards becoming an organic state.

Rural agriculture economy depends on symbiosis of crop & livestock production. In view of continuously declining area for agriculture & small size of land holdings, livestock production plays an important role in providing sustainable income to the rural masses. Therefore, the major cattle development activities undertaken in the state are – livestock production through artificial insemination using frozen semen & natural services for production and procurement of high quality cross-bred breeding cows & bulls. Due attention is also given on enhancement of feed & fodder production, pasture development, conservation of fodder through conversion into silage & hay. More emphasis is given in providing better health care to the livestock by increasing diagnostic services & development of bio-technical tools, manpower & skill development.

- Bullock

Since mechanized farming is difficult in the state because of the hilly terrain, bullocks are widely used both for cultivation and other agricultural operations. So, these are reared by those farmers who can afford them.

- Piggery

There is a great demand of pork by the local people. So is the growth potential for piggery development. Piggery is the most suited activity for commercial exploitation because of the following advantages:–

a) Faster multiplication
b) Faster growth
c) High carcass return of 60 to 80%
d) More environmental friendly as grazing is not involved

- Sheep and Goat

These have a tremendous scope for development in Sikkim. Sheep is mainly reared in West and North districts. Goatery is a very popular economic activity in the state. Goats are reared in stall-fed condition. The state has two important breeds of goat- Black Bengal and Betal. Both breeds
are small in size but are famous for their meat quality all over India. Though, it is an important source of income for over 60% of the masses, no official policy for their breeding and development has yet been articulated by the Government. Government prefers stall fed condition of goatery as grazing by goats causes ecological damage. For this reason Government does not favour sponsoring applications for disbursement of credit/subsidy towards goatery under SGSY.

- **Poultry**

It is the fastest growing activity in animal husbandry section, which not only provides portentous food but also gainful employment to the people and helps in supplementing their income. There is an increase in the demand of poultry products due to increase in the standard of living of the people, increase in the floating population with the development of tourist industry, presence of army and paramilitary forces in the state who are the largest consumer of poultry and poultry products and with the increase in the working population in secondary and tertiary sector.

Government of Sikkim has launched a programme named ‘Poultry Mission 2009-12’ to develop eco-friendly poultry industry for providing sustainable livelihood and for the state to become self-sufficient in the poultry meat production. The State Government has set up mother units under a centrally sponsored scheme for poultry development in which day old chicks of low input birds are reared up to four weeks in the mother units and supplied to the beneficiaries.

### 1.4.4.5.2 Sericulture in Sikkim

The practice of sericulture farming is rural/farmer oriented and is aimed at increasing the income level of poor and backward farmers. The sericulture programme has been being implemented in the state, its real push and momentum was given by the government in 1998 when it announced rupees five crores in five year plans. It was soon followed by the creation of a separate directorate under the forest, environment and wildlife department to function as a distinct identity. Facilities such as providing low cost rearing houses, mulberry saplings, silkworm seeds, rearing appliances are being given. One month long training programmes are being conducted at Jorethang centre. Mulberry, Muga, Eri, Oak-Tussar and silk are cultivated in Sikkim. The Sericulture Department of Sikkim promotes exports of silk from Sikkim. The State has a suitable climate for agricultural and horticultural products.
1.4.4.5.3 Fisheries in Sikkim

The 'fisheries and aquaculture sector' is recognized as the sunshine sector in Indian agriculture. The 'Department of Animal Husbandry, Dairying and Fisheries' is the main authority for development of fisheries' industry in India. However, fishery is basically a State subject and the primary responsibility for its development mainly rests with the State Governments. It helps in generating employment and improving welfare and socio-economic status of fishermen.

Despite enormous water resources in the form of river, rivulets and springs, pisciculture is not a popular activity in the state. But capture fishing is carried on in the streams in a very limited and scattered manner. With the development of secondary and tertiary sector, the demand for fish is also increasing continuously. To fulfill this demand, 145.28 tonnes of fish was imported through Rangpo check post during 2007-2008 (Fisheries Department).

During XI plan, the department has adopted the following strategies for the development of pisciculture in the state.

   a) Increase the fish and fish seed production.
   b) Propagation of sport fisheries.
   c) Lab to land programme by extension programme.
   d) Research and survey programmes to support the development of fisheries.
   e) Encouraging Trout culture.

The department is also implementing two projects viz. Border Area Development Project and Pilot Project on cold water fisheries. Both the projects were connected with the development of high altitude cold water fish species i.e. Trout.

1.5 Extension Service in Sikkim

The training as appears so simple, but it is so complex that many ambitious schemes and project finally collapse due to inadequate methods of training. Thus before executing any scheme, proper training schedules, method and techniques of tackling the situation must be well formulated in order to achieve the desired goal.

Bearing these things into the mind, the government of India started the Extension Reforms. The organizational structure of which has been given below.
1.5.1 Support to State Extension Programmes for Extension Reforms:

This scheme of Support to State Extension Programs for Extension reforms, launched during 2005-06, aims at making the extension system farmer-driven and farmer-accountable, by way of new institutional arrangements for technology dissemination in the form of an Agricultural Technology Management Agency (ATMA) at the district level to operationalize extension reforms. ATMA has the active participation of farmers and farmer groups, NGOs, Krishi Vigyan Kendras, Panchayati Raj institutions, and other stakeholders operating at the district level and below. The release of funds under the ATMA scheme is based on State Extension Work Plans (SEWPs) prepared by the state governments. At present, the scheme is under implementation in 588 districts in 29 states/UTs in the country. In Sikkim all 4 districts are covered under this scheme.

The cafeteria of activities being supported under the scheme has state as well as district-level activities. State-level activities include support for upgrading State-Level Training Institutions namely state agriculture management and extension training institute(SAMETI), training and exposure visits of extension functionaries, organization of state level agricultural exhibitions, regional fairs and exhibitions, monitoring and evaluation, rewards and incentives. District-level
activities include farmer-oriented activities (training, demonstration, exposure visits, group mobilization, and capacity building), farm information dissemination activities (exhibition, information technology, print media), and research-extension-farmer linkages, (farmer scientist interactions, organization of field days and kisan goshties; assessment, refinement, validation, and adoption of front line technologies).

1.5.2 Model Training Courses (MTCs):

Model Training Courses of eight days' duration on the thrust areas of agriculture, horticulture, animal husbandry, and fisheries extension are supported by the Directorate of Extension (DoE) with the objective of improving professional competence, upgrading knowledge, and developing technical skills of subject matter specialists/extension workers of agriculture and allied departments.

1.5.3 Coffee Table Book:

A coffee table book titled Harvest of Hope which has been released in February 2010 highlights the success stories of farmers from all over the country.

1.5.4 Mass Media Support to Agricultural Extension:

FM Kisan Vani stations have been established in 7 states of the North Eastern region. Though, it is not there in Sikkim.

1.5.5 Kisan Call Centre (KCC):

The scheme was launched on 21 January 2004 to provide agriculture information to farming community through toll-free telephone lines. A country-wide common eleven digit number '1800-800-1551' has been allocated for KCCs. Replies to queries of the farming community are being given in 22 local languages. Calls are attended from 6.00 a.m. to 10.00 p.m., on all seven days of the week. In order to make farmers aware of this facility, All India Radio and Doordarshans have been broadcasting/telecasting the audio and the video spots on Kisan Call Centre. Publicity to KCC is also given through Meghdoot postcards/inland letters nationwide. A Kisan Knowledge Management System (KKMS), to provide correct, consistent and quick replies to the queries of farmers is being developed. The Guwahati Call Centre caters to the needs of the North Eastern
region. Queries are answered in different languages, depending upon the area from where the query is received. Since the beginning of the scheme, calls received from Sikkim were 2351 till 30 November 2009.

1.5.6 Extension Education Institutes (EEIs):

An Extension Education Institute set up in Jorhat (Assam) in 1987 has been providing training support at the regional level to middle-level functionaries of state governments of the eight states of the North Eastern region and West Bengal. During the year 2009-10 (till November 2009), 17 courses were organized and 417 officers have been trained. Rupees 95.50 lakh has been released to EEI Jorhat.

1.5.7 Establishment of Agro-Clinics and Agro Business Centres by Agriculture Graduates:

Five training centres-two in Assam, one in Manipur, one in Mizoram, and one in Nagaland, have trained 707 agriculture graduates so far. Of all the trained graduates, 143 have established their ventures, including 79 candidates from Assam, 51 from Manipur, and 13 from Nagaland.

1.6 MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act) in Sikkim

MGNREGA came into force on September 7, 2005. The objective of the act is to enhance livelihood security in rural areas by providing at least 100 days of guaranteed wage employment in every financial year to adult members of any rural household willing to do public work-related unskilled manual work at the statutory minimum wage of rupees 118 for Sikkim (US$2.17) (Gazette Notification, website) per day in 2009 prices.

Essential entitlements under this Act include:

Employment on demand within 15 days; minimum wages; payment within 15 days; and basic worksite facilities are the essential features of the act. If employment is not provided within 15 days, an unemployment allowance has to be paid. In the North-eastern States, Mizoram pays a minimum daily wage of rupees 110 to NREGA labourers. Sikkim shares the tenth place in the country by paying minimum daily wage of rupees
In phase I of this scheme, it was introduced in 200 most backward districts of the country on February 2, 2006. North district of Sikkim is covered in Phase 1. 130 districts were further included under NREGS in phase II with effect from April 1, 2007 and East and South district of Sikkim gets covered in this phase. The scheme was extended to the remaining 274 districts of India from April 1, 2008 and West district of Sikkim comes in this phase.

This was further amended vide Notification dated July 24, 2009 to add small and marginal farmers i.e. “provision of irrigation facility, horticulture plantation and land development facilities to land owned by households belonging to the Scheduled Castes and the Scheduled Tribes or below poverty line families or to beneficiaries of land reforms or to the beneficiaries under the Indira Awas Yojana of the Government of India or that of the small farmers or marginal farmers as defined in the Agriculture Debt Waiver and Debt Relief Scheme, 2008.”

The primary objective of the Act is augmenting wage employment. By generating employment for women at fair wages in the village, NREGA can play a substantial role in economically empowering women and laying the basis for greater independence and self-esteem. The act stipulates that wages will be equal for men and women thereby eliminating the scope for gender discrimination of wages. It is also committed to ensure that at least 33 percent of the workers shall be women. Its auxiliary objective is strengthening natural resource management through works that address causes of chronic poverty, like drought, and so encourage sustainable development to enhance agricultural productivity and generate steady income.

1.7 Awareness of Citizens is the Key to Measurable Development

National Bank for Rural and Agriculture Development (NABARD) has been playing a pivotal role in training and bringing awareness among the farmers about agro-horticulture produces of Sikkim like orange and guava through 222 Farmers Club (PIC AT DUGA, website). Sikkim is the first State in the country to establish Board of Livelihood School aimed at providing skill upgradation to even the non-literate and the semi-literate youths. Keeping in view the importance of capacity along with education, the State government has been striving to equip each and every
youth irrespective of their education with adequate skills to enable them to sustain their livelihood in meaningful manner.

1.7.1 Farmers’ Club Programme

It aims to develop the rural area by organizing the farmers into an informal organization around a common agenda to have smooth access to credit, capacity building and generate a bargaining power to deal with agriculture input suppliers and bulk produce buyers. Through it, farmers are exposed to new technologies and agriculture practices and motivated to adopt methods and technologies which are most suitable to their soil and geographical situation. Progressive non-defaulter farmers are eligible to become the members of the club. Assistance for their maintenance is provided by NABARD for 3 years. Banks, NGOs and KVKs have been involved in the promotion of farmers’ club. Members of farmer’s club and SHGs are given exposure in farm-based and related activities. They are also helping the banks in popularizing various schemes of the banks and also helping them in the recovery of bank dues by spreading awareness about the advantages of linking with banks, organic farming and pest control measures. Members are also encouraged to take up social and income generating activities through bank credit in their villages to set an example.

During the year 2010, 40 farmers drawn from all the districts were given in-house training under capacity building for adoption of technology at ICAR, Tadong, Sikkim. There were 93, 47, 7 and 75 farmer’s clubs in East, West, and North and South districts respectively as on 31 March 2010.

1.7.2 Joint Liability and Activity Group (JLG)

Joint Liability Group is an informal group of 4-10 individuals consists of tenant farmers, sharecroppers and small farmers having no legal right to land holdings, coming together for the purpose of availing bank loan either singly or through the group mechanism against mutual guarantee. Activity-based Group is an informal group of 5-20 individual engaged in similar activity. In order to improve their efficiency, a lot of efforts are being done and support is given by NABARD as far as capacity building, production and investment credit and market related support is concerned.
1.8 Status of Women

1.8.1 Historical Background of the Status of Women

Scholars believe that in ancient India, the women enjoyed equal status and rights with men in all fields of life (Mishra, R. C. 2006). However, some others hold contrasting views (Pruthi et. al. 2001). Works by ancient Indian grammarians such as Patanjali and Katyayana suggest that women were educated in the early Vedic period. Rigvedic verses suggest that the women married at a mature age and were probably free to select their husband (Majumdar, R. C. et. al. 1951). Scriptures such as Rig Veda and Upanishads mention several women sages and seers, notably Gargi and Maitreyi (Vedic Women).

However, later (approximately 500 B.C.), the status of women began to decline with the Smritis (esp. Manusmriti). The Indian woman’s position in the society further deteriorated during the medieval period and with the Islamic invasion of Babur and the Mughal Empire and later Christianity curtailing women’s freedom and rights. Many evils like ‘Purda’ system, ‘Sati Pratha’, discrimination against women in all fields of life were started. (NRCW, 2006) During the British Raj, many reformers such as Ram Mohan Roy, Ishwar Chandra Vidyasagar, Jyotirao Phule etc. fought for the upliftment of women. Though, after the attainment of Independence, Government of India also adopted so many measures by making and implementing policies in favour of women. Here, decline in the status of women is seen as inequality and practices adopted against them in their rights as compared to men. It is very important to remove them from the society to get the complete result of the policies and also to make all the members of the society to contribute equally in the development process.

But, in most developing countries, there is a patriarchal system of social setting. In this tradition, men hold the sovereign power to control households and society as a whole while women are ascribed to a lower hierarchy compared to men (Balk, 1997). The historical deprivation of women socially, legally, politically and technologically aggravates their positions and they are subordinated as a production unit for bearing and rearing children (Ahmad, 2001).
1.8.2 Constitutional Status of Women

Women empowerment is one of the central issues in the process of development not only in India but world over. In India, it was with the declaration of the decade 1975-85 as women’s decade that the official recognition was given to the importance of studying various facets of the role of women in reproduction. The planning commission in its sixth plan (1980-85) gave more emphasis for the cause of women. However, formal earmarking of funds for women started with 7th plan (1985-86 to 1989-90) and The National Commission for Women was set up by an Act of Parliament in 1990 to safeguard the rights and legal entitlements of women. The 73rd and 74th Amendments (1993) to the Constitution of India have provided for reservation of seats in the local bodies of Panchayats and Municipalities for women, laying a strong foundation for their participation in decision making at the local levels. The Government of India made empowerment of women as one of the principal objectives during 9th five year plan (1997-2002) and ushered in the new millennium by declaring the year 2001 as 'Women's Empowerment Year'.

The most common explanation of 'women's empowerment' is the ability to exercise full control over one's actions. There has been shift in policy approaches from the concept of 'welfare' in the seventies to 'development' in the eighties and now to 'empowerment' since the nineties. The constitution not only grants equality to women but also empowers the state to adopt measures of positive discrimination in favour of women. It underscores women’s right, health, women education, gender equality, decision making, poverty eradication and violence against women.

1.8.3 Gender Equality

Gender disparity manifests itself in various forms, the most obvious being the trend of continuously declining female ratio in the population in the last few decades. Social stereotyping and violence at the domestic and societal levels are some of the other manifestations. In most Indian families, women do not own any property in their own names, and do not get a share of parental property (Kalyani and Kumar, 2001, Wikipedia). Due to weak enforcement of laws protecting them, women continue to have little access to land and property (Carol S. June, 1998). In fact, some of the laws discriminate against women, when it comes to land and property rights. The Hindu personal laws of mid-1956s (applied to Hindus, Buddhists, Sikhs and Jains) gave women
rights to inheritance. However, the sons had an independent share in the ancestral property, while the daughters' shares were based on the share received by their father. Hence, a father could effectively disinherit a daughter by renouncing his share of the ancestral property, but the son will continue to have a share in his own right. Additionally, married daughters, even those facing marital harassment, had no residential rights in the ancestral home. After amendment of Hindu laws in 2005, now women have been provided the same status as that of men (THE HINDU, 2005). The United Nations has also outlined seven interdependent strategic priorities with regard to Millennium Development Goals (MDGs-3) in altering discrimination against women. Two strategies are to ensure women’s property and inheritance rights and to eliminate gender inequality in economic sectors (World Bank, 2007). The 4th World Congress of Rural Women, held in South Africa in 2007, reiterated the need to provide full and equal access for rural women to productive resources, including the right to inheritance and ownership of land and other property, credit/capital, appropriate technologies, markets and information.

Women agricultural workers are occupying very low positions in the agrarian hierarchy. In terms of gender, rural women bear the burden of poverty and exploitation more heavily than men. Women's participation in agricultural production is related to the decline in farm size and persistent poverty. Women and all "weaker" groups in general, are virtually inarticulate victims of the principle of equality in an unequal social context. Women are generally perceived to be patient, dependent and passive and their work is considered to be unexciting and repetitive. In fact, women are naturally mothers, and their greatest pleasure and true fulfilment lies in maternity, the one out of a few things that women are good at (Deckard, 1983). These kinds of ideologies about women have tended to marginalize women and have belittled women’s work in the home and outside the home and therefore women’s contribution to economic wellbeing of the home and society. To correct this imbalance and to reverse the marginalization of women it was necessary for both men and women to realize that women are not treated as equals of men. And, so long as gender is an important indicator of economic social and political roles, there will be a need for special policies targeted to rural women for education and training, technology transfer, and credit (Rajula Devi A.K., 1989).

Despite economic disparity and woeful neglect, women have been the embodiment of sacrifice, surrendering all their comforts for the welfare of the children and other members of the family
and indirectly for the well-being of the community that we can call her unsung heroine of our country, who without any publicity contributes her best to the progress and welfare of the country.

1.8.4 Need of Gender-Disaggregated Data in Agriculture

- Lack of Gender-Disaggregated Data Could Hold Back Agricultural Development

Male and female farmers are affected differently by agricultural policies and programmes because of their diverse yet often complementary roles and responsibilities in agricultural production, disparities in their access to and control over productive resources and the existence of social norms and legal legislations that often favour men over women (FAO, 2010, website). Gender-disaggregated agricultural data can be used to illustrate economic, social and political differences that may exist between male and female farmers, to assess the possible impacts of these differences on their production and productivity, and to better understand and recognize men and women’s (changing) roles and responsibilities related to the agricultural sector, rural development and food security. The need for more gender-disaggregated data was already highlighted as a prerequisite for obtaining more equitable development in the world in a Plan of Action adopted at the First World Conference on Women (1975). Concerning the agricultural sector, the need for this kind of data became more apparent as evidence grew that human capital is a crucial factor for agricultural development and that a lack of gender-disaggregated data could hold back agricultural development. Agricultural plans formulated on the basis of inadequate information contributed to a low impact of policy and planning efforts and the wastage of scarce human, financial and environmental resources (FAO, 2005b).

For improving the socio-economic condition of women, the efforts of the State Government as well as of different NGOs are also very significant. Various development agencies have undertaken some initiatives and programmes focusing on education and capacity building, credit, health and nutrition, political empowerment, gender awareness, human rights and oppression. Some innovative steps taken in the Sikkim State like free education for daughters with special stipends, reservation of seats for women in local government, special quota in services and amendment of laws have been promoting women’s empowerment as well as reducing the gender disparity.
1.9 Female Labour in Agricultural Sector

1.9.1 Concept of Labour

Any work manual or mental undertaken for certain pecuniary consideration is termed as ‘labour’ in economics. All labour is directed towards producing some effect or change. This of course excludes activity undertaken with an objective of amusement merely for own sake, it does not constitute as labour. (Marshall Alfred, 1964) has defined labour as, “Any exertion of mind or body undergone partly or wholly with a view to some good other than the pleasure, derived directly from the work.” Labour in this sense includes, the very highest professional skill of all kind as well as the labour of unskilled workers and artisans and of those employed in education, in fine arts, in literature, in science, in administration of justice and in the Government in all its branches.

1.9.2 Role of Female Labour in Agricultural Sector

Role of female labour in agricultural sector can be classified as follows (Samnohtra Nidhi, 1992). (Chattopadhyay Manabendu, 1982) in his study has also done the same classification: -

(a) Contribution of labour in agricultural production.
(b) Management of cattle and other farm animals.
(c) Pre-harvest activities, and
(d) Post harvest management, such as, providing labour for storage of seed, food grains, processing and marketing.

Not much endeavour has been done to assess the enormous contribution made by an average woman in rural Sikkim. In fact, one can call her the unsung heroine, who without any glare of publicity, contributes her best to the welfare and progress of the state in particular and country as a whole.

1.9.3 Characteristics of Agricultural Labour

The following are the main characteristics which differentiate agrarian labour from industrial labour (Bhagoliwal, T.N., 1976):-

(a) There is usually a lack of clear cut employer - employee relationship in agriculture, especially in subsistence farming, as opposed to industry.
(b) In agriculture there is usually no classification of workers into skilled, semi-skilled and unskilled labour. There are only two types of agricultural labourers employed either for casual work or for regular farm work, on a continuing basis.

(c) Employment in agriculture is mostly seasonal with varying intensity depending upon regional characteristics and crop pattern. This seasonal activity is followed by a slack period, for which agricultural workers have to seek alternative sources of employment, like road construction and building operations etc.

(d) Migration is another distinctive feature. In busy season, agricultural labourers migrate from regions where labour is relatively abundant to regions where it is scarce.

(e) Wage payment in agriculture also show considerable diversity. Payment of wages in kind or partly in cash and partly in kind is quite common. Payment of supplementary wages in the form of perquisites is also made to labourers. Wages for some agricultural operations like harvesting and threshing are paid in kind on basis of piece wage rate; wage structure in agriculture is considerably influenced by traditions and customs.

1.9.4 Workers Profile in Sikkim

The Indian Himalayan region (IHR) displays a different picture in land use pattern and its dependency on agricultural land. The Himalayan people have traditionally practiced integrated agriculture, balancing cultivation, agro-forestry, animal husbandry and forestry. Mountain geography and inaccessibility have helped maintain agro-biodiversity; yet commercial agriculture is not as high-yielding and profitable as in the plains. Here forest is the major land use pattern, which covers over 52% of total reporting area followed by wastelands and agricultural land. However, the dependency on its limited arable land is marginally higher in the IHR as cultivators and agricultural labourers together comprise about 59% of total workforce in the region (Nandy and Samal, 2005).

According to Census 2001, there are 37,936 cultivators (About 26,000 of them are small/medium farmers) out of which 19,725 are males and 18,211 are females in East district. Of them 37,889 live in rural and only 47 live in urban area. In rural area 19,701 are males and 18,188 are females. Total number of agricultural labourers 8,143 out of which 4,076 are males and 4,067 are females. Of them 8,110 live in rural and only 33 live in urban area. In rural area 4,056 are males and 4,054 are females. There are 25,535 (which is 45% of the total) small land holdings i.e. < 1
Hectare, 13,076 (which is 24% of the total) medium land holdings i.e. between 1-2 Hectare and 17,587 (which is 31% of the total) large land holdings i.e. > 2 Hectare in the district. In total there are 56,198 land holdings in the district (Department of Agriculture).

In **West district** there are 35,764 cultivators (About 16,000 of them are small/medium farmers) out of which 20,634 are males and 15,130 are females. Of them 35,762 live in rural and only 02 live in urban area. In rural area 20,632 are males and 15,130 are females. Total number of agricultural labourers in the district is 4,112 out of which 2,389 are males and 1,723 are females. Of them 4,110 live in rural and only 02 live in urban area. In rural area 2,389 are males and 1,721 are females. There are 9,907 (which is 53.20% of the total) small land holdings i.e. < 1 Hectare, 4,502 (which is 24.18% of the total) medium land holdings i.e. between 1-2 Hectare and 4,213 (which is 22.62% of the total) large land holdings i.e. > 2 Hectare in the district. In total there are 18,622 land holdings in the district.

In **North district** there are 9,180 cultivators (About 6,000 of them are small/medium farmers) out of which 4,831 are males and 4,349 are females. Of them 9,173 live in rural and only 07 live in urban area. In rural area 4,824 are males and 4,349 are females. Total number of agricultural labourers in the district is 2,051 out of which 1,045 are males and 1,006 are females. Of them 2,038 live in rural and only 13 live in urban area. In rural area 1,033 are males and 1,005 are females. There are 25,535 (which is 45% of the total) small land holdings i.e. < 1 Hectare, 13,076 (which is 24% of the total) medium land holdings i.e. between 1-2 Hectare and 17,587 (which is 31% of the total) large land holdings i.e. > 2 Hectare in the district. In total there are 56,198 land holdings in the district.

In **South district** there are 48,378 cultivators (About 20,000 of them are small/medium farmers) out of which 24,917 are males and 23,461 are females. Of them 48,377 live in rural and only 01 live in urban area. In rural area 24,917 are males and 23,460 are females. Total number of agricultural labourers in the district is 2,694 out of which 1,252 are males and 1,442 are females. All of them live in rural and no one live in urban area. In rural area 1,252 are males and 1,442 are females. There are 12,883 (which is 55.57% of the total) small land holdings i.e. < 1 Hectare, 5,759 (which is 24.84% of the total) medium land holdings i.e. between 1-2 Hectare and 4,540 (which is 19.59% of the total) large land holdings i.e. > 2 Hectare in the district. In total there are 23,182 land holdings in the district.
The above data, shows that in all the districts more than half of the cultivators are small/medium farmers. It has also been observed that almost all of them live in rural areas and equal numbers of female participants have been sighted as of men.

1.9.5 Women in Agriculture

Some historians believe that it was woman who first domesticated crop plants and thereby initiated the art and science of farming. While men went out hunting in search of food, women started gathering seeds from the native flora and began cultivating those of interest from the point of view of food, feed, fodder, fibre and fuel (Prasad and Singh 1992). Women have protected the health of the soil through organic recycling and promoted crop security through the maintenance of varietal diversity and genetic resistance. Therefore, without the total intellectual and physical participation of women, it will not be possible to popularize alternative systems of land management to shifting cultivation, arrest gene and soil erosion, and promote the care of the soil and the health of economic plants and farm animals.

Women play a distinctive role in shaping the rural economic activities and earning a livelihood. India is an agriculture dominated country and most of manual operations like sowing, weeding, transplanting, harvesting, threshing and winnowing and even marketing of agricultural produce are being done by women. Their contribution to the rural economy is enormous. But the role of women in economic and social development has not received due recognition so far in our society. But, efforts are being made by the Government to give due recognition to their participation by time to time making various laws in favour of women.

The social, economic and cultural conditions of the area determine women’s participation in home and farm activities. The nature and extent of women’s involvement in agriculture, no doubt, varies greatly from region to region and within a region, their involvement varies among different farming systems, castes, classes and socio-economic status. But regardless of these variations, there is hardly any activity in agricultural production, except ploughing in which women are not actively involved (Swaminathan, 1985). In some of the farm activities like processing and storage, women predominate so strongly that men workers are numerically insignificant.
Women played a unique role in shaping the family affairs, in-house management vis-à-vis the rural society. On the other hand, women from below poverty Level (BPL) were participating in the field work related to agriculture, horticulture, floriculture, animal husbandry and few in tertiary sector. However, exception was, women from rich landlords and upper caste category of high/medium income groups remained insulated. On the contrary, gradually urban women are in search of fulfilling their self-motivating attitude towards enlarging productive base and also attempting towards marketing of agricultural and allied products, to have better share of income, of-course with value addition. These women along with these activities also combine household work. Women are continuing their old pattern of avocation and also embraced the new order of economic development as stakeholder, however, without compromising their ancient role as food, firewood and fodder gatherer, has now changed and adopted new types of avocation however, intimate involvement of rural women continues at least in the rural areas. Sociologists’ view support the complementary role of both gender for the sake of argument, however mythological role of women been considered one stage ahead of men.

1.9.6 Women in Sikkim Agriculture

India’s North East having nearly seventy percent hilly terrain, her food security is most important concern. Traditional agriculture of the hills needs massive involvement of the women in this noble venture. The state of Sikkim is the smallest in area and population as well. Involvement of women in agriculture and allied areas is prospective. Sikkim is strategically located at high altitude and therefore its agricultural practices supposed to be unique and of course difficult. It has to be a mix of traditional and experimental. Therefore this type of research needs an action research, which deals with regular intervention such as observation, monitoring using statistical data mainly shall go through the statistical data on the involvement in various other associated areas. The study has another special feature that of being located in the North East Region, surround by long stretch of international border which is considered most important strategically located having both positive and negative aspects.

In Sikkim, agriculture is the main economic activity of all the districts in the state. About 30% population of West, 37% of South and 64% each of East and North districts depend upon agriculture. 76% women workers are directly or indirectly engaged in agriculture and allied activities. Among the main workers 71.74% are cultivators, 7.37% are agricultural labourers, 1.58% are engaged in livestock, fishing, forestry, hunting, plantation, orchard and allied activities. So,
women are the main participants in agriculture and allied production and they attend all secondary and cumbersome tasks that require more patient, time and devotion. As far as upper class women are concerned, they mostly engage to those activities that can be performed within the household compound e.g. cleaning and sorting of grains, large scale food processing, cooking etc. for their household. In case of lower class women, they participate extensively in the fieldwork as a member of family or wage labourers contributing substantially in the farm management decision. The work burden among the women of various economic strata seems to be unequal; the women in the middle income strata have longer working hours. The poor women lack opportunities for employment due to limited size of the family farm and seasonal character of the demand for agricultural labour whereas, women in the high economic strata may hire outside labour for more strenuous food processing chores and other household work. Women in the middle economic Strata often take all the responsibilities of family animals as well as the food processing chores.

1.10 The Research Question

The engagement of women in economic activities in Sikkim is widespread, ranging from the formal to the informal sector; even though a majority of the activities women perform in the informal sector are of “invisible” activities nature, which may not be considered as economic activities. Women’s participation in the formal sector is improved with access to education and therefore as more women get educated and acquire the requisite skills, they are increasingly being engaged in the formal sector with a few of them in senior positions in the government jobs. But, at the same time women’s participation in the formal sector with lower access to education is confined to low profitable jobs. However, considering that women make up majority of the people in the farming sector with low accessibility to the productive resources, it is disheartening to note that their socio-economic condition is pitiable. This fact therefore motivated the researcher to study the present status of females involved in the farming sector in the state of Sikkim and suggest few points that will help women to achieve the best first for them and then also for the state.

Hence the research question is:-

What is the present contribution and status of women in the farming sector in the state of Sikkim?