

# Chapter 3

## Agriculture and Agro-Economic Environment in Sikkim

### Introduction

Agriculture is the main occupation of the inhabitants of Sikkim and it forms the very basis of the socio-cultural pattern of the territory. The economy of Sikkim was a pure primitive form before the British took over the administration of the state. Actually, it was inflexibly traditional in its pattern and showed no signs of modernism whatsoever. With no elementary technological basis for agriculture, people had to gather their food from the vicinity of jungles during the flaccid season. In the surrounding areas there was limited supply of basic food items and it has always relation with their life in terms of economic aspects of primitive society.

People of Sikkim led a very primitive life and the original inhabitants were not agriculturists. They were dependent on nature for wild roots, fruits, fishes and flesh etc. When Bhutias penetrated into Sikkim they initiated semi-pastoral and sedentary farming and ploughed the land wherever they encountered flat pieces of land. Actually, settled agriculture started in Sikkim only after the entrance of Nepalis. These people were innovative, hard working, energetic and therefore cleared large tracts of forestlands and prepared the land that became fit for agriculture (Khawas, 2012:193).

The agro-ecosystems are innovated, adapted, managed and evolved over 600 years by traditional communities in antiquity, initially by aboriginal Lepchas and Limboos (now under ethnic group Nepali), followed by Bhutias after 1275 AD and later on by other Nepalese (Rai, Yakha, Gurung, Mangar, Tamang, Sunuwar, Thakuri, Bahun, Chettri, Kami, Damai, Sarki, Majhi, Newar, Sherpa, Thami, Bhujel, Jogi) after 1774 onwards through the generations to the present state. Mass clearing of forest area for agricultural use was accelerated during the British protectorate period (1817-1947 AD) mainly after the policy of Nepali settlement in Sikkim for revenue rising by Mr. J.C. white (1889 to 1908 AD), while the terrace cultivation system was accelerated since the Maharaja of Sikkim Sedkeong Tulku's time, i.e. 1914 AD onwards. The traditional shifting agriculture system and practice over centuries gradually conversed into sedentary system which is still continuing. The mixed system is a combination of compartments such as agro-forestry, forestry, livestock, and parcel of agricultural land forming together a unit mountain garden-based farming system. In the recent times, remains of

shifting cultivation are rarely observed in the form of *Khoriya* in Dzongu North Sikkim (Lepcha reserved area) and elsewhere (Subba, 2008).

The aborigines of the land, the Lepchas were originally nomads who spent their time hunting for food (*Sikkim A to Z* (2010) Land distribution and land revenue contribution according to the three major ethnic groups in the State, namely Bhutias, Lepchas and Nepalis, is highly uneven. In 1983, the Nepalis owned almost 59 percent of the total cultivated land and contributed almost 64 percent of the total land revenue generated in the State. In contrast, the land share of the Bhutias and Lepchas was 20 percent each and their land revenue contribution was 19 percent and 16 percent respectively (Lama, 2001).

### **The Agrarian Structure**

Sikkim has three-tier agrarian structure comprising landowners, sharecroppers and agricultural labourers. The different types of landowners, sharecroppers and the agricultural labourers in Sikkim may be classified as follows:

1. Landowner or *Bustiwalla*:
  - i. Absentee landowner
  - ii. Non-cultivating landowner
  - iii. Cultivating landowner
  - iv. Cultivating landowner-cum- sharecropper/agricultural labourer.
2. Tenants (*Pakhurey*)/ Sharecroppers (*Adhiadar*, *Kutdar* and *Chakhurey*):
  - i. Sharecroppers
  - ii. Sharecroppers-cum-landowner
  - iii. Sharecroppers-cum-agricultural labourer
3. Agricultural labourer or *Khetala*:
  - i. Labourer
  - ii. Labourer -cum-landowner
  - iii. Labourer -cum-sharecropper

The absentee landowners who do not live in the *busti* or village employ *pakhureys* or sharecroppers who cultivate the land either as *adhiadar* or as *kutdar*. The non-cultivating landowners live in the village but do not take part in the production system. Usually they give their land on lease to *pakhureys* who cultivate land on the basis of contract. The cultivating landowners are usually small farmers who cultivate their land themselves or employ agricultural labourers. The cultivating landowners-cum sharecroppers/labourers are marginal labourers, but only temporarily (Choudhury, 2004: 26).

There are different categories of tenant or *pakhurey* in Sikkim. Those who cultivate land in lieu of 50% of the total produce are called *adhiadars*. The *adhiadars* enjoy some amount of liberty in raising subsidiary crops that they may not have to share with the landowner. But the system of *adhiadar* is prevalent to a very limited extent. The *kutdars* are those tenants who pay

money for rent. They also have to bear some other duties imposed by the landowners. Quite often the rent of land is fixed verbally and renewal or revision of contract depends upon the will of the landowner. In other words, there is no fixed agreement on the lease of land in case of the *kutdar*, and the landowner may drop a *kutdar* at his will. The tenants of the monastery estates are known as *chakhurey*. The *chakhureys*, in addition to cultivating the land taken on lease from the monasteries, have to contribute manual labour. Renewal of their contracts depends entirely upon the mercy of the lamas of the concerned monastery. The tenants or the sharecroppers mostly cultivate their land themselves. Exchange of labour is quite common among the sharecroppers. They exchange labour in lieu of labour at their convenience. Sometimes they engage the agricultural labourers or *khetala*, especially when the land taken on lease is large and the size of family is small. Since the sharecroppers are also found to be landowners, it is quite common for them to engage labourers (Choudhury, 2004:26).

The agricultural labourers or *khetalas* perform all sorts of work decided by their employers. They are employed on daily wage or contract basis. The labourers employed on contract basis are usually paid in kind. In most cases the contract labourers get a share of the produce, the amount of which is stipulated by his employer. The well-to-do landowners employ labourers who perform both household work and agricultural operations. They are paid both in cash and kind. Besides, there are labourers who are engaged to perform all sorts of work including ploughing, sowing, harvesting throughout the year in lieu of food and shelter but do not get any wage (Choudhury, 2004:26).

### **History of Agricultural Development in Sikkim**

Among other land resources agricultural land has played a crucial role since time immemorial. Due to alarming rate of increasing population pressures on land and constantly growing demands of food and raw materials, the history of agricultural development in the district and state as a whole can be flashed back to the beginning of planned economic development in Sikkim. The first planned period is visualized in 1954 with the support of a technical team of planning commission of India. Planned development of agriculture in Sikkim started in early fifties during the rule of the last king of Sikkim, Late Palden Thopdun Namgyal. It was seven years planned period of state from 1954 to 1961. Through this period, a split Directorate of Agriculture and Horticulture was formed. The Directorate of Agriculture started functioning in Sikkim in 1954 under the leadership of Dr. K.L. Narsingham as the first Director of Agriculture and Animal Husbandry. These first seven years plan was confined by three five years plan viz. 1961-66, 1966-71 and 1971-76. At the time of three five years plans the main focus was on the infrastructural development, except some improvement in the land tenure system.

Agricultural development in the districts as well as the state as a whole had gained momentum immediately after the merger of Sikkim with India. The department of Animal Husbandry was

separated from the Directorate of Agriculture in 1974. After the formation of new state this started experimenting with regional concept of agricultural development in the fifth plan period. The state, in order to run the department, was divided into nine Regional Centres and a number of sub-centres as well as V.L.W. circles. The policies like regional concept of agricultural development were initiated, dividing the whole state into various regional centres. The south district had been divided into two regional centres and one sub-regional centre with 20 VLW centres.

The Seven Year Development plan of Sikkim had specific schemes for Agriculture & Rural Development and Horticulture. The government of Sikkim allocated Rs. 12, 99,983/- for the scheme of Agriculture & Rural Development and Rs. 11, 20,075/- for Horticulture during the first plan period. The first seven-year plan was followed by eight successive five-year plans during the period 1961-2001. By the time Sikkim became a state of Indian Union (May 1975), the fourth plan of Sikkim was nearing its completion. There was a massive increase in the budget allocation for agriculture and allied activities. The fifth plan allocated Rs. 16,08,27,000/- for agricultural development in the state. Ever since the merger of Sikkim with India, separate head wise attention to crop husbandry, soil and water conservation, animal husbandry, dairy development, fisheries, forestry and wildlife, food, storage and warehousing, agricultural research and education, marketing and quality control, and co-operation accelerated development in the agriculture sector. The quantum leap can be assessed from the fund allocation for agriculture in the annual plan of Sikkim during the year 2001-02. The total lay out for annual planning in the sector of agriculture and allied activities in the year 2001-02 was to the tune of Rs. 25,55,00,000. As an outcome of planned economic development, agriculture sector has become one of the most well-established and well-organised sectors in the state of Sikkim (Choudhury, 2004:25).

Before the merger in 1975, the agriculture sector was characterized by uncertainty about land tenure rights, negligible public investment and over-dependence on traditional technologies. This sector has recorded considerable progress during the last two decades. In the past low productivity, negligible marketable surplus and other institutional inadequacies which plagued the economy, led to agricultural backwardness. Some of the reasons which are responsible for agricultural backwardness in Sikkim in pre-merger period are the physical features of the state necessitating terrace cultivation, extreme concentration in land-holding patterns, low cropping intensity due to mono-cropping, outmoded technologies of production, inadequate thrust on agriculture in terms of investment and planning, inadequate infrastructure support in transportation, communication, irrigation, technical research and marketing etc. (Lama, 2001). The details of the investment on agriculture and horticulture during the period 1954 to 1960 are presented below:

**Table 3.1: Statement Expenditure (1954-1960)**  
**A. Agriculture and Rural Development**

Sl. No.	Different Sectors of Expenditure	Total Expenditure (in Rs.) Mean $\pm$ S.D.(Standard Deviation)	Standard Error
1.	Demonstration Farms at Gangtok	5,41,449 $\pm$ 11.9163	4.8648
2.	Demonstration Farm at Lachung	11,482 $\pm$ 15.4531	6.3087
3.	Seed Certification Farm, West District	73,452 $\pm$ 29.3734	11.9916
4.	Cardamom Installation of an Entomological and Pest Control Lab.	1,849 $\pm$ 25.0519	10.2274
5.	Training	14,040 $\pm$ 21.6333	8.8317
6.	Agriculture Loans	49,209 $\pm$ 33.3586	13.6189
7.	Agriculture Information Service, Staff, Equipment	5,000 $\pm$ 35.8664	14.6424
8.	Acquisition of Land for Cardamom Nurseries	2,349 $\pm$ 32.2676	13.1732
9.	Fair Price Shops	2,04,198 $\pm$ 58.4260	23.8523
10.	National Extension Service Organization	3,96,955 $\pm$ 35.0314	14.3015
	Total	12, 99,983 $\pm$ 17.0080	6.9761

*Source: J.R.Subba, 1984.*

The table 3.1 shows percentage wise distribution of expenditure on Demonstration Farm at Gangtok, Demonstration Farm at Lachung, Seed Certification Farm, West District, Cardamom Installation of an Entomological and Pest Control Laboratory, Training, Agriculture Loans, Acquisition of Land for Cardamom Nurseries, Fair Price Shops and National Extension Service Organization in table. The highest Expenditure was recorded in Demonstration Farms at Gangtok sector (41.65 percent). Second highest expenditure sector is National Extension Service Organization (30.54 percent). The third position is occupied by Fair Price Shops (15.71 percent) and rests have less than 10 percent of expenditure.

**Table 3.2: Statement Expenditure (1954-1960)**  
**B. Horticulture**

Sl. No.	Different Sectors of Expenditure	Total Expenditure (in Rs.) Mean $\pm$ S.D. (Standard Deviation)	Standard Error
1.	Staff Quarters	34,613 $\pm$ 37.4058	15.2708
2.	Pay of Staff etc	81,262 $\pm$ 60.3523	24.6387
3.	Cost of Equipment, Seed, Fertilizers, Insecticides etc.	1,74,439 $\pm$ 34.3918	14.0404
4.	Rent of Store, Godowns for Manure etc.	2,393 $\pm$ 44.7794	18.2811
5.	Loans to Fruit Growers	300 $\pm$ 68.9260	28.1389
6.	Training	1,863 $\pm$ 28.0285	11.4426
7.	Fruit Preservation & Canning Factory	7,05,224 $\pm$ 41.6173	16.9901
8.	Horticultural Nurseries	25,221 $\pm$ 52.8053	21.5576
9.	Plant Protection – cum Horticultural mobile items	94,760 $\pm$ 26.2754	10.7269
	Total	11, 20,075 $\pm$ 52.5753	21.4637

*Source:* J.R.Subba, 1984.

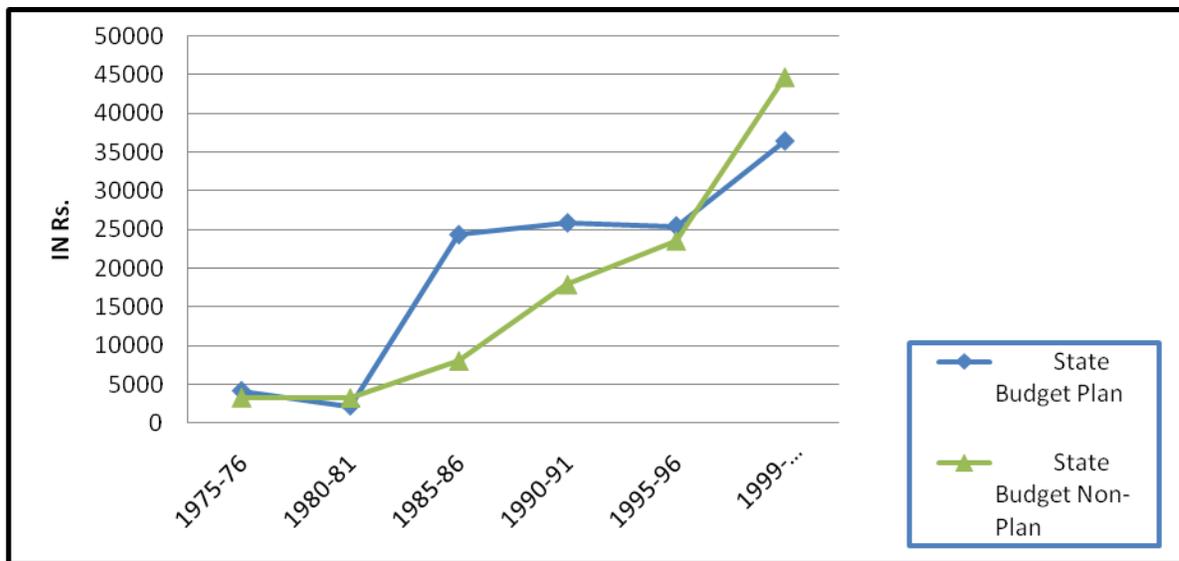
The table 3.2 shows that the highest expenditure is recorded in Fruit Preservation & Canning Factory sector, the significant mean is 7,05,224 $\pm$ 41.6173 and its corresponding error is calculated as 16.9901. The second highest expenditure sector comprises of the Cost of Equipment, Seed, Fertilizers, and Insecticide etc. which has the significant mean  $\pm$  S.D. of 1,74,439 $\pm$ 34.3918 and standard error is 14.0404. The other sector of expenditure are Plant Protection–cum Horticultural Mobile Items (mean  $\pm$  S.D 94,760 $\pm$ 26.2754 and standard error as 10.7269), Pay of Staff etc. (mean, S.D. 81,262 $\pm$ 60.3523 and standard error as 24.6387), Staff Quarters (mean  $\pm$  S.D 34,613 $\pm$ 37.4058 and standard error as 15.2708). The lowest expenditure sector, i.e. Loans to Fruit Growers shows the significant mean  $\pm$  S.D. is 300 $\pm$ 68.9260 and standard error is calculated as 28.1389.

In the post-merger period, the strategy was to provide a package of services aimed at consolidating peasant economy. This covered land reforms, agricultural credit and marketing, provision of inputs like seeds, fertilizers, minor irrigation, and encouragement to horticulture and cash crops. Thus, despite the limited cultivable land in Sikkim, agricultural development has made considerable progress during last two decades (Lama, 2001).

**Table 3.3: Budget Expenditure on Agriculture (1975-76 to 1999-00)**  
(In Rs.000)

Year	State Budget			
	Plan Mean±S.D. (Standard Deviation)	Standard Error	Non-Plan Mean±S.D. (Standard Deviation)	Standard Error
1975-76	4128±45.1043	18.4137	3304±48.5592	19.8242
1980-81	2190±48.8917	19.9599	3247±38.8690	15.8682
1985-86	24300±64.6436	26.3906	8047±32.5515	13.2890
1990-91	25825±48.0707	19.6248	17885±52.3717	21.3806
1995-96	25440±45.0066	18.3738	23557±37.2182	15.1943
1999-2000	36400±64.9461	26.5141	44675±42.1663	17.2143

Source: Lama, 2001.



**Figure 3.1:** Budget Expenditure on Agriculture (1975-76 to 1999-00)

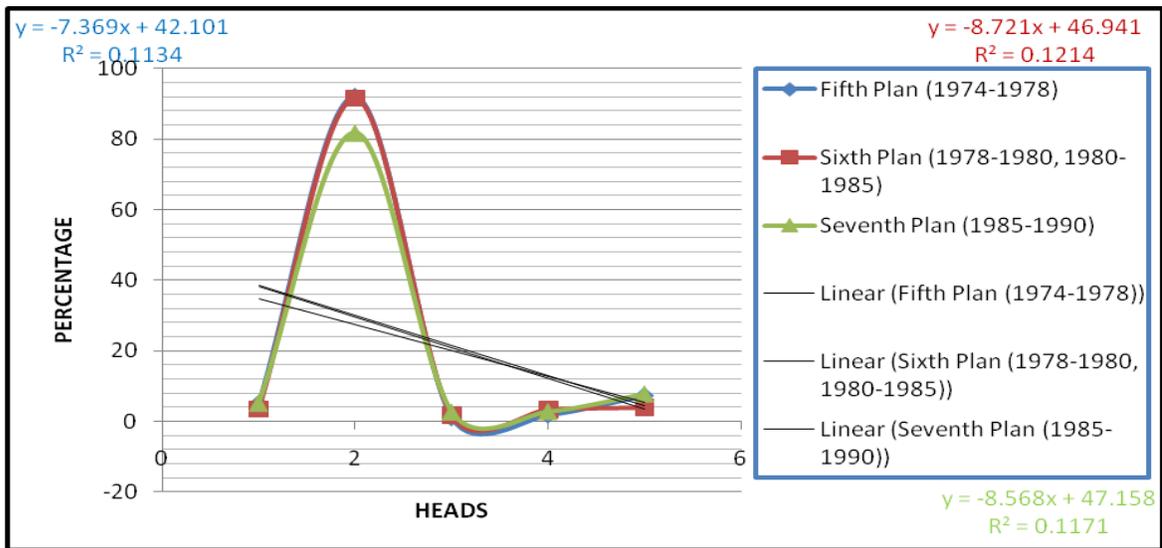
The Budget Expenditure on Agriculture (1975-76 to 1999-00) in different Plan and Non-Plan year, the comparison between State Budget Plan and Non-Plan year 1975-76, 1980-81, 1985-86, 1990-91, 1995-96 and 1999-2000 shows the positive aspect for agriculture development. From the above figure it is clearly seen that Budget Expenditure (State Budget) on Agriculture in both Plan and Non-Plan period increasing in every five year plan (1975-76, 1980-81, 1985-86, 1990-91, 1995-96 and 1999-2000). The Plan budget from 1975-76 to 1999-2000 increased by 781 percent and Non-Plan budget increased by 1252 percent.

**Table 3.4: Plan Investment in Agricultural Activities (in Percentage)**

Heads	Fifth Plan (1974-1978)	Sixth Plan (1978-1980, 1980-1985)	Seventh Plan (1985-1990)
Research & Education	4.98	3.42	5.10
Crop Husbandry	92.14	91.55	81.77
Storage & Ware Housing	1.03	1.64	2.58
Agriculture Marketing & Quality Control	1.82	3.38	2.76
Soil & Water Conservation	7.30	3.90	7.76

Source: Lama, 2001.

Although planned agricultural development in Sikkim was started during 1954-55, it gained momentum only in 1976-77, that is during the fifth five year plan. The Plan Investment (1974-1990) on Agriculture in different heads, Research & Education, Crop Husbandry, Storage & Ware Housing, Agriculture Marketing & Quality Control, Soil and Water Conservation is shown in table 3.4. It is noticed that the highest Plan Investment was done on Crop Husbandry, followed by Soil and Water Conservation, and Research and Education.



**Figure 3.2: Plan Investment in Agricultural Activities (in Percent)**

The figure 3.2 shows the percentagewise plan investment in agricultural activities in different heads. The linear 1, 2 and 3 show the regression lines corresponding to different heads such as Research & Education, Crop Husbandry, Storage & Ware Housing, Agriculture Marketing & Quality Control, Soil and Water Conservation. The first and second regression curves are highly significant in the case of Crop Husbandry. The Storage & Ware Housing curves show the negative decreasing order and corresponding straight line equations are:

$Y = -7.369x + 42.101$ ,  $R^2 = 0.1134$ ,  $y = -8.721x + 46.941$ ,  $R^2 = 0.1214$  and  $y = -8.568x + 47.158$ ,  $R^2 = 0.1171$  respectively.

Like other hilly and mountainous areas, the question of land has been central to the political economy of Sikkim, both because it is scarce and because of historical factors. For many centuries, feudalism had a stranglehold over land and society. Land rights were vested primarily in the nine Kazi (feudal lords) families, with each region rigidly separated from the others. Accordingly to the 1991 Census, Sikkim was predominantly rural with nearly 91 percent of the population living in villages (Lama, 2001). Sikkimese agriculture has to be seen in the context of larger Himalayan geography and environmental specificities therein. Physiography of the region has made agricultural conditions extremely diverse. Agriculture is greatly impacted by altitude and slope aspect. Agricultural fields are invariably terraced all over Sikkim Himalaya. The natures of terrain and varied micro climatic conditions influence agriculture in Sikkim to a great extent (Khawas, 2012).

In the present scenario, agricultural land use covers about 11.13% of the total geographical area of the state. Out of the total agricultural land, 82.1% land is under crops, 9.5% under fallow and 8.4% land is not very well recognized and considerable progress has been realized within past few years in this direction. This has apparently been the result of the planners and administrators, who vividly envisaged the need for having rapid agriculture development in hilly areas. The agricultural universities, I.C.A.R. research complexes and the state Departments of Agriculture have been playing major role in transforming the economy of hill people. Only a beginning has been made and more needs to be done to have meaningful development in hilly region. The concerted efforts made in evolving suitable land-use patterns for developing hill economy have paid good dividend and the concept of agro-forestry, agri-horticulture, silvi-pastoral etc., systems of land use are gradually becoming popular amongst cultivators. Also, cropping system like intercropping, relay cropping and multiple cropping have replaced traditional farming in many areas. Further the cultivation of commercial crops like seed potato, off season vegetables, ginger, turmeric, etc have been gradually gaining ground. The stage has been set for the progress in the right direction and thereby requires further promotion and encouragement.

The agricultural lands are situated within the elevation of 300m to 3000m above mean sea level. However, most of the cultivated area is located within 1800m (Choudhury, 2004).

The Agriculture and Horticulture Department has prepared a month-wise calendar for the cultivation of different crops in Sikkim. According to the calendar, the concerned department and the farmers plan for cropping of different crops from time to time; departmental experts sometimes train the farmers according to the calendar.

**Table 3.5: Month wise Calendar for Agricultural Operations in the State**

Area	Climate	Altitude (M)	Ecological Adaptation	Crops	
				Agriculture	Horticulture
Lower Hills	Tropical	300-500	Wet & Dry Agriculture, Sedentary Farming, Livestock, Horticulture	Rice, Maize, Millet, Wheat And Mustard, Pulses, Soybean, Vegetables, Potato.	Guava, Lime, Lemon, Ginger, Oranges
	Sub-Tropical	500-1500			
Mid Hills	Temperate	1500-2000	Wet And Dry Agriculture, Slash And Burn Agriculture Or Rotational Dry Collection Of Minor Forest Produce, Horticulture	Paddy, Maize, Millet, Wheat, Soybean, Potatos, Vegetables, Ginger	Mandarin (Orange), Large Cardamom, Plum, Peach, Peas.
High Hills	Temperate	2000-2700	Dry Agriculture, Bhutias Transhumance	Maize, Barley, Vegetables, Sweet Potato	Apple, Plum, Peach, Peas.
High Hills	Sub-Alpine	2700-4000	Yak Herding, Horticulture, Pastoral Economy, Wool, Cheese, Butter, Hides, Apple	Potato	Apple
	Alpine	4000-5000	Potatoes Are Commercial Commodities		
Very High Hills	Alpine	Above 5000	Lachenpa and Lachungpa Transhumance Groups Visit the Area; Lachenpa Grows vegetable And Potato at higher elevation.	Mainly Used For Seed Potato, Vegetables	Pasturage

Source: Agriculture & Horticulture Department, Government of Sikkim.

The above table (3.5) shows the month wise calendar prepared by the Agriculture and Horticulture department, Govt. of Sikkim wherein the time frame is stipulated for the Preparation of the Soil, Sowing and Transplanting, Irrigation & Interculture and Harvesting & Threshing for different crops and vegetables in Rabi and Kharif seasons. The suitable months for cropping of different crops in the case of Sikkim are January, February, March, April, May, June and July only and rest five months i.e., August, September, October, November and December according to agriculture and horticulture calendar are not suitable due to lack of irrigational facilities.

Sikkim contains within its borders a variety of non-tropical and geographic environments from the low snow tree outer hills to the high peaks with permanent snow and glaciers. Within its habitable portions, different social, religious, linguistic and ethnic groups co-exist practising different types of agriculture and pastoral activities. As one moves northwards, valley floors and mountain peaks increase in altitude, the terrain becomes more rugged and the climate drier and more temperate, the vegetation changes from Sal forest to rhododendrons and conifers and finally to grass above timber line. Such a transition can sometimes be seen even on a single mountain side in any of the ecological zones (<http://www.envis.nic.in>).

It is observed that the agricultural as well as horticultural crops had important stand from lower hills i.e. from 500m up to very high hills of above 3000m. The tropical, subtropical to temperate region has occupied important place for the cultivation of different crops in Sikkim. But in the sub-alpine to above alpine region, few crops can be sown due to cold climate.

In addition to the above described agricultural calendar the farmers of three communities i.e. Lepcha, Bhutia and Nepali have their own calendar for the cultivation of different crops.

### **Cultivation Calendar of the Nepali Community**

According to the cultivation Calendar of Nepali community in Sikkim, it is found that they have their own calendar for the cultivation of different crops in agriculture which they follow and apply in their farms since ancient times.

**Table 3.6: Agricultural Calendar for Nepali Community**

<b>Crops</b>	<b>Agricultural Activities in Different Elevation</b>	<b>Months (in Nepali Calendar)</b>
1. Paddy	<i>Upper Belt</i>	
	1. Land Preparation	Baishak (April-May)
	2. Transplanting	Ashad (June-July)
	3. Weeding	Badau (August-Sep)
	4. Inter culture	Asoj (Sep-Oct)
	5. Harvesting	Mongsir (Nov-Dec)
	<i>Lower Belt</i>	
	1. Land Preparation	Jet (May-June)
	2. Transplanting	Srawan (July-August)
	3. Weeding	Badau (August-Sep)
4. Inter culture	Asoj (Sep-Oct)	
5. Harvesting	Mongsir (Nov-Dec)	

<b>2. Maize</b>	<i>Upper Belt</i> <ol style="list-style-type: none"> <li>1. Time of Sowing</li> <li>2. Weeding</li> <li>3. Dohoro/Dafey</li> <li>4. Ukarah</li> <li>5. Harvesting</li> </ol> <i>Lower Belt</i> <ol style="list-style-type: none"> <li>1. Time of Sowing</li> <li>2. Weeding</li> <li>3. Harvesting</li> </ol>	Fagun (Feb-March) Baishak (April-May) Jet (May-June) Ashad(June-July) Badau(August-Sep)  Fagun (Feb-March) Baishak (April-May) Srawan (July-August)
<b>3. Buckwheat</b>	Time of Sowing/ Broadcasting  Harvesting	Badau – Asoj (August –Oct) Mongsir–Paush (Nov-Jan)
<b>4. Mustard</b>	<i>Upper Belt</i> <ol style="list-style-type: none"> <li>1. Time of Sowing/Broadcasting</li> <li>2. Harvesting</li> </ol> <i>Lower Belt</i> <ol style="list-style-type: none"> <li>1. Time of Sowing/ Broadcasting</li> <li>2. Harvesting</li> </ol>	Asoj (Sep-Oct) Mongsir–Paush (Nov-Jan)  Mongsir (Nov-Dec) Fagun (Feb-March)
<b>5. Pulses</b>	<ol style="list-style-type: none"> <li>1. Time of Sowing/ Broadcasting</li> <li>2. Weeding</li> <li>3. Clearing</li> <li>4. Harvesting</li> </ol>	Srawan (July-August) Asoj (Sep-Oct) Kartik (Oct-Nov) Mongsir (Nov-Dec)
<b>6. Wheat</b>	<ol style="list-style-type: none"> <li>1. Time of Sowing/ Broadcasting</li> <li>2. Irrigation</li> <li>3. Harvesting</li> </ol>	Mongsir (Nov-Dec) Every 15 days Chaiyet (March-April)
<b>7. Millet</b>	<i>Upper Belt Only</i> <ol style="list-style-type: none"> <li>1. Time of Sowing/ Broadcasting</li> <li>2. Harvesting</li> </ol>	Asoj (Sep-Oct) Magh (Jan-Feb)
<b>8. Potato</b>	<i>Upper Belt</i> <ol style="list-style-type: none"> <li>1. Time of Sowing</li> <li>2. Weeding</li> <li>3. Harvesting</li> </ol> <i>Lower Belt</i> <ol style="list-style-type: none"> <li>1. Time of Sowing</li> <li>2. Weeding</li> <li>3. Harvesting</li> </ol>	Asoj –Kartik 45 days Magh (Jan-Feb)  Mongsir (Nov-Dec) Paush (Dec-Jan) Chaiyet (March-April)

Source: Field Survey, 2015-16.

From the above table, it is clear that Nepali Community have their own agriculture calendar for Land Preparation, Time of Sowing/ Broadcasting, Transplanting, Irrigation, Weeding, Inter culture, Harvesting etc. Crops like Paddy, Maize, Mustard and Potato are grown from lower belt to upper belt according to the calendar.

### Cultivation Calendar of the Lepcha Community

According to Gorer (1938) the Lepcha's agricultural calendar for the Talung valley of Sikkim which may also be taken as representative of the general agricultural practices in Sikkim throughout the year is as given in table 3.7:

**Table 3.7: Agricultural Calendar for Lepcha Community**

Months	Agricultural Activities
CHUNIPU (January) ( <i>Karnet Nyum</i> )	The big sowing of buckwheat
TANGBU (February) ( <i>Kursong Nyum</i> )	Clear the ground and finishing of sowing buckwheat
NIBU (March) ( <i>Thun Nyum</i> )	Finish of clearing ground and sow dry paddy in temporary fields. Sow maize and early millet in the valley. Weed cardamom in flower and strike new plants.
SUMGU (April) ( <i>Sum Nyum</i> )	Harvest barley and wheat. Clear ground for main crop-millet. Weed cardamom again round new- found fruit.
ZIBU (May) ( <i>Glou Nyum</i> )	Harvest buckwheat. Sow main crop-millet. Sow maize in garden burning the wheat straw for fertilizing. This and the three following months are the period of constant rain and heat.
NAPU (June) ( <i>Namchum Nyum</i> )	Plant rice Wheat dry rice. This is the leanest month when people may go hungry.
TIKPU (July) ( <i>Parveem Nyum</i> )	Harvest early millets in valley. Weed main crop-millet.
DENGBU (August) ( <i>Taffa Nyum</i> )	Harvest at earliest variety of wet rice. Make a shade too dry cardamom fruit. Make a small sowing of buckwheat for seed.
GEEBO (September) ( <i>Gloue Nyum</i> )	Harvest dry rice. The women start harvesting the millet, the men look after the cardamom. This and the two following months are relatively dry.
GOOBU (October) ( <i>It Nyum</i> )	Cardamom picking continues. Wet rice is harvested. Barley, wheat and onions are sown in the garden.
CHOOPU (November) ( <i>Ra Nyum</i> )	The seed –buckwheat is harvested cardamom is sold. This and the next two months are the prosperous period.
CHUCHIKPU (December) ( <i>Mar Nyum</i> )	The harvested field is ready for buckwheat. This and the two following months are the period of intense cold.

Source: Gorer (1938: 94).

Gorer, in 1938 explained about the agricultural calendar of Lepchas of Sikkim. He had given the name of months according to the commonly known names which were actually mixed

with Bhutia language. However, the words in *Italic fonts* above are the real Lepcha words for the name of months according to field survey done by the researcher.

### Cultivation Calendar of the Bhutia Community

**Table 3.8: Agricultural Calendar for Bhutia Community**

Four Seasons	Agricultural Activities
Chika (Spring = March-May) 2+3+4	Cultivation time: -Maize, Ginger, Millet etc.
Yarka (Summer = June-August) 5+6+7	Buckwheat, Green Vegetables, Paddy, Pulses, Cardamom etc.
Tonka (Autumn = Sep-Nov) 8+9+10	Harvesting time
Gunka (Winter = Dec-Feb) 11+12+1	No cultivation and harvesting time

Source: Field Survey, 2015-16.

From the above table, it is seen that Bhutia community of Sikkim pertaining to agriculture aspects follow the season-wise agricultural activities rather than monthly. According to Bhutias, there are four seasons suitable for agricultural activities. Among them, in the season Gunka (Dec-Feb), no agricultural activities like cultivation and harvesting are carried out.

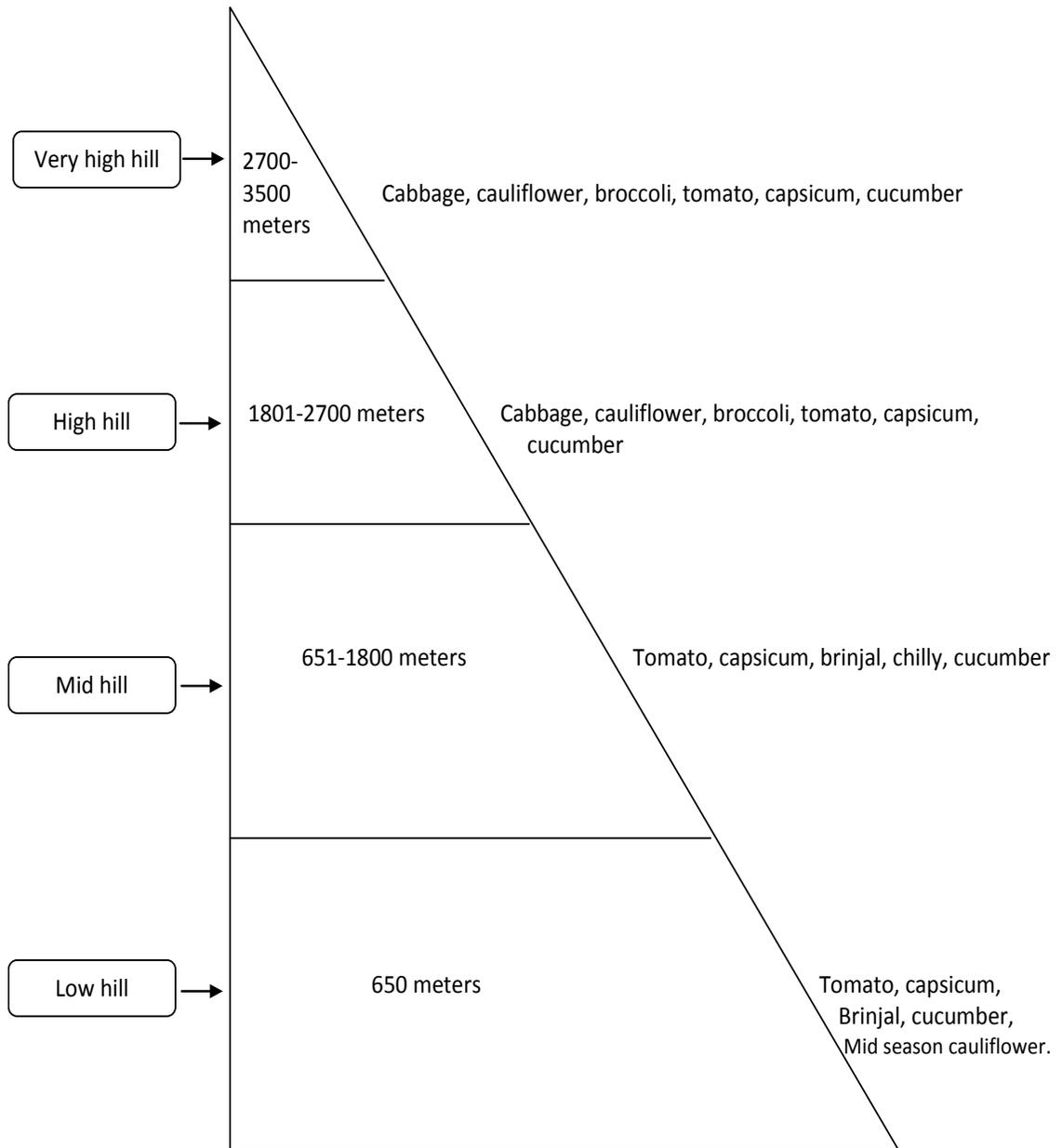
**Table 3.9: Horticulture Schedule of Cropping**

Zone	Sowing	Transplanting	Harvesting
1. <u>Low hill up to 650 m.</u> Tomato, Capsicum, Brinjal, Cucumber, etc Mid season cauliflower	Dec- Feb August	Jan-March September	June-Aug December
2. <u>Mid hills 651-1800 m.</u> Tomato, Capsicum, Brinjal, Chilly, Cucumber etc.	Jan-Feb	Feb-March	July-Aug
3. <u>High hill 1801-2700 m.</u> Cabbage, cauliflower, Broccoli, Tomato, Capsicum, Cucumber	Feb-March April March – April	March- April May April – May	July-Aug Aug Aug-Sept
4. <u>Very high hill 2701-3500 m.</u> Cabbage, Cauliflower, Broccoli Tomato, Capsicum, Cucumber	March – April March	April – May April	July – Aug Aug- Sept

Source: Training Manual of Horticulture crops.

Table 3.9 shows the Horticulture Schedule of Cropping in four different zones in Sikkim such as Low hill up to 650 m, Mid hills 651 m to 1800 m, High hill 1801 m to 2700 m and Very high hill 2701m to 3500 m. According to different zones, crops are sown, transplanted and harvested in different feasible months. From the depiction in the diagram below, it is clear what types of altitude is needed for the vegetables grown.

**Figure 3.3:** Altitudinal Agro-Climatic Zones of Horticulture in Sikkim



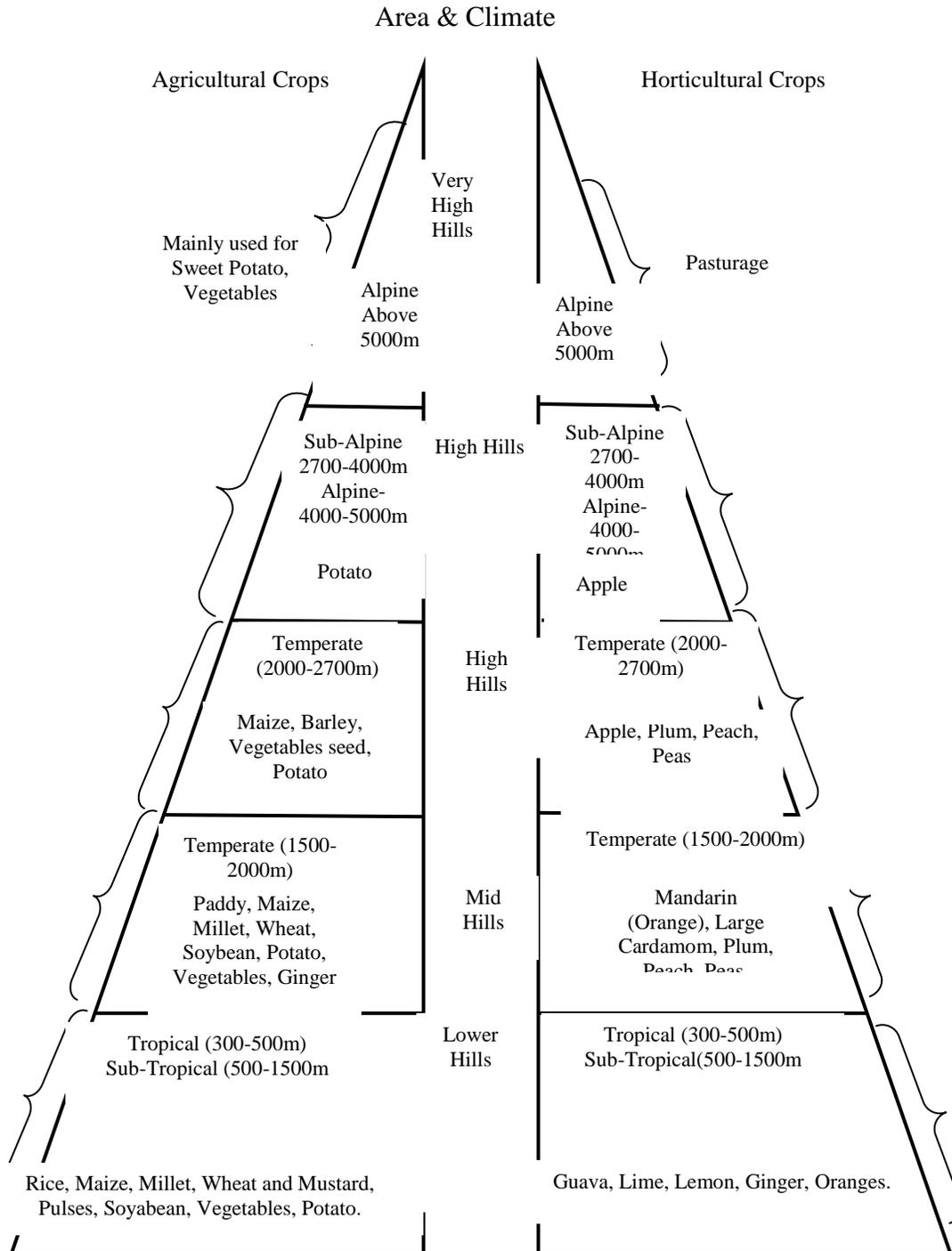
**Table 3.10: Ecological Zones and Ecological Adaptation in Sikkim**

Area	Climate	Altitude (M)	Ecological Adaptation	Crops	
				Agriculture	Horticulture
Lower Hills	Tropical	300-500	Wet & Dry Agriculture, Sedentary Farming, Livestock, Horticulture	Rice, Maize, Millet, Wheat And Mustard, Pulses, Soybean, Vegetables, Potato.	Guava, Lime, Lemon, Ginger, Oranges
	Sub-Tropical	500-1500			
Mid Hills	Temperate	1500-2000	Wet And Dry Agriculture, Slash And Burn Agriculture Or Rotational Dry Collection Of Minor Forest Produce, Horticulture	Paddy, Maize, Millet, Wheat, Soybean, Potatos, Vegetables, Ginger	Mandarin (Orange), Large Cardamom, Plum, Peach, Peas.
High Hills	Temperate	2000-2700	Dry Agriculture, Bhutias Transhumance	Maize, Barley, Vegetables, Sweet Potato	Apple, Plum, Peach, Peas.
High Hills	Sub-Alpine	2700-4000	Yak Herding, Horticulture, Pastoral Economy, Wool, Cheese, Butter, Hides, Apple	Potato	Apple
	Alpine	4000-5000	Potatoes Are Commercial Commodities		
Very High Hills	Alpine	Above 5000	Lachenpa and Lachungpa Transhumance Groups Visit the Area; Lachenpa Grows vegetable And Potato at higher elevation.	Mainly Used For Seed Potato, Vegetables	Pasturage

Source: www.envis.nic.in.

The above table depicts that Area, Climate, Altitude, Ecological Adaptation, Crops-Agriculture and Horticulture are correlated with each other. It also provides information on types of Agriculture and Horticulture crops that are grown and the nature of ecological adaptations that are followed by the people in different areas at different altitude and climatic conditions.

**Figure 3.4: Ecological Zones (Agriculture & Horticulture)**



### **Agro-Economic Activities of Selected Gram Panchayat Units (GPUs) of South District**

The state's economy is largely agrarian, based on the terraced farming of rice and the cultivation of crops such as maize, ginger, buckwheat, finger millet, wheat, barley, oranges, tea and cardamom. Agriculture is the primary activity of the people of Sikkim. About 11.13 percent of the total geographical area of the land is dedicated to agriculture. The subsidiary system of livestock rearing is the most predominant livestock rearing system in most rural areas of Sikkim. It is one of the important parts of the mixed farming system in the mid and lower hills of Sikkim in which agriculture, horticulture and agro-forestry form major pillars in the life of farmers. The role of livestock reared under this system is to support the main components. The livestock help to recycle the crop residues and agricultural products effectively.

South District is the smallest district of Sikkim state with a geographical area of 750 sq km and constitutes only 10.56 percent out of 7096 sq km. The South district also has mixed farming system which supports the economic life of the farmers basically in the rural areas. Around 70 percent of population depends on farming for their livelihood. It has different agro-climatic conditions suitable for cultivation of various crops. South district has 41,790 hectares (2015-16) i.e. 5.89 percent under operated area (agriculture + horticulture) and majority of farmers are marginal and small. The main agricultural and horticultural crops grown in the district (from 300m to 2100 m) are maize, ginger, paddy, barley, buckwheat, mustard, pulses, cardamom, orange and vegetables.

The South district ranks first in terms of production of vegetables. The farmers of South district have made notable improvement in vegetable production. Vegetables during the main seasons are grown in almost all the areas of south district. The horticulture department takes initiatives to encourage farmers to produce vegetables either early or in off-season so that farmers get good market price for their products. Recently, Agriculture and Horticulture Department, Government of Sikkim has adopted few villages or GPUs of South Sikkim in order to improve the agricultural systems and quality of production of farmers. Some of the villages are famous for specific commercial vegetables such as tomato of Sadam, Phongla, Tinzir, bottle-gourd of Pakzor and Samatar, beans of Passi and Rong, cabbage and broccoli of Salleybong and Chisopani, carrot, palak, bhindi, lettuce of Chisopani and Samatar, green peas of Rabang, Ghurpisay, Perbing (in Perbing cabbage and radish are also famous) and Temi, chayote in Bikmat area. Livestock sector is highly livelihood intensive. Agriculture along with livestock is the single largest source of employment in the state. Over 80 percent of the farmers in the state own livestock and earn supplementary incomes from them. In the case of livestock cattle, goat, pig and poultry are main economic support to the villagers.

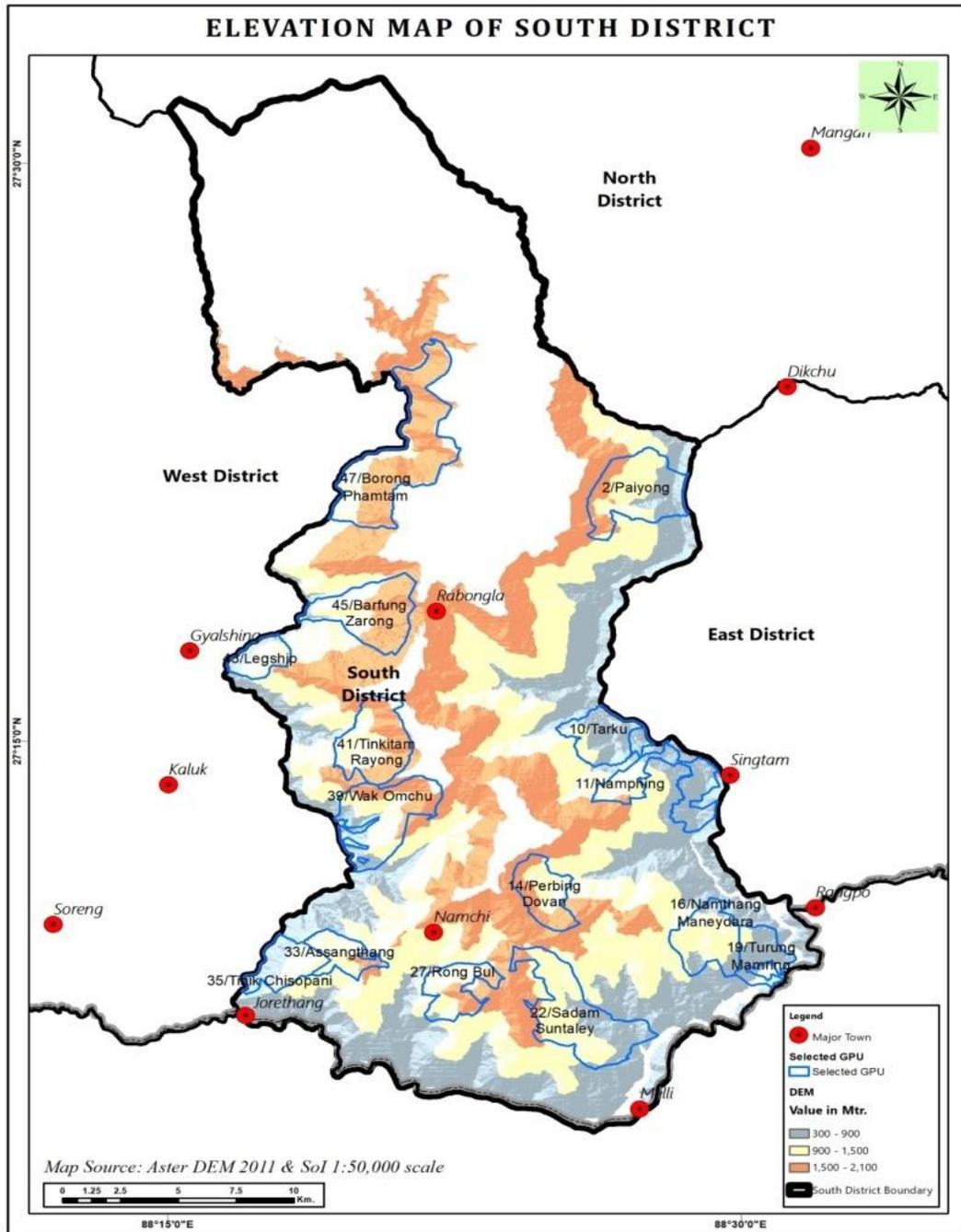
According to agro-climatic zones, the study areas i.e. Gram Panchayat Units (GPU) of South district are categorised into three groups-

The distribution of GPUs according to elevation bands (300m-900m, 900m-1500m, and 1500m-2100m) is as follows:

**Table 3.11: Agro-Climatic Zones**

<b>Sl. No.</b>	<b>Elevation (in metres)</b>	<b>Gram Panchayat Units</b>
1. Set I	300-900 metres	<ul style="list-style-type: none"> <li>i. Namphing GPU (381 m),</li> <li>ii. Legship GPU (596 m),</li> <li>iii. Rong-Bul GPU (644 m),</li> <li>iv. Tarku GPU (769)</li> <li>v. Turung-Mamring GPU (922 m).</li> </ul>
2. Set II	900-1500 metres	<ul style="list-style-type: none"> <li>i. Sadam –Suntaley GPU (1305 m)</li> <li>ii. Tinik- Chisopani GPU (1322 m)</li> <li>iii. Namthang- Maneydara GPU (1400 m)</li> <li>iv. Assangthang GPU (1413 m)</li> <li>v. Wok- Omchu GPU (1471 m).</li> </ul>
3. Set III	1500-2100 metres	<ul style="list-style-type: none"> <li>i. Borong-Phamthang GPU (1846 m).</li> <li>ii. Barfung-Zarung GPU (1853 m)</li> <li>iii. Paiyong GPU (1856 m)</li> <li>iv. Tinkitam-Rayong GPU (1956 m)</li> <li>v. Perbing-Dovan GPU (1976)</li> </ul>

Map No. 9



**Set I: Namphing, Legship, Rong-Bul, Tarku, Turung-Mamring**

**Crops:** In group I, the main crops cultivated include maize, barley, ginger, paddy and chili. The main crops of Namphing GPU are paddy, maize and ginger. Legship GPU has three belts i.e. lower, middle and upper. In the lower belt crops such as maize, barley, ginger, and paddy are grown, in the middle belt ginger and maize and in the upper belt, ginger, maize, orange and cardamom are grown. In Rong-bul GPU crops like buckwheat, ginger, mustard, maize and vegetables are grown. Maize and dalle chillies are grown in all GPUs. In Tarku GPU, in the lower belt crops like paddy are grown whereas in the upper belt maize and paddy are grown. Ginger is grown well in every GPU. In Turung-Mamring GPU maize, pulses and ginger are grown. However the best grown crop is maize. The farming system of Legship GPU is very much traditional. The 99 percent of household's area comes under the traditional farming in Rong-bul GPU. The farming system of Tarku GPU too is largely traditional. Only 5 percent of households are involved in modern way of farming.

However, in case of Turung-Mamring GPU about 65 percent of households are involved in modern way of farming while 35 percent of households are under traditional way of farming as per VDAP report.

**Period of Intensity:** The intensity of agriculture activities in the Namphing GPU is from medium to high. In the months of February, March, July, August and November the intensity of agricultural activities is high but the remaining months fall under medium category. Legship GPU has intense agriculture activities during the months of September, October and November. Medium intensity occurs in the months of January, May, June, and December. The high intensity of agriculture activities is seen during five months: February, March, April, July, and August. In the Rong-bul GPU, agricultural activities start during the months of December, January and February but the intensity of agriculture activities is low during the period. April, May, August, September and March are months of medium intensity, but June, July, October and November have high intensity. The months of July, November and December have low intensity of agricultural activities. The medium intensity occurs in January, March, April, May, September and October, and high intensity of agriculture activities prevails in the months of June, August and February in Tarku GPU. The intensity of agriculture activities in Turung-Mamring GPU is low in the months of January, April, May, October, November and December. In the months of June, July and February the intensity of agriculture activities is medium but it is high in August, September and March.

**Set II: Sadam-Suntaley, Tinik Chisopani, Namthang-Maneydara-Assangthang-Wok-Omchu**

**Crops:** The main crops of Sadam-Suntaley GPU from lower belt to upper belt are maize, mustard, vegetables (tomato etc.). But the best practices are horticulture and dairy farming. The main crops of Tinik-Chisopani GPU are maize, pulses, ginger and paddy. Similarly, main crops of Namthang-Maneydara GPU in the lower belt are maize, pulses, and paddy and in middle to upper belt ginger and maize. But the best practices in the lower belt are maize and pulses and in the upper belt maize and ginger. The main crops of Assangthang GPU in the lower belt are maize, ginger, tomato, fire ball chilies, in the middle belt maize, buckwheat, ginger, beans and in the upper belt ginger and maize. But the best practices in the lower belt are maize and pulses and in the upper belt are ginger, beans, soybean, fire ball chilies, and buckwheat. The main crops of Wok-Omchu GPU from lower belt to upper belt are ginger, pulses and maize. But the best practice is that of cash crop i.e. ginger. The farming system in Sadam-Suntaley GPU is mostly traditional way of farming. According to VDAP-2011 about 300 households have adopted modern way of farming. According to VDAP-2011 about 27 households in Tinik-Chisopani GPU are involved in modern way of farming and total area under modern farming techniques is only 10 percent. The rest of the households and area are under traditional way of farming. In Namthang-Maneydara only 18 households follow modern farming techniques and the area coverage is only 0.5 percent (VDAP-2011). The rest of the households in the area practices traditional farming, even though villagers focus more on cash crop like ginger. Likewise, the farming system in Assangthang GPU is also traditional. Only 02 households follow modern way of farming and total area under modern farming techniques is only 0.5 acre. The total households involved in cash crop cultivation are 10 percent and the area under modern farming techniques is only 20 percent (VDAP-2011). The rest 90 percent of households and 80 percent of area are under traditional farming in Wok- Omchu GPU.

**Period of Intensity:** In Sadam-Suntaley GPU during the months of January, February and December the intensity of agriculture activities is low but by March, April, May, September, October and November the intensity rises to medium. The highest intensity is recorded in the months of June, July and August. The intensity of agriculture activities in Tinik-Chisopani GPU area in the months of October, November and December is low and it is high in the months of February, March, April, May, June, July and August. In Namthang-Maneydara GPU area during the months of January, May, October, November and December the intensity is low. The medium intensity takes place in the months i.e. February, March, April, July, August and September. There is no high intensity month of agriculture activities. In Assangthang GPU, the intensity of agriculture activities in the months of January, June, August, and September is low. Medium intensity is observed in the months of February, March, April, May, October, November and December. There is only one month i.e. July which has high intensity of agriculture activities. The intensity of agriculture activities in Wok-Omchu GPU area in the months of October, November and December is, while medium

intensity months are January, June and September. The high intensity of agriculture activities occurs during February, March, April and May.

### **Set III: Borong-Phamthang, Barfung-Zarong, Paiyong, Tinkitam-Rayong and Perbing-Dovan**

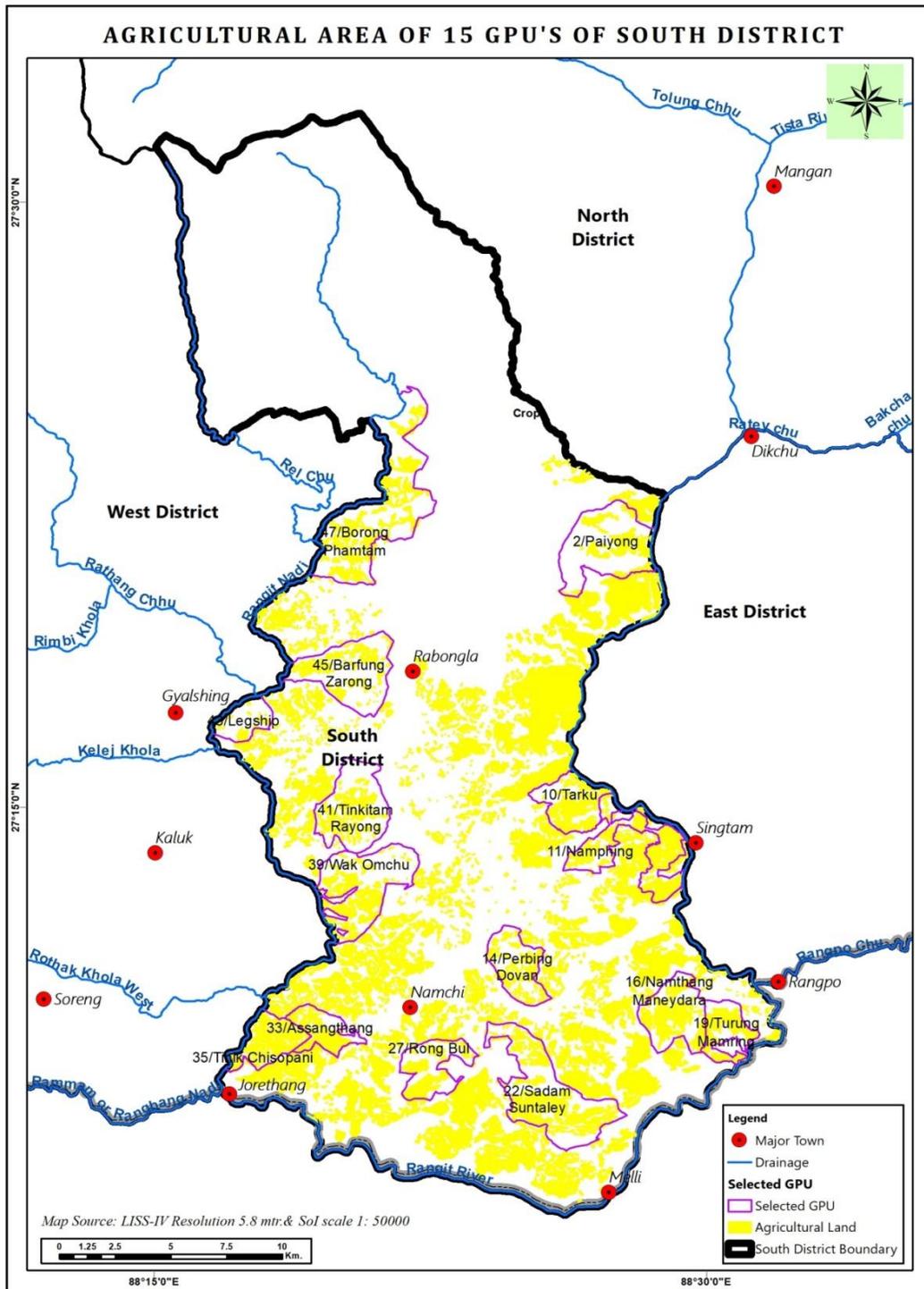
**Crops:** The main crops of Borong-Phamthang GPU in the lower belt are maize, paddy, ginger, orange and cardamom, in the middle belt maize, ginger and cardamom, but in the upper belt ginger, maize, potato and cardamom are grown. But the best practices in this GPU from lower belt to middle belt are ginger, maize and cardamom cultivation, and in the upper belt, cardamom, ginger, maize, vegetables, dairy and goatery. The main crops of Barfung-Zarrong GPU are maize, ginger, cardamom, and paddy. But the best practices from lower belt to upper belt are ginger, dairy farming, vegetables and floriculture. The main crops of Paiyong GPU are paddy, maize, millet, wheat, mustard and ginger. The main crops of Tinikitam-Rayong GPU from lower belt to middle belt are maize and ginger but in the upper belt ginger, maize and potato are common. The best practices of crops in this GPU in the lower belt are ginger, cardamom and orange, in middle belt ginger and cardamom but in the upper belt ginger, potato and cardamom grow best. The main crops of Perbing-Dovan GPU in the lower belt are maize, pulses and ginger, middle belt has maize, potato and cauliflower but in the upper belt potato, maize, radish, cabbage and cauliflower are grown. However, the best practice of crops in this GPU is mixed farming of peas, potato and cabbage. But the potentiality of ginger, broom, potato and cabbage is high.

**Period of Intensity:** The farming system in Borong-Phamthang GPU is traditional way of farming. The total households involved in modern way of farming is only 10 percent and likewise total area under modern farming techniques is only 5 percent (VDAP-2011). The rest i.e. 90 percent of households and 95 percent of area follow traditional way of farming. The farming system in Barfung-Zarung GPU is both modern and traditional way of farming. The total households involved in modern way of farming are only 10 percent and the total area under modern farming techniques is only 4 percent (VDAP-2011). The rest 90 percent of households and 96 percent area are covered by traditional way of farming. The farming system in this GPU is traditional way of farming. The total households involved in modern way of farming are only 25 household (VDAP-2011) and total area under modern farming techniques is only 1 acre. The farming system in Paiyong GPU is traditional way of farming. The total households involved in modern way of farming are only 25 household (VDAP-2011) and total area under modern farming techniques is only 1 acre. The farming system in Tinkitam-Rayong GPU is overwhelmingly traditional. Only 1 percent of households are involved in modern way of farming and likewise total area under modern farming is only 1 percent (VDAP-2011). In the case of Perbing-Dovan GPU both modern and traditional systems are observed. The total households involved modern way of farming are 65 percent of households and total area under

modern farming techniques is 5 percent (VDAP-2011). The rest almost 35 percent of households and 95 percent of area is covered by traditional way of farming.

**Period of Intensity:** In Borong-Phamthang GPU, the intensity of agriculture activities is low in the months of January, October, November and December. The medium intensity occurs in the months of July, August, and September. There are five months of high intensity in agriculture activities i.e. February, March, April, May, and June. Likewise, in Barfung-Zarung the months of January, September, October, November and December have low intensity. The medium intensity is seen in only two months i.e. July and August and high intensity occurs in February, March, April, May and June. In Tinkitam-Rayong GPU the farming system is overwhelmingly traditional. Only 1 percent of households are involved in modern way of farming and likewise total area under modern farming is only 1 percent (VDAP-2011). In Perbing-Dovan three months have low intensity of agriculture activities i.e. January, September and October. The medium intensity occurs in the months of May, June, November and December, There are five months of high intensity in agriculture activities .i.e. February, March, April, July and August.

Map No. 10

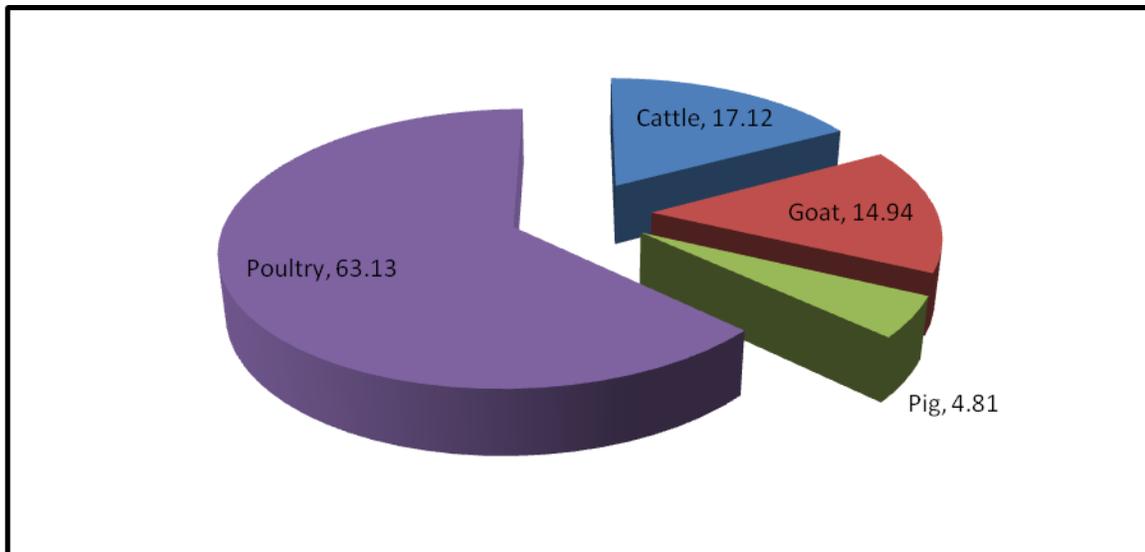


## Availability of Livestock

**Table 3.12: Total Number of Livestock Availability in Five GPUs (Namphing, Legship, Rong-Bul, Tarku & Turung-Mamring)**

Sl. No.	Livestock	Availability of Livestock Mean $\pm$ S.D.	Standard Error
1.	Cattle	3873 $\pm$ 33.7105	13.7622
2.	Goat	3378 $\pm$ 27.4881	11.2220
3.	Pig	1088 $\pm$ 36.2767	14.8099
4.	Poultry	14279 $\pm$ 35.6146	14.5396
	Total	22618 $\pm$ 3.4641	1.4142

Source: Department of AHLF&VS, 2012.



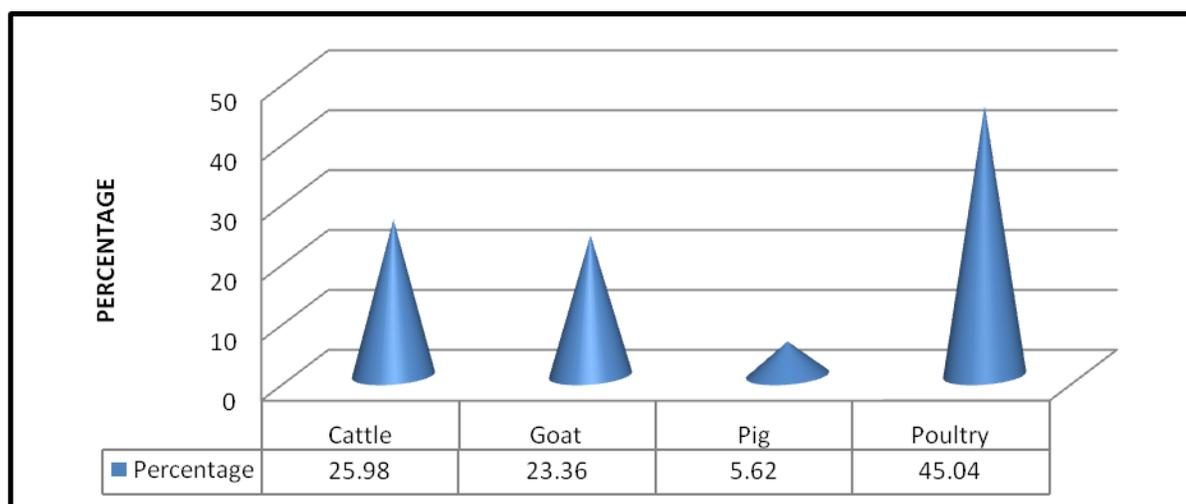
**Figure 3.5: Percentagewise Distribution of Livestock in Five GPUs (Namphing, Legship, Rong-Bul, Tarku & Turung-Mamring)**

The total number of livestock available in five GPUs - Namphing, Legship, Rong-Bul, Tarku & Turung-Mamring has been compared in the above figure. The highest available livestock is poultry which has the significant mean  $\pm$  S.D. i.e. 3873 $\pm$ 33.7105 and its corresponding standard error is calculated as 13.7622. The second largest available livestock is cattle and the mean  $\pm$ S.D. is 3873 $\pm$ 33.7105 and its corresponding standard error is calculated as 13.7622. Goat comes third with significant mean of 3378 $\pm$ 27.4881 and standard error of 11.2220.

**Table 3.13: Total Number of Livestock Availability in Five GPUs (Sadam-Suntaley, Tinik-Chisopani, Namthang-Maneydara, Assangthang, Wok-Omchu)**

Sl. No.	Livestock	Availability of Livestock	Mean $\pm$ S.D.	Standard Error
1.	Cattle	3895 $\pm$ 23.2292		9.4833
2.	Goat	3501 $\pm$ 17.6181		7.1925
3.	Pig	842 $\pm$ 19.6774		8.0332
4.	Poultry	6752 $\pm$ 12.4096		5.0662
	Total	14990 $\pm$ 10.2956		4.2031

Source: Department of AHLF&VS, 2012.



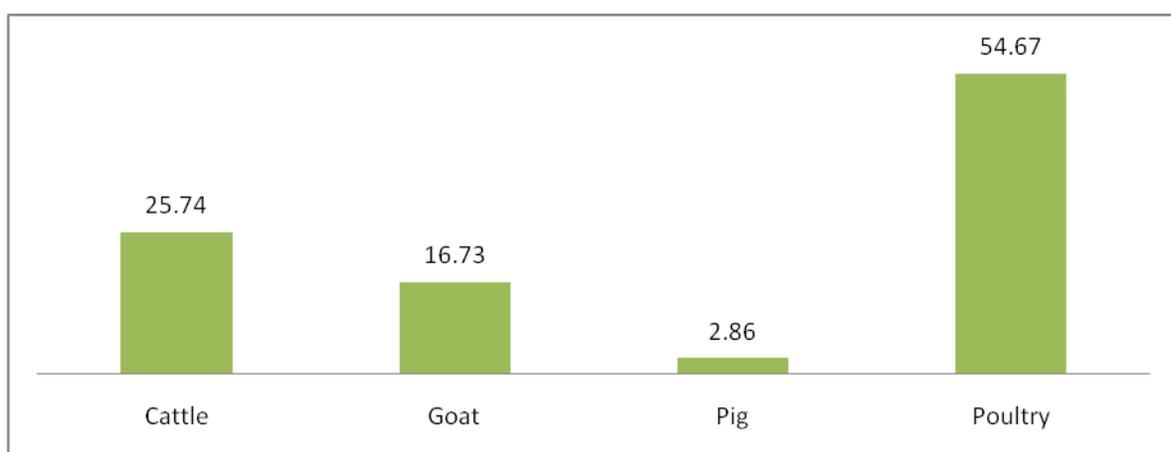
**Figure 3.6:** Percentagewise distribution of Livestock in Five GPU (Sadam–Suntaley, Tinik-Chisopani, Namthang-Maneydara, Assangthang and Wok-Omchu)

The total number of livestock available in five GPUs - Sadam-Suntaley, Tinik-Chisopani, Namthang-Maneydara, Assangthang and Wok-Omchu has been compared in the above figure which makes it clear that the highest availability of livestock is in poultry which has the significant mean  $\pm$  S.D. i.e. 6752 $\pm$ 12.4096 and its corresponding standard error is calculated as 5.0662. The second largest available livestock is cattle and the mean  $\pm$ S.D. is 3895 $\pm$ 23.2292 and its corresponding standard error is calculated as 9.4833, followed by goat (3501 $\pm$ 17.6181) and pig (842 $\pm$ 19.6774).

**Table 3.14: Total Number of Livestock Availability in Five GPU (Borong-Phamthang, Barfung-Zarung, Paiyong, Tinkitam -Rayong & Perbing-Dovan)**

Sl. No.	Livestock	Availability of Livestock	Mean $\pm$ S.D.	Standard Error
1.	Cattle	5204 $\pm$ 10.1980		4.1633
2.	Goat	3383 $\pm$ 9.3380		3.8122
3.	Pig	578 $\pm$ 9.1214		3.7238
4.	Poultry	11052 $\pm$ 10.7888		4.4095
	Total	20217 $\pm$ 48.6004		19.8410

Source: Department of AHLF&VS, 2012.

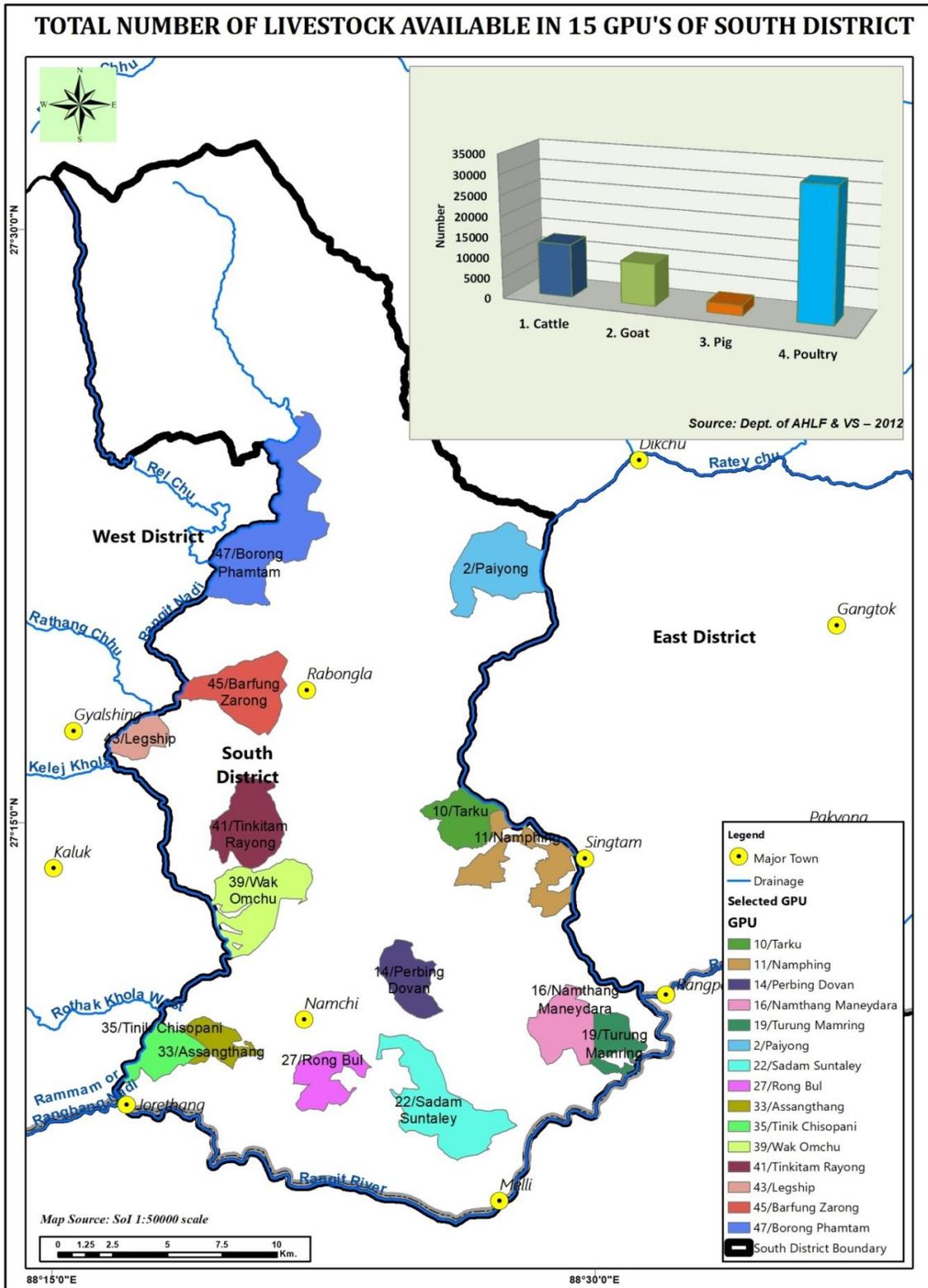


**Figure 3.7: Percentagewise distribution of Livestock in Five GPUs (Borong-Phamthang, Barfung-Zarung, Paiyong, Tinkitam -Rayong & Perbing-Dovan)**

The total number of livestock available in five GPUs - Borong-Phamthang, Barfung-Zarung, Paiyong, Tinkitam -Rayong & Perbing-Dovan has been compared in figure 3.7. The highest availability of livestock is poultry which has the significant mean  $\pm$  S.D. i.e. 11052 $\pm$ 10.7888 and its corresponding standard error is calculated as 4.409. The second largest available livestock is cattle and the mean  $\pm$ S.D. is 5204 $\pm$ 10.1980 and its corresponding standard error is calculated as 4.1633, followed by goat (3383 $\pm$ 9.3380) and pig (578 $\pm$ 9.1214).

It has been observed that in almost all GPUs, the number of poultry is highest. But it should be kept in mind that the poultry are low maintenance livestock compared to cattle, goats and pig. As far as the significance in terms of livelihood is concerned, cattle rank first for obvious reasons.

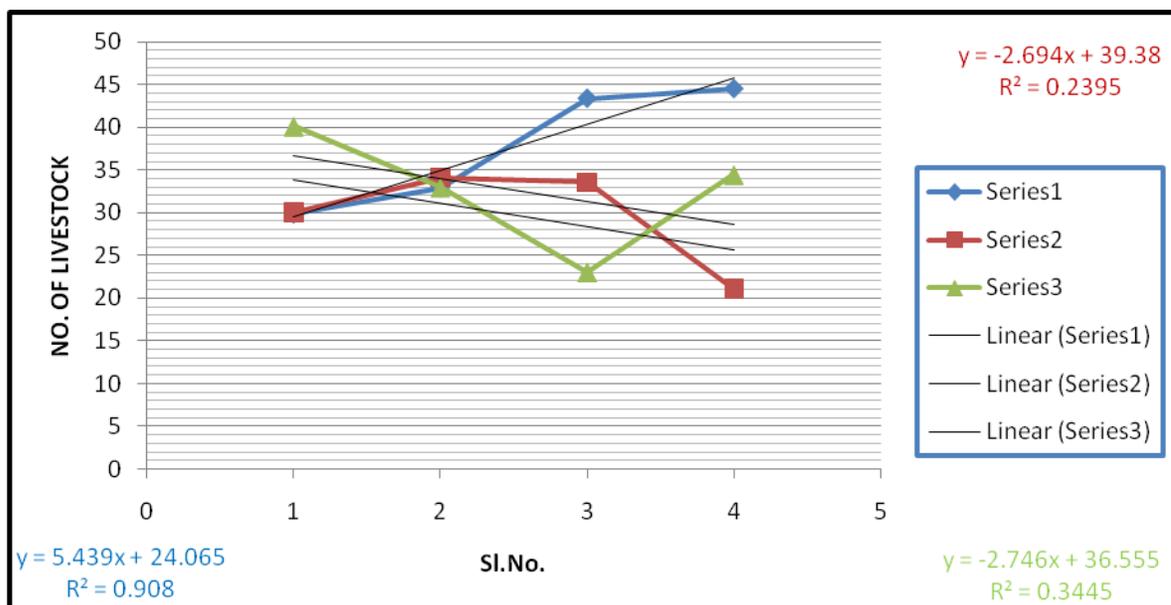
Map No. 11



**Table 3.15: Percentagewise Distribution of Livestock in 15 GPUs**

Sl. No.	Livestock	Five GPU (300-900 metres)	Five GPUs (900-1500 metres)	Five GPUs (1500-2100 metres)	Total (%)
1.	Cattle	29.86	30.02	40.12	100.00
2.	Goat	32.91	34.12	32.97	100.00
3.	Pig	43.38	33.57	23.04	100.00
4.	Poultry	44.50	21.05	34.45	100.00

Source: Department of AHLF&VS, 2012.



**Figure 3.8: Percentagewise Distribution of Livestock in 15 GPUs**

The figure 3.8 indicates the percentagewise distribution of livestock in 15 GPUs based on the secondary data compilation which makes it clear that the series 1, 2 and 3 show the regression lines corresponding to five GPUs between 300m to 900m, between 900m to 1500m and between 1500m to 2100m respectively. The first regression curve shows a highly significant trend as compared to the other two. First curve is increasing in order show that its value is positive in the form of  $y=mx+c$ , that is  $y = 5.439x + 24.065$  and corresponding regression value is  $R^2 = 0.908$ . The series 2 and series 3 curves show a decreasing order and seem less significant as compared to the first and corresponding straight line equations are  $y = -2.694x + 39.38$  and  $= -2.746x + 36.555$  respectively. In the regression methods there are two variables i.e. independent and dependent. In this table livestock is dependent variable and elevation is

independent variable, because livestock always depends on altitude to survive and adjust with natural climate.

**Table 3.16: Income Generated From Livestock Per Annum in Five GPUs, Set I**  
(Namphing, Legship, Rong-Bul, Tarku & Turung-Mamring)

Sl. No.	Livestock	Income (Rs.) Mean $\pm$ S.D.	Standard Error
1.	Dairy	941400 $\pm$ 5.0990	2.0816
2.	Goatery	325100 $\pm$ 41.2116	16.8245
3.	Piggery	81800 $\pm$ 64.7888	26.4499
4.	Poultry	286000 $\pm$ 362.4643	1.4797
	Total	1634300 $\pm$ 97.1193	39.6488

Source: Department of AHLF&VS, 2012.

The income generated from livestock per annum in five GPUs such as dairy, goatery, piggery, and poultry of Namphing, Legship, Rong-Bul, Tarku & Turung-Mamring is indicated in table 3.16. The highest income value is generated from dairy which has 57.60 percent among others livestock. This indicates that the inhabitants of five GPUs depend on the dairy farming which is more suitable and reliable source of income due the availability of its required facilities. However, other livestock's also contribute towards generation of income in villages like goatery (19.89%), poultry farming (17.50%), and piggery farming (5.01 %) respectively.

**Table 3.17: Income Generated From Livestock Per Annum in Five GPUs, Set II**  
(Sadam–Suntaley, Tinik-Chisopani, Namthang-Maneydara, Assangthang, Wok-Omchu)

Sl. No.	Livestock	Income (Rs.) Mean $\pm$ S.D.	Standard Error
1.	Dairy	36000 $\pm$ 901.9811	3.6823
2.	Goatery	22500 $\pm$ 90.4013	36.9061
3.	Piggery	28000 $\pm$ 784.6334	3.2032
4.	Poultry	94000 $\pm$ 823.2635	3.3609
	Total	180500 $\pm$ 79.1403	32.3089

Source: Department of AHLF&VS, 2012.

The income as shown above shows the comparison between dairy, goatery, piggery, and poultry of Sadam-Suntaley, Tinik-Chisopani, Namthang-Maneydara, Assangthang, Wok-Omchu in the form of the significant mean $\pm$  S.D. and standard error. The highest income value is generated from poultry farming that is 94000 $\pm$ 823.2635 and its corresponding error is calculated as 3.3609. This result indicates that the inhabitants of five GPUs depend on the

poultry farming which is more suitable and reliable source of income due to easy availability. In descending order the income from various livestock is: dairy (36000±901.9811), piggery farming (28000±784.6334), and goatery (22500±90.4013). The overall income generated by five GPUs has a significant mean± S.D. i.e. 180500±79.1403 and its standard error calculated as 32.3089.

**Table 3.18: Income Generated From Livestock Per Annum in Five GPUs, Set III**  
(Borong-Phamthang, Barfung-Zarung, Paiyong, Tinkitam -Rayong & Perbing-Dovan)

Sl.No.	Livestock	Income (Rs.)	Mean ±S.D.	Standard Error
1.	Dairy	189300±63.4539		25.9049
2.	Goatery	68800±38.7969		15.8387
3.	Piggery	158800±66.2178		27.0333
4.	Poultry	72700±74.2266		303029
	Total	489600±74.4795		30.4061

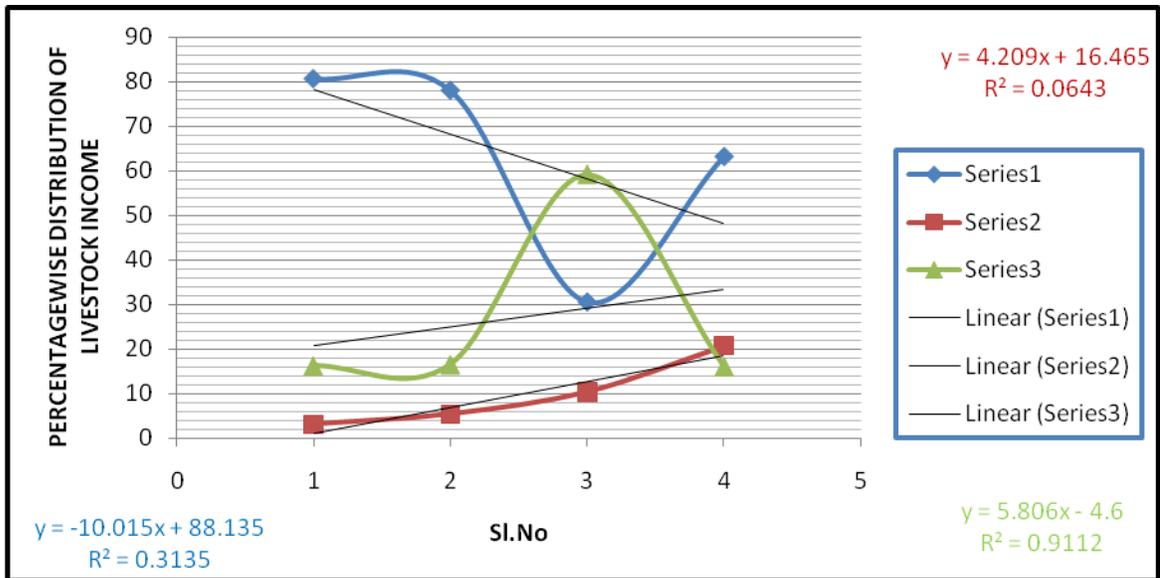
Source: Department of AHLF&VS, 2012.

The income from dairy, goatery, piggery, and poultry of Borong-Phamthang, Barfung-Zarung, Paiyong, Tinkitam -Rayong & Perbing-Dovan GPUs is shown in table 3.18. The highest income value is generated from dairy that is Rs. 1, 89, 300. This indicates that the inhabitants of these GPUs depend more on dairy farming. Piggery farming is also successful in higher altitude due to availability of space and suitable climatic conditions and contribute second highest income i.e. Rs. 1, 58,800. Similarly, poultry and goatery also support the income generating mechanism but to a lesser extent than dairy and piggery farming.

**Table 3.19: Percentagewise Distribution of Income in 15 GPUs**

Sl. No	Livestock	GPUs between 300 -900 metres	GPUs between 900 -1500 metres	GPUs between 1500 - 2100 metres	Total (%)
1.	Dairy	80.69	3.08	16.23	100.00
2	Goatery	78.07	5.40	16.53	100.00
3.	Piggery	30.45	10.42	59.13	100.00
4.	Poultry	63.18	20.76	16.06	100.00

Source: Department of AHLF&VS, 2012.



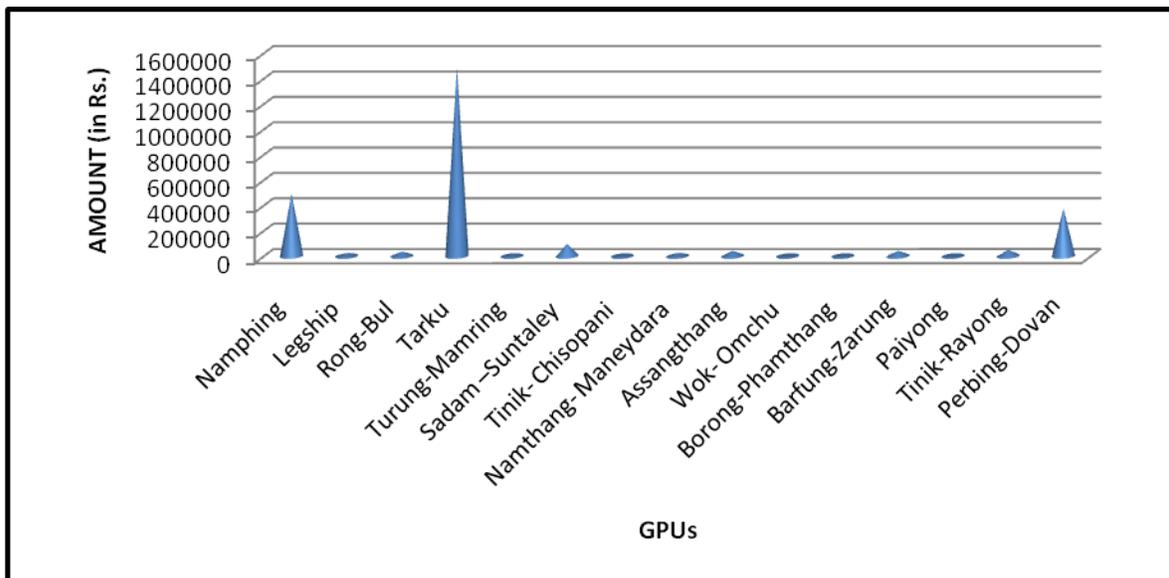
**Figure 3.9:** Percentagewise Distribution of Income in 15 GPUs

The figure 3.9 indicates the Percentagewise distribution of livestock in 15 GPUS based on the secondary data compilation. It is clear that the series 1, 2 and 3 show the regression lines corresponding to Five GPUs falling within 300m to 900 m, 900m to1500m, and 1500m to 2100m respectively and comparison has been made of available livestock, namely, cattle, goat, pig and poultry. First regression curve shows the value of  $y = -10.015x + 88.135$  and corresponding regression value is  $R^2 = 0.3135$ . Similarly, the series 2 and series 3 curves show equations of  $y = 4.209x + 16.465$  and  $y = 5.806x - 4.6$  respectively. The linear series 1 shows the negative; because the income from livestock i.e. dairy is high initially but other livestock income is descending. In the linear series 2 percentage of income of livestock is less even though there is sign of increasing rate of income that's why this line shows moderately positive sign. In the case of linear series 3 there is also indication of increasing income of livestock; the line shows positive.

**Table 3.20: Income Generated in 15 GPUs from Livestock Per Annum**

Sl. No.	Gram Panchayat Units	Amount (in Rs.)	Mean±S.D.	Standard Error
1.	Namphing	494000±34.3336		14.0166
2.	Legship	24000±18.9631		7.7416
3.	Rong-Bul	35600±37.4326		15.2818
4.	Tarku	1490000±48.7007		19.8820
5.	Turung-Mamring	14500±56.4482		23.0448
6.	Sadam –Suntaley	97000±45.2327		18.4661
7.	Tinik- Chisopani	12000±47.9124		19.5601
8.	Namthang- Maneydara	24000±42.6286		17.4030
9.	Assangthang	41500±27.9928		11.4280
10.	Wok- Omchu	6000±42.8158		17.4795
11.	Borong-Phamthang	11000±23.4520		9.5742
12.	Barfung-Zarung	43500±23.2292		9.4833
13.	Paiyong	5100±49.4732		20.1973
14.	Tinik-Rayong	50000±26.7731		10.9300
15.	Perbing-Dovan	380000±23.5202		9.6020
	Total	2728200±64.9730		26.5251

Source: Source: VDAP, 2011.



**Figure 3.10: Income Generated of 15 GPUs from Livestock Per Annum**

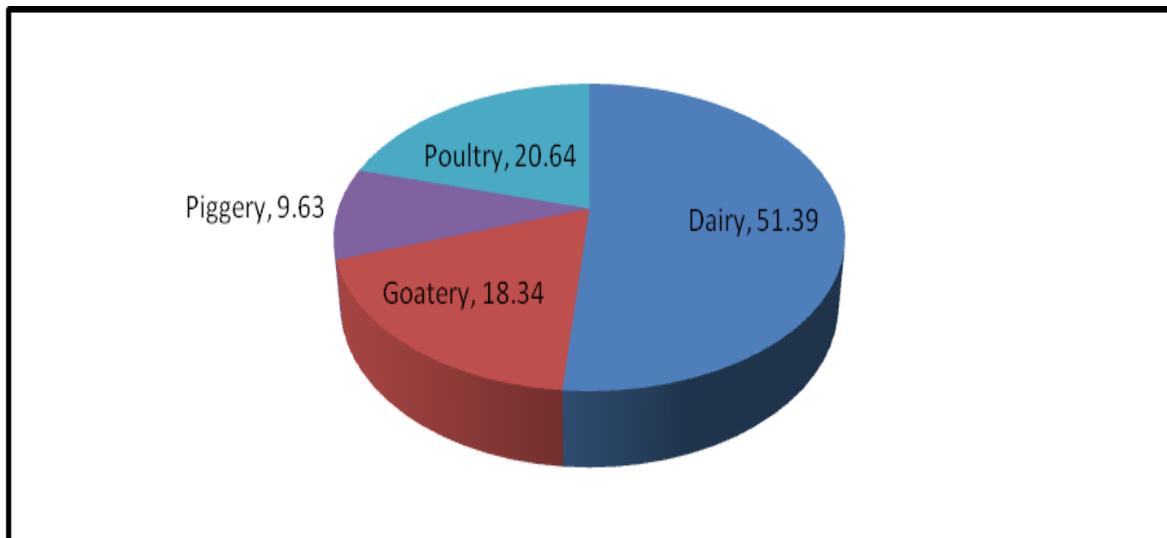
The table 3.20 shows the income generation from livestock of 15 GPUs, the significant mean±S.D. and standard error. The highest income value generated from livestock is in Tarku which is 1490000±48.7007 and its corresponding error is calculated as 19.8820. The second

and third highest income generated from livestock are from two GPUs i.e., Namphing and Perbing-Dovan and their mean± S.D. are 494000±34.3336, 380000±23.5202 and corresponding errors are 14.0166 and 9.6020 respectively. The other GPUs do have average income from livestock. But the lowest income generated from livestock is in the Paiyong GPU that is 5100±49.4732 and its corresponding error is calculated as 20.1973. The landform structure, availability of water, favourable climatic conditions, availability of fodder trees etc. are conducive for rearing of cattle in any particular place. Here, Tarku, Namphing and Perbing-Dovan GPUs have such kinds of favourable components for rearing of cattle.

**Table 3.21: Income Generated from Livestock Per Annum (Average) of 15 GPUs**

Sl. No.	Livestock	Percentage	Mean±S.D.	Standard Error
1.	Dairy	51.39±34.5774		14.1161
2.	Goatery	18.34±10.8949		4.4478
3.	Piggery	9.63±5.2153		2.1291
4.	Poultry	20.64±12.7279		5.1961
	Total	100.0±25.3456		10.3473

*Source:* Compiled by Researcher.



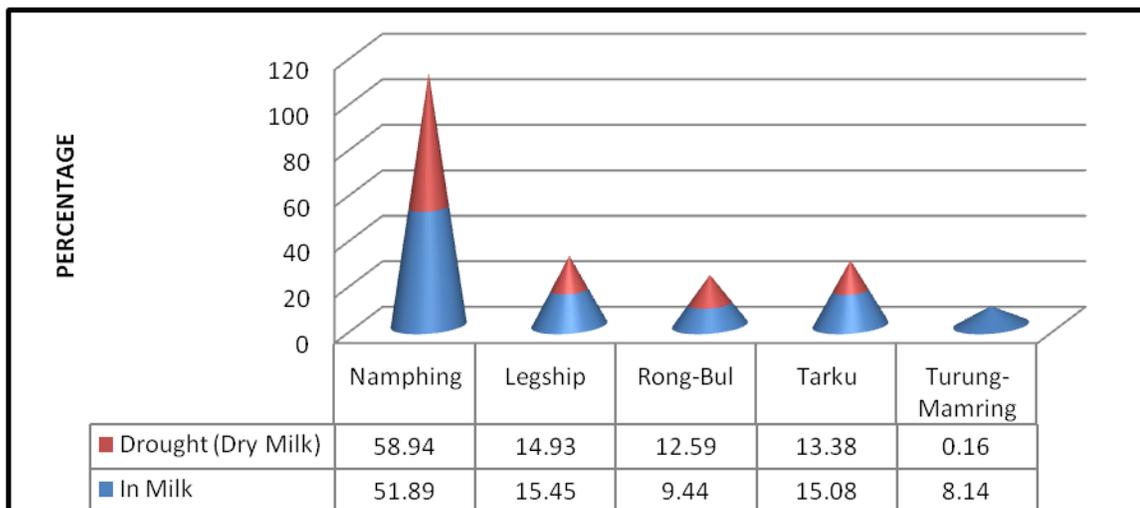
**Figure 3.11: Income Generated from Livestock Per Annum (Average) of 15 GPUs**

Overall, it is found that of all livestock, highest percentage i.e. more than half of income is generated from dairy farming. It is seen that maximum villagers domesticate cattle in almost all GPUs to supplement their income. After dairy farming, 20.64 percent and 18.34 percent income come from Poultry and Goatery respectively. Income is low (9.63 percent) from piggery.

**Table 3.22: Milk and Drought (Dry Milk) Cow of Five GPUs, Set I**

Name of GPU	In Milk Mean $\pm$ S.D.	Standard Error	Drought (Dry Milk) Mean $\pm$ S.D.	Standard Error
Namphing	561 $\pm$ 35.0770	14.3201	379 $\pm$ 41.8760	17.0958
Legship	167 $\pm$ 30.5614	12.4766	96 $\pm$ 48.7975	19.9215
Rong-Bul	102 $\pm$ 35.5640	14.5189	81 $\pm$ 26.3590	10.7610
Tarku	163 $\pm$ 31.1640	12.7226	86 $\pm$ 38.3144	15.6418
Turung-Mamring	88 $\pm$ 53.1337	21.6917	01 $\pm$ .8811	.3597
Total	1081 $\pm$ 43.5201	17.7670	643 $\pm$ 31.0934	12.6938

Source: Department of AHLF&VS, 2012.



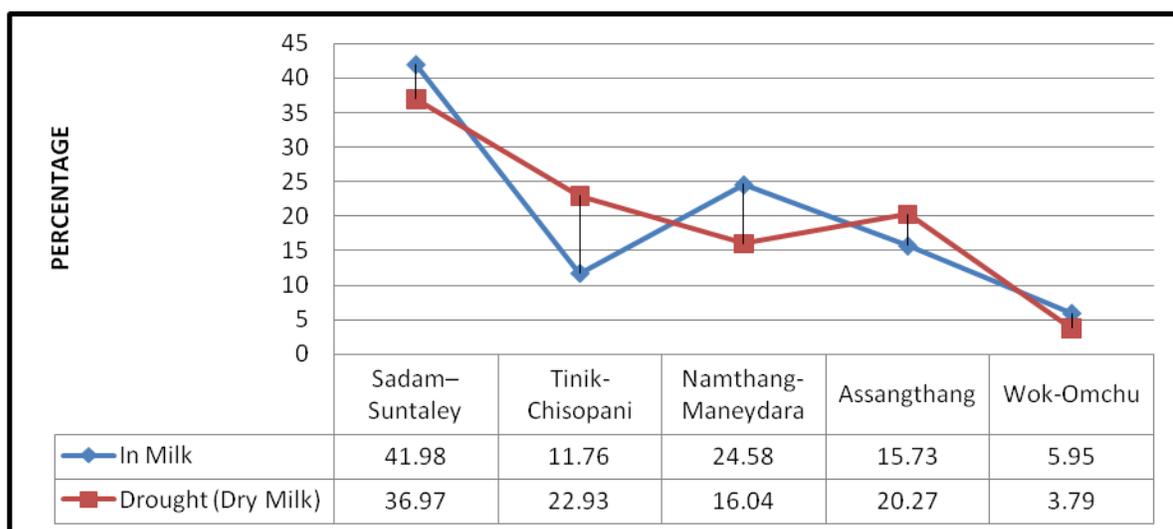
**Figure 3.12: Total Number of Milk and Drought (Dry Milk) Cows of Namphing, Legship, Rong-Bul, Tarku & Turung-Mamring GPUs**

The table 3.22 shows comparison between Milk and Drought (Dry Milk) Cows of Namphing, Legship, Rong-Bul, Tarku & Turung-Mamring GPUs with the significant mean  $\pm$  S.D. and standard error. The mean, S.D. of Milk cow of five GPU is 1081 $\pm$ 43.5201 and its corresponding error is 17.7670. This result indicates that the inhabitants of five GPUs depend on the Dairy farming and the Milk cow numbers are more compared to Drought cow. The mean  $\pm$ S.D value of Drought cow is 643 $\pm$ 31.0934 and Standard error is 12.6938. The lowest numbers of Milking and Dry Milk cows are found in Turung-Mamring GPUs due to scarcity of water, lack of fodder tress and people are found engaged in part-time job in factories.

**Table 3.23: Milk and Drought (Dry Milk) Cow of Five GPUs, Set II**

Name of GPU	In Milk Mean $\pm$ S.D.	Standard Error	Drought (Dry Milk) Mean $\pm$ S.D.	Standard Error
Sadam–Suntaley	275 $\pm$ 35.0257	14.2991	166 $\pm$ 27.5245	11.2368
Tinik-Chisopani	77 $\pm$ 20.5912	8.4063	103 $\pm$ 25.1077	10.2502
Namthang-Maneydara	161 $\pm$ 35.0941	14.3271	72 $\pm$ 25.6826	10.4849
Assangthang	103 $\pm$ 43.6669	17.8269	91 $\pm$ 30.6267	12.5033
Wok-Omchu	39 $\pm$ 17.8997	7.3075	17 $\pm$ 7.6681	3.1305
Total	655 $\pm$ 30.2588	12.3531	449 $\pm$ 26.3286	10.7486

Source: Department of AHLF&VS, 2012.



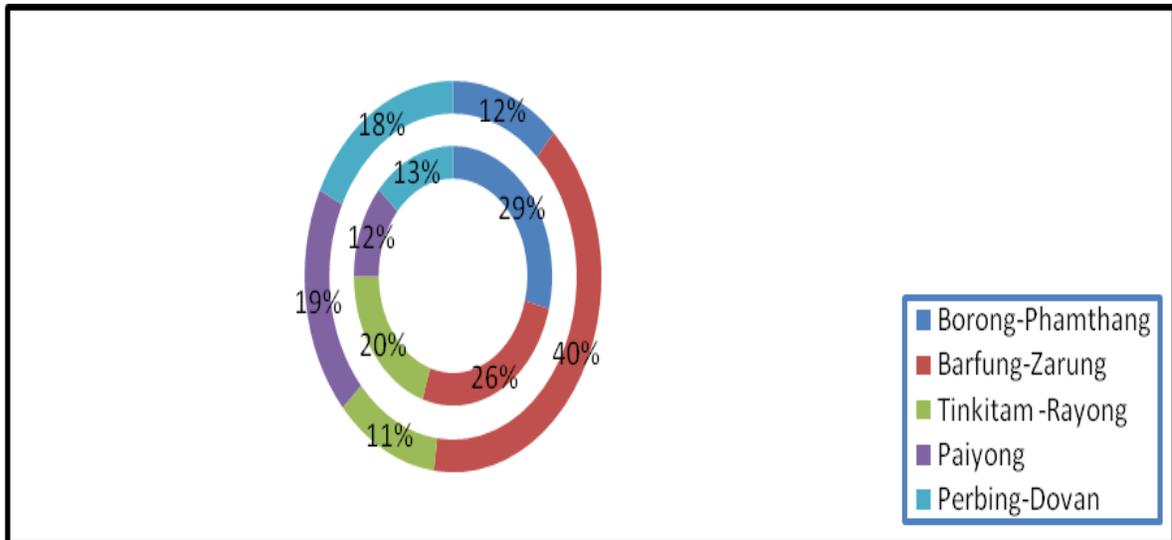
**Figure 3.13:** Total Number of Milk and Drought (Dry Milk) Cow of Five GPUs (Sadam–Suntaley, Tinik-Chisopani, Namthang-Maneydara, Assangthang & Wok-Omchu)

The table 3.23 shows the Milk and Drought (Dry Milk) Cows of Five GPUs of Sadam-Suntaley, Tinik-Chisopani, Namthang-Maneydara, Assangthang, Wok-Omchu. The highest number of Milk and Drought (Dry Milk) Cows has been found in Sadam-Suntaley GPU and the lowest has been found in Wok-Omchu GPU. The number of population has a correlation with the number of cattle reared in a village. The total population of Sadam-Suntaley GPU is 4,021 while Wok-Omchu GPU has only 1,856 persons as per 2011 census. Consequently Sadam-Suntaley GPU has much higher number of Milk and Drought (Dry Milk) Cows than Wok-Omchu and other areas.

**Table 3.24: Milk and Drought (Dry Milk) Cow of Five GPUs, Set III**

Name of GPU	In Milk Mean $\pm$ S.D.	Standard Error	Drought (Dry Milk) Mean $\pm$ S.D.	Standard Error
Borong-Phamthang	379 $\pm$ 35.1169	14.3364	98 $\pm$ 56.1106	22.9070
Barfung-Zarung	338 $\pm$ 18.7616	7.6594	331 $\pm$ 48.6621	19.8662
Tinkitam -Rayong	259 $\pm$ 30.6398	12.5086	93 $\pm$ 54.1664	22.1133
Paiyong	151 $\pm$ 34.7044	14.1680	156 $\pm$ 38.3614	15.6609
Perbing-Dovan	176 $\pm$ 27.9857	11.4251	146 $\pm$ 33.8467	13.8178
Total	1303 $\pm$ 68.7808	28.0796	824 $\pm$ 15.3103	6.2503

Source: Department of AHLF&VS, 2012.



**Figure 3.14:** Total Number of Milk and Drought (Dry Milk) Cow of Five GPUs (Borong-Phamthang, Barfung-Zarung, Paiyong, Tinkitam -Rayong & Perbing-Dovan)

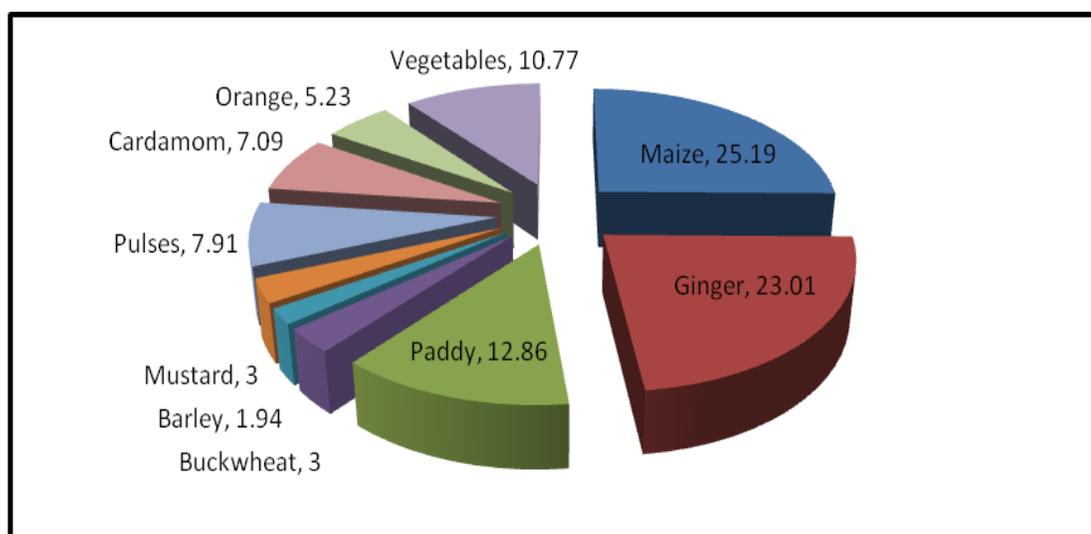
The figure 3.14 shows Milk and Drought (Dry Milk) Cows of Five GPUs viz. Borong-Phamthang, Barfung-Zarung, Paiyong, Tinkitam -Rayong & Perbing-Dovan. The crust represents Drought (Dry Milk) Cows and mantle shows the Milk cows. As per above figure in both crust and mantle, Barfung-Zarung GPU secures the highest percentage in both Milk and Drought (Dry Milk) Cows i.e. 40 and 26 percent respectively. Some of the reasons such as favourable climatic conditions, ample space, consumption of meat and highest total population i.e. 5,835 as per 2011 census among other the GPUs are behind the highest number of Milk and Drought (Dry Milk) Cows in Barfung-Zarung GPU.

## Availability of Crops and Ways of Farming in the Study Area

**Table 3.25: Percentagewise Availability of Crops in Study Areas**

Sl. No	Main Crops	Availability of crops Mean $\pm$ S.D.	Standard Error
1.	Maize	25.19 $\pm$ 16.1121	6.5777
2.	Ginger	23.01 $\pm$ 13.0384	5.3229
3.	Paddy	12.86 $\pm$ 8.9218	3.6423
4.	Buckwheat	3.00 $\pm$ 1.5811	.6455
5.	Barley	1.94 $\pm$ 1.1715	.4782
6.	Mustard	3.00 $\pm$ 1.5811	.6455
7.	Pulses	7.91 $\pm$ 5.1282	2.0936
8.	Cardamom	7.09 $\pm$ 5.6921	2.3237
9.	Orange	5.23 $\pm$ 3.4741	1.4183
10.	Vegetables	10.77 $\pm$ 5.9563	2.4316
	Total	100.00 $\pm$ 25.3456	10.3473

Source: Field Survey, 2015-16.



**Figure 3.15: Percentagewise Availability of Crops in Selected Areas**

The table (3.25) and figure 3.15 present the percentagewise availability of crops and a comparison between maize, ginger, paddy, buckwheat, barley, mustard, pulses, cardamom, orange and vegetables. The table shows the significant mean  $\pm$ S.D. and standard error. The highest available crop is maize that is 25.19 $\pm$ 16.1121 and its corresponding error is calculated

as 6.5777. The second highest available crop is ginger and it has significant mean  $\pm$ S.D. is 23.01 $\pm$ 13.0384 and its corresponding error is calculated as 5.3229. After maize and ginger come paddy, (12.86 $\pm$ 8.9218), vegetables (10.77 $\pm$ 5.9563), pulses (7.91 $\pm$ 5.1282) and cardamom (7.09 $\pm$ 5.6921) respectively. But the lowest crop available is barley having the mean  $\pm$ S.D. of 1.94 $\pm$ 1.1715 and its corresponding error is calculated as .4782. The above table shows that maize is the dominant crop in the study area. The second available crop is ginger, an important spice and grown in almost all parts of South district, but mostly confined in mid and low altitude areas. The climate and soil of South district are particularly favourable for ginger. For many farmers in the district, ginger cultivation is the primary source of income.

**Table 3.26: Traditional Way of Farming**

Sl. No.	Gram Panchayat Units (GPUs)	Traditional (%)	Mean $\pm$ S.D.	Standard Error
1.	Namphing	99.00 $\pm$ 41.6076		16.9862
2.	Legship	100.00 $\pm$ 25.7449		10.5103
3.	Rong-Bul	99.00 $\pm$ 41.6076		16.9862
4.	Tarku	95.00 $\pm$ 21.7715		8.8881
5.	Turung-Mamring	35.00 $\pm$ 13.6088		5.5557
6.	Sadam –Suntaley	66 $\pm$ 36.1220		14.7467
7.	Tinik- Chisopani	94.00 $\pm$ 29.1547		11.9023
8.	Namthang- Maneydara	96.00 $\pm$ 33.2806		13.5867
9.	Assangthang	99.00 $\pm$ 41.6076		16.9862
10.	Wok- Omchu	90.00 $\pm$ 27.5100		11.2309
11.	Borong-Phamthang	90.00 $\pm$ 27.5100		11.2309
12.	Barfung-Zarung	90.00 $\pm$ 27.5100		11.2309
13.	Paiyong	92.00 $\pm$ 29.3121		11.9666
14.	Tinik-Rayong	99.00 $\pm$ 41.6076		16.9862
15.	Perbing-Dovan	35.00 $\pm$ 13.6088		5.5557

Source: VDAP, 2011.

The above table illustrates that most of the GPUs of the district still follow the traditional way of farming which ranges between 90-100 percent. Among 15 GPUs, only two GPUs i.e., (Turung-Mamring and Perbing-Dovan) are adopting less traditional way of farming and the significant mean  $\pm$ S.D. for the two are (35.0 $\pm$ 13.6088), (35.0 $\pm$ 13.6088) and corresponding

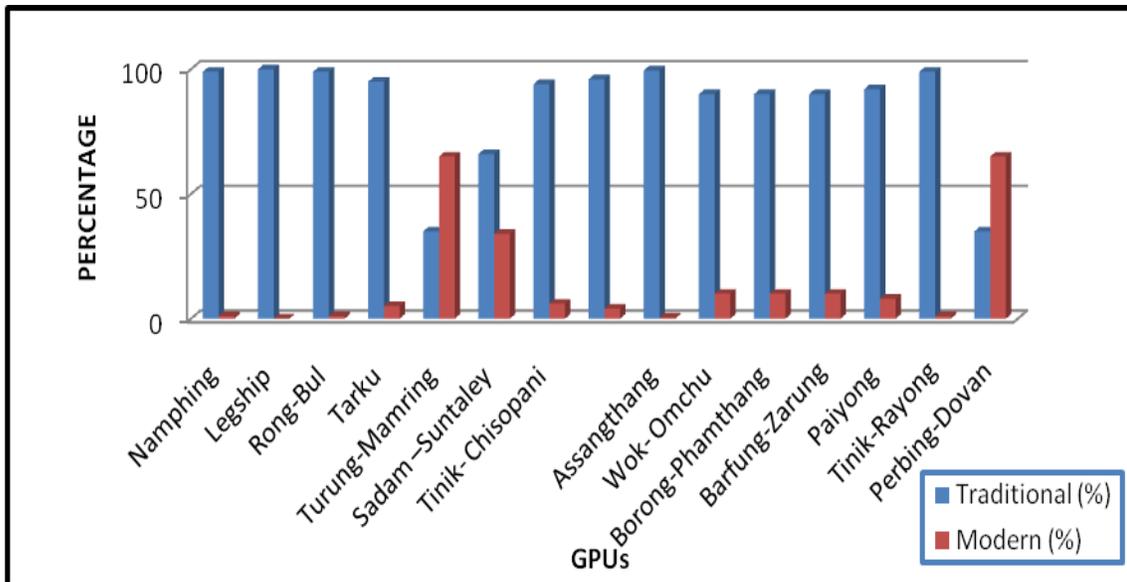
errors are (5.5557) and (5.5557) respectively. Sadam-Suntaley is the GPU where traditional way of farming is less adopted; it has significant mean± S.D. of 66±36.1220 and corresponding error is calculated as 14.7467. Farmers of Sikkim follow the traditional way of farming due to the physiographic features and conservative market, but it is high time to adopt modern ways of farming.

**Table 3.27: Modern Way of Farming**

Sl. No.	Gram Panchayat Units (GPUs)	Modern (%) Mean ±S.D.	Standard Error
1.	Namphing	1.00±.6841	.2792
2.	Legship	0.00±.0000	.0000
3.	Rong-Bul	1.00±.6841	.2792
4.	Tarku	5.00±2.8816	1.1764
5.	Turung-Mamring	65.00±13.2815	5.4221
6.	Sadam -Suntaley	34.00±8.8994	3.6331
7.	Tinik- -Chisopani	6.00±3.7416	1.5275
8.	Namthang- -Maneydara	4.00±2.0976	.8563
9.	Assangthang	0.500±.2607	.1064
10.	Wok- -Omchu	10.00±5.6213	2.2949
11.	Borong-Phamthang	10.00±5.6213	2.2949
12.	Barfung-Zarung	10.00±5.6213	2.2949
13.	Paiyong	8.00±4.6043	1.8797
14.	Tinik-Rayong	1.00±.6841	.2792
15.	Perbing-Dovan	65.00±13.2815	5.4221

Source: VDAP, 2011.

The table 3.27 shows that most GPUs of South Sikkim do not follow the modern way of farming and those GPUs which follow modern way farming ranges between 0-10 percent only. Among 15 GPUs, only three GPUs i.e., (Turung-Mamring, Perbing-Dovan and Sadam-Suntaley) have adopted modern way of farming in larger scale as per the above data.



**Figure 3.16:** Comparison between Traditional and Modern Ways of Farming

The agriculture system in the State of Sikkim was purely traditional with agrarian economy over centuries due to remoteness, inaccessibility, fragility and marginality (Gazetteer, 2013). The above figure reveals that maximum Gram Panchayat Units follow the traditional way of farming. Farmers of some GPUs like Turung-Mamring, Perbing-Dovan and Sadam-Suntaley, practise modern way of farming to a comparatively larger extent. Some GPUs like Namphing, Legship, Rong-Bul, Assangthang, Tinik-Rayong have very small percentage of modern farming practices. The rest of the GPUs are slowly adopting modern ways of farming. The 2015-16 agriculture progress report shows that productivity in both rabi and kharif season is good in two GPUs i.e. Turung-Mamring and Sadam-Suntaley, but due to high altitude some of the rabi and kharif crops are not being grown in Perbing-Dovan GPU, even though this GPU practices modern way of farming. During fieldwork it has been observed that farmers of Turung-Mamring, Perbing-Dovan and Sadam-Suntaley GPUs also follow traditional farming predominantly.

Some of the things which come under modern farming include drip irrigation, mulching, line showing methods, maintenance of distance between crops, use of shade nets and green house etc. These are the major components of horticulture. In the high altitude areas like Perbing, Damthang, and Namchi, low cost green houses are well adopted by farmers. Cultivation of flowers, off-season vegetables and high value crops in the green house are proving to be highly profitable ventures. The farming system of South district may be categorized as mixed farming. Farmers depend on agriculture, horticulture and animal husbandry for their livelihood.

**Table 3.28: Households Main Economic Activities and Sources**

Sl. No.	Activities	Households involved in Economic Activities
1.	Agriculture+Animal Husbandry	1135
2.	Services	235
3.	Others	130
4.	Total	1500

*Source:* Field Survey, 2015-16.

The economic profile of Sikkim is presented under three broad heads, namely, (i) Agriculture and allied activities, (ii) Industries, and (iii) Services. The economic profile of the state shows an overwhelming dependence on agriculture and allied activities (Choudhury, 2006). The households main economic activity in the selected area include agriculture with animal husbandry and others activities which play a vital role in supporting and sustaining their livelihood. As per the above table, the highest number of households, i.e. 1,135 are involved in main economic activities viz. agriculture with animal husbandry. Actually, agriculture with animal husbandry covers over 76 percent in rural areas. The second highest number of households are involved is services and it has a total of 235 households. People in villages are involved in other activities too.

**Table 3.29: Agriculture Activities for Livelihood**

Sl. No.	Agriculture Activities	No. of Households Involved
1.	Mainly Subsistence	1,444
2.	Mainly Commercial	51
3.	No Agricultural Activity	5
	Total	1,500

*Source:* Field Survey, 2015-16.

Sikkim's agriculture thus remained highly subsistence oriented (Economic Survey, 2006-07). The agricultural activities for livelihood in study areas are mainly categorized into three groups - mainly subsistence, mainly commercial and no agricultural activity. The highest livelihood of Sikkim's farmers depends on mainly subsistence which covers around 96 percent and some households are marching towards commercial basis i.e. 3.4 percent in order to earn money for their family. Some of the households i.e. 0.33 percent in villages are not involved in agricultural activity due to less population, water scarcity, old age, but are involved in other forms of activities.

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