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Provisional Certificate

This is to certify that Nidhi Dwivedy

has been awarded the degree of

Doctor of Philosophy (Ph.D.)

On successful completion of defense on the topic

"Role of Female Labour in Farming Sector"

A Study of State of Sikkim"

This certificate is issued in accordance with the provisions of UGC regulations for award of M.Phil./Ph.D. – 2009

18/1/14

Dy. Controller of Examination (Med)
Sikkim Manipal University.

Dated: 18th Jan, 2014
Gangtok, Sikkim-737102

SIKKIM MANIPAL UNIVERSITY ★ 5TH MILE, TADONG, GANGTOK ★

Registration No. 201010019

Sikkim Manipal University

(Established under Govt. of Sikkim, Act 9 of 1995, recognized under 2(f) of the UGC Act, 1956)

Upon the recommendations of the Senate & Faculty of Management
hereby confers the Degree of

Doctor of Philosophy

(Ph.D)

on

Nidhi Dwivedy

in recognition of his/her research work entitled

Role of Female Labour in Farming Sector: A Study of State of Sikkim

for having fulfilled the prescribed requirements in the year 2014.

Given this day, 20th September 2014

Under the seal of the University in the Republic of India

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REG NO: 201010019
Gangtok, Sikkim

VICE-CHANCELLOR

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27th Sep, 2014

TO WHOMSOEVER IT MAY CONCERN

This is to certify that the Degree of Doctor of Philosophy (Ph.D) has been conferred upon Nidhi Dwivedy bearing registration no. 201010019 in recognition of her work **"Role of Female Labour in Farming Sector: A Study of State of Sikkim"** is in accordance with the UGC (Minimum Standards and Procedure for Award of Ph.D Degree) Regulation 2009.

Vice Chancellor
Sikkim Manipal University

SIKKIM MANIPAL UNIVERSITY
5th Mile Tadong, Gangtok

Vice Chancellor
Sikkim Manipal University
5th Mile, Tadong, Gangtok

ROLE OF FEMALE LABOUR IN FARMING SECTOR: A STUDY OF STATE OF SIKKIM

By

Nidhi Dwivedy
(Reg. No. 201010019)

Department of Management Studies
Sikkim Manipal Institute of Technology

In fulfilment of requirement for the award of Degree in

DOCTOR OF PHILOSOPHY

To The

SMU

SIKKIM MANIPAL UNIVERSITY

5th Mile, Tadong, East Sikkim-737102

July , 2013

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July , 2013

CERTIFICATE FROM THE SUPERVISOR

This is to certify that the thesis entitled **"Role of female labour in farming sector: a study of state of Sikkim"** submitted in fulfilment of the requirements for the award of degree in Doctor of philosophy by Mrs Nidhi Dwivedy (Reg. No. 201010019), who got her name registered on August 2010 to Sikkim Manipal Institute Technology of Sikkim Manipal University in the Department of Management Studies is a record of authentic work carried out by her under my supervision and guidance.

To the best of my knowledge and belief, the thesis

(i) Embodies the work of the candidate herself

(ii) Has duly been completed

(iii) Fulfils the requirement of the ordinance relating to the PhD degree of the University

(iv) Is up to the standard both in respect of contents and language for being referred to the examiners.

Place: SMIT, Sikkim

Date : 27.07.2013.

Dr. Niranjan Upadhyay

Prof. Department of Management Studies

List of Publications

International Journals

1. "Participation in Decision Making - A Study of Female Farmers in the Rural Area of Sikkim in North- Eastern India", Nidhi Dwivedy, Niranjan Upadhyay, "Research Journal of Humanities and Social Sciences" 3(3): July-September, 2012, Pp 347-353, ISSN 0975 – 6795.

2. "Gender Wise Status of Farm Land - A Study of Female Farmers in the Rural Area of Sikkim in North- Eastern India", Nidhi Dwivedy, Niranjan Upadhyay, Ajeya Jha, **"***International Journal of Research in Economics & Social Sciences"* Volume 2, Issue 6 (June 2012), ISSN: 2249-4642**.**

3. "Female farmers Views to Absorb Future Generation in Farming – A Study of Rural Area of Sikkim in North- Eastern India", Nidhi Dwivedy, Niranjan Upadhyay, Ajeya Jha, "*Journal of Social and Development Sciences" International Foundation for Research and Development (IFRD)* , Vol. 3, No. 4, pp. 142-151, Apr 2012, (ISSN 2221-1152).

4. "Supplementary Responsibilities of Female Farmers – A Study of Rural Area of Sikkim in North- Eastern India", Nidhi Dwivedy, Niranjan Upadhyay, Ajeya Jha, **"***International Journal of Research in Social Sciences & Humanities" (IJRSSH*) 2012, Vol. No. 1, Issue No. IV, Apr-Jun, ISSN: 2249-4642.

5. "Female farmer's views to leave farming - A study of Rural Area of Sikkim in North - Eastern India", Nidhi Dwivedy, Niranjan Upadhyay, Ajeya Jha, **"***Research Journal of Commerce & Behavioral Science"***,** Volume: 01, Number: 10, August-2012,Pp-28-35, ISSN : 2251-1547**.**

6. "Challenges Faced by Agriculture Sector in Developing Countries with Special Reference to India", Nidhi Dwivedy, "*International Journal of Rural Studies*", Vol. 19, No. 2, October 2011, Pp-11-16, ISSN: 1023-2001**.**

7. "Possession & Gender-Wise Ownership of Domestic Animals by Female Farmers of Sikkim" Nidhi Dwivedy, "*Research Journal of Social Science & Management - RJSSM*", Vol. 02, No. 01, May 2012, Pp-87-93, ISSN : 2251-1571**.**

8. "Access of Farming Females to Productive Resources in Sikkim: A Pillar for Promoting their Empowerment", Nidhi Dwivedy, "*International Journal of Social Science Tomorrow*"**,** Vol. 1, No. 3, May 2012, ISSN: 2277-6168**.**

9. "Female farmer's view to hand over the ownership rights of the farming land to daughter-in-law – A Study of Rural Area of Sikkim in North- Eastern India", Nidhi Dwivedy, **"***Research Journal of Economics & Business Studies"***,** Vol. 1, No 9 (2012): 01 July 2012, ISSN : 2251-1555**.**

10. "Gender Participation in Crop Production and Animal Husbandry & Related Activities in the Rural Area of Sikkim in North- Eastern India", Nidhi Dwivedy, **"***Asian Journal of Management"* 3(3): July-Sept. 2012, Pp 139-148, ISSN- 0976- 495X**.**

11. "Suggestions for Female Farmer's Areas of Gainful Employment - A study of Rural Area of Sikkim in North- Eastern India", Nidhi Dwivedy, **"***Research Journal of Humanities and Social Sciences"* 3(3): July-September, 2012, Pp 304-315, ISSN 0975 – 6795.

12. "Traditional knowledge in plants, agriculture/related activities and its management/practices by female farmers of Sikkim", Nidhi Dwivedy, **"***International Journal of Multidisciplinary Research"*Vol.2 Issue 8, August 2012, Pp. 43-58, ISSN 2231- 5780.

13. "Empowering Farming Females through Sericulture - A Study of Rural Area of Sikkim in North- Eastern India", Nidhi Dwivedy, "Asian Journal of Management (AJM)" 3(4): Oct.-Dec., 2012, Pp. 219-228, ISSN- 0976- 495X.

14. "The Membership Status of Farming Females-A Study of Rural Area of Sikkim in North-Eastern India" Nidhi Dwivedy, *"Research Journal of Economics & Business Studies*" Volume: 02, Number: 01, November -2012, Pp. 150-168, ISSN : 2251-1555.

15. "Education Status of Farming Females - A Study of Rural Area of Sikkim in North-Eastern India" Nidhi Dwivedy, *"International Journal of Social Sciences and Interdisciplinary Research",* Vol.2 (2), February -2013, Pp. 36-48, ISSN: 2277-3630.

16. "The Credit Status of Farming Females-A Study of Rural Area of Sikkim in North-Eastern India" Nidhi Dwivedy, *"Excel International Journal of Multidisciplinary Management Studies* EIJMMS", Vol.3 (1), January 2013, Pp. 97-112, ISSN : 2249-8834**.**

ABSTRACT

The present work has studied the **"Role of female labour in farming sector: a study of state of Sikkim"**. In the state, with the increasing population, per capita land availability for farming is consistently declining. Additionally, location of the state is such that people working in farming sector have to face a lot of hardship. It has been recently that there is spurt in secondary as well as tertiary sector activities in the state. Therefore, people from farming sector are moving towards the other sectors to get rid of the hardship of the farming sector and also to have more gainful employment. Here, it makes important that farming sector should be studied to gain food security. Also, the primary focus of National Policy for Farmers 2007 is on 'farmer' define holistically and not merely on agriculture. It becomes therefore, essential, that along with agriculture, allied sectors should be studied and developed to get supplementary sources of income. Keeping this in mind, allied sectors of agriculture have also been studied. Furthermore, the contribution of women in this noble sector is enormous but is still invisible. Bearing it in mind, females in this sector in the state of Sikkim in North- Eastern India have been studied in the present work. Data has been collected from 230 female farmers through interviews using a pre-designed schedule from 24 circles from the rural area of all the four districts of Sikkim State in North-Eastern India, which includes broadly gender participation/decision making in crop production and animal husbandry & related activities, possession & gender-wise ownership of domestic animals/land and the extent of accessibility to seven production resources of sample female farmers. The effect of different socio-economic factors such as age, education and land holding on the participation of women in different activities has also been analysed. Percentages are used to come to a logical conclusion for that. Mean scores are used to descriptively analyse the data to come to conclusion for the level of decision making & accessibility. Descriptive as well as One-Sample T-test of inferential statistics with the help of SPSS has been used to interpret the data. The findings of the data have shown a strong impact of education level on laborious farm & animal related activities. Comparatively more percentage of illiterate farm women has been found participating in these types of activities. The percentage data of big farmwomen has discovered joint participation in all the activities except for the male dominant activities. Data for age & participation reveals that 25-45% of sample female farmer respondents for all the categories of age have documented independent participation in sowing, weeding, harvesting, milking and milk disposal. Data also implies that the women have better accessibility for livestock rearing and to some of the production inputs. However, a gender disparity in livestock/land ownership has been observed in

the data. Results pertaining to these findings have been discussed here in this thesis. The study concludes with some useful suggestions so that through them and also with the development of suggested allied sectors, the socio-economic condition of the stakeholders can be improved and accessibility can be enhanced thus making them understand the dynamics of the existing structures and helping the farming sector make sustainable by efficiently employing the female farmers. The combination of these types of adaptive and preventive measures will also lend a hand in attracting the younger generation towards farming by building empathy to the growing need of making farming sustainable.

KEYWORDS: Gender participation, Decision making, Access, Production Resources, Produc-tion Inputs, Farming Females, Crop Production, Animal Husbandry, Gender-Wise Farm Land Status, Cultivators, Agriculture Labourers, Traditional Knowledge, Integrated Farming, Sikkim.

Acknowledgement

This dissertation would not have been possible without the guidance and the help of several individuals who in one way or the other contributed and extended their valuable assistance in the preparation and completion of this study.

First and foremost, I would like to thank the Almighty for everything I have achieved.

My heartfelt gratitude goes out to my supervisor, Prof. (Dr.) Niranjan Upadhyay Department of Management Studies, who is a well-known professor in this field and is responsible for the successful completion of my dissertation. Without his constant encouragement, meticulous guidance and support, this thesis would not have seen the light of the day.

It is indeed a pleasure to express my sincere gratitude and indebtedness to Professor Ajeya Jha, Head, Department of Management Studies, SMIT for my doctoral thesis. His thorough supervision, inspiring discussions, unsparing and ever available help, from the preliminary to the concluding level, helped me greatly in the understanding and writing of the dissertation during the entire course of my work. Right from finalizing the topic of this research work and till the completion of this work, he was continually there to extend his guidance and support.

I owe my deepest gratitude to Brig. (Dr.) S. N. Mishra, Vice Chancellor, Sikkim Manipal University for his kind support in the successful completion of my dissertation work.

I am thankful to Major General (Dr.) S. S. Dasaka, SM, VSM (Retd.), Director, SMIT for his help and support.

I would also like to express my sincere thanks to Prof. (Dr.) Mrinal Kanti Ghose, Dean (R&D) and Prof. B. S. Dandapat, Dean (Academics), SMIT, for their moral support and steadfast encouragement to complete this dissertation work.

I would like to thank Prof. (Dr.) Vandana Suhag, Registrar, Academics and the members of Research Protocol Evaluation Committee (RPEC) for giving me constant and unconditional support in completing my work in Sikkim Manipal University.

I would also like to acknowledge the assistance that I received from Krishi Bhavan, Tadong, in data collection from some interior areas of the State.

Nobody has been more important to me in the pursuit of my dissertation than the members of my family. I wish to thank my loving and supportive husband, Lt. Col. Sumeet Dwivedy, for providing me unending inspiration and whole hearted support in the successful completion of my dissertation. I would also like to thank my parents, Late Mr R. L. Samnohtra and Mrs Kusum Samnohtra and all my dear ones whose love and guidance are always with me in whatever I pursue. I am extremely thankful to my very dear elder son Koustubh Dwivedy in assisting me in computer application whenever I needed the same and also to the younger one Keshav Dwivedy for cooperating me during my thesis writing time.

Lastly, I offer my regards to all those who supported me in any respect during the completion of my thesis.

Place: SMIT, Sikkim
Date: 27.07.2013 .

Nidhi Dwivedy
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CHAPTER I

INTRODUCTION

Chapter I
Introduction

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)

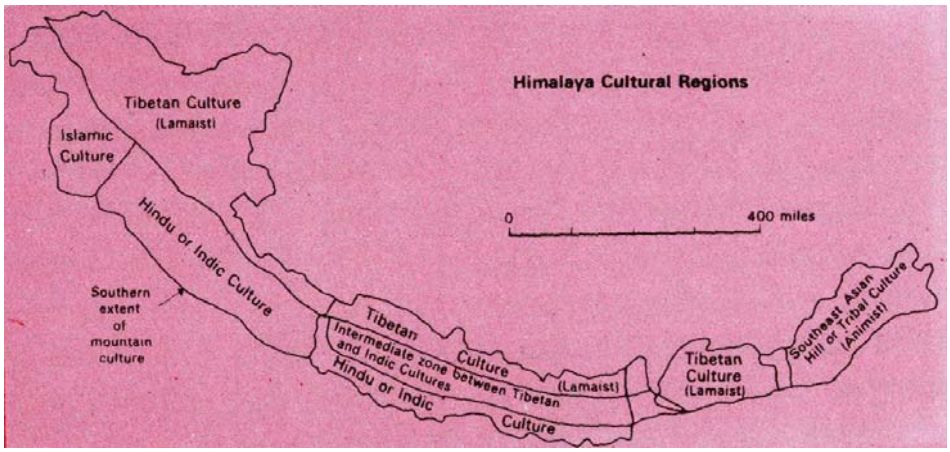
Glaciers play an important role in maintaining ecosystem stability as they act as buffers and regulate the run of water supply from high mountains to the plains during both dry and wet spells. The Himalayan glaciers account for about 70% of the world's non-polar glaciers and affect the lives of millions 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 km^2 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 km^2 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).



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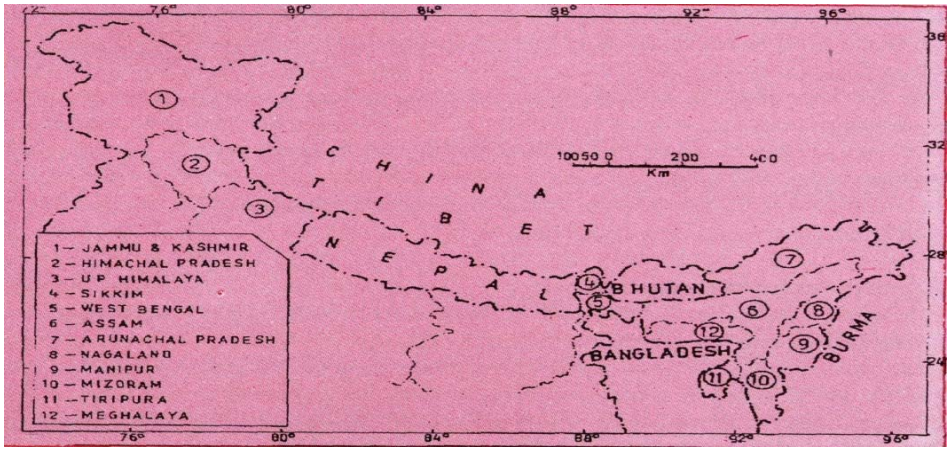

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Figures 1.1 & 1.2- Himalayan Region

In the1960s, the hill areas of India were divided in 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, Uttrakhand 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 attrib-utes 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 run-ning 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 360^0 N while the eastern ranges of Arunachal Pradesh are located around 270^0 N. Thus, western region including the mountainous areas of Jammu and Kashmir, Himachal Pradesh and Uttrakhand have stronger temperate influences compared to eastern sector including Sikkim and Aru-nachal which for being closed to the equator exhibit more tropical influences. Because of prox-imity of the Eastern Himalaya to sea (Bay of Bengal) and the unique directions of monsoon orig-inating 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 configura-tions 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. Rain-fall 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 geo-graphical 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 30^0 C during July and August and the minimum between 2 and 10^0C 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 km^2 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, 21,661are 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 281293 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 66.81to 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 67.31which 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, san-

flower 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, garl-ic, 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 tom-atoes. 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.

*"Challenges Faced by Agriculture Sector in Developing Countries with Special Reference to India", Nidhi Dwivedy, "International Journal of Rural Studies", Vol.19, No.2, October 2011, Pp-11-16, ISSN: 1023-2001.

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

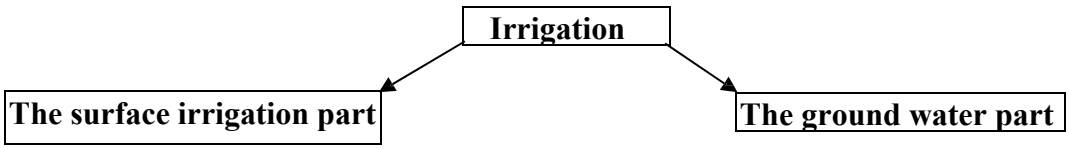
lliteracy is the root cause of poor socio-economic condition of the farmers and should be tackled at the war footing level. Though the government is taking initiative by adopting the policies like universalization of education, but despite large expenditures in these types of schemes and rural development, 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 (^ Satellites , ^ Columbia , ^ Keepers Wikipedia). 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, 2011measuring 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 now- a- days. 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 1below.

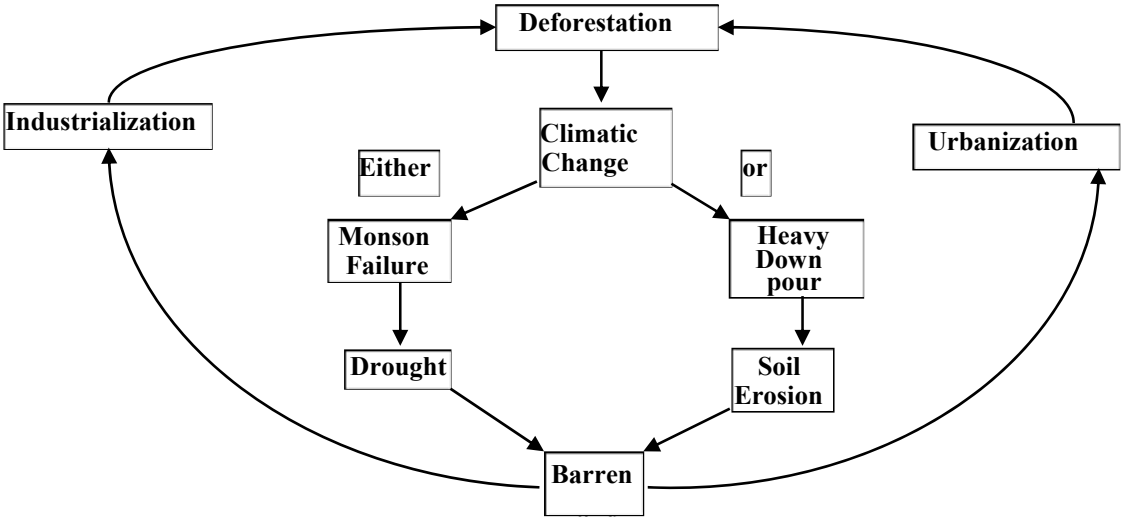


Fig 1.4- Flow Diagram of Vicious circle of climatic change

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 Rodríguez 2002; Mette 1998; Bui Xuan An et al 1997) when compare to other types of bio-digester (Mikkle et al 1996; Timothy and Gohl 1996). It is an agricultural system that provides 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).

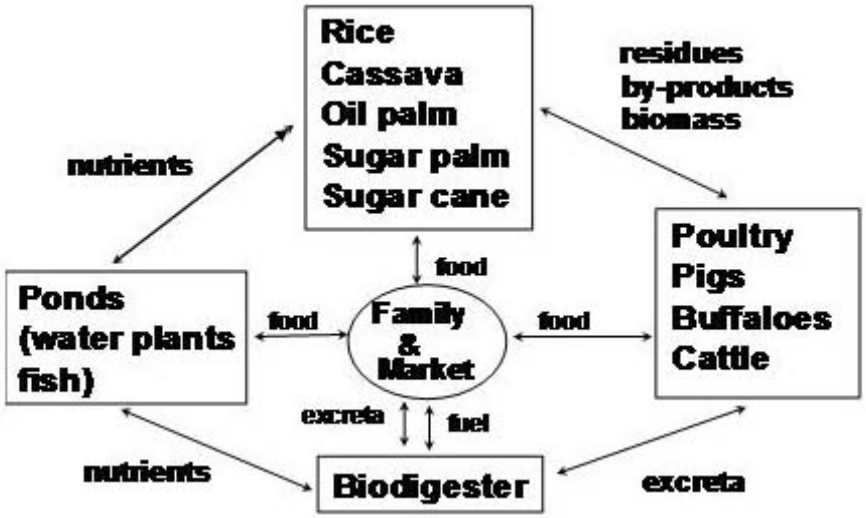


Fig 1.5-The flow diagram of an integrated farming system (Source: Preston 2000)

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 Rodríguez 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 m^3 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 acuatica), 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 Yojana (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 1.1Livestock Population

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

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 up gradation 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.

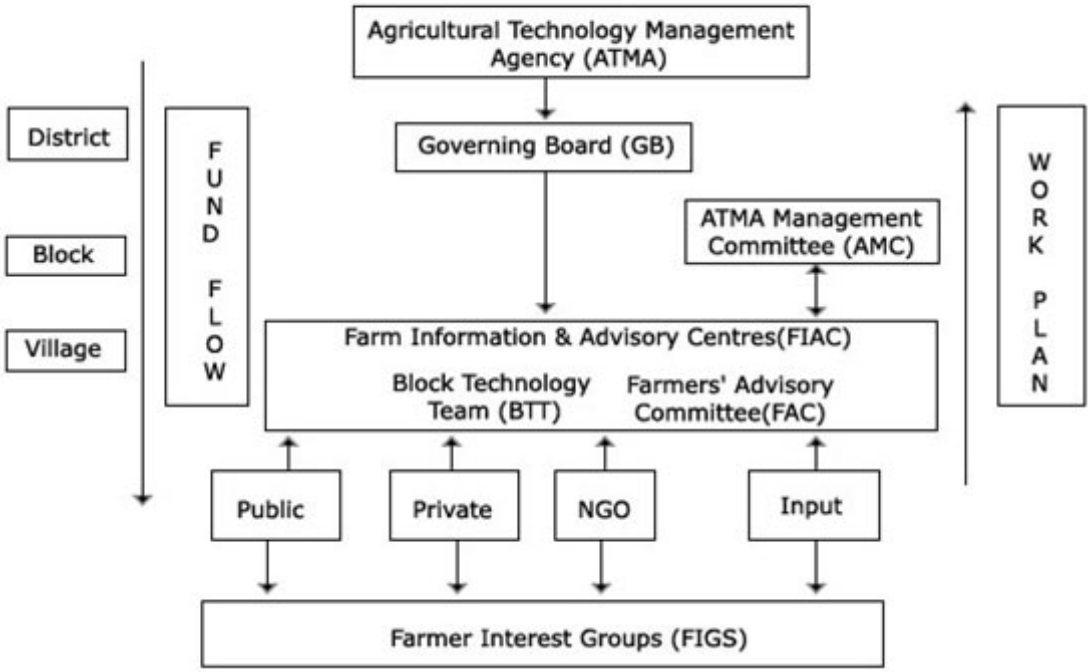
The department is also implementing two projects viz. Border Area Development Project and Pilot Project on cold water fisheries. Both the projects were connected with the development of high altitude cold water fish species i.e. Trout.

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.

Organizational Structure of Agricultural Technology Management Agency (ATMA)



Source: http://sametiwb.org/urls/pdf/operationalisation_of_ATMA.pdf Pp-11

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

100(http://beacononline.wordpress.com/2009/08/27/sikkim-sikkim-ranks-10th-in-nrega-wage-rate/).

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 up gradation 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, share croppers 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 prod/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, appro-priate 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 4,831are 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 2,051out 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 24,917are 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 state 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?

CHAPTER II

LITERATURE SURVEY

Chapter II
Literature Survey

The literature survey has been subdivided into following five categories:

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. Being the women intensive areas, the chapter also contains at length the information regarding some of the allied sectors (sericulture and floriculture) and self-help group. The literature review covers the developing countries of Asia (India, Bangladesh and Nepal countries) and the Africa (Ghana and Mozambique countries mainly) continents. Finally, the chapter concludes the literature review followed by the research gap.

2.1 Gender Wise Participation

2.1.1 Asia

2.1.1.1 India

Contrary to the common perception about women in India, a large percentage of them work (Women of India, 2006, Wikipedia). The National data collection agencies accept the fact that there is a serious under-estimation of women's contribution as workers. However, there are far fewer women in the paid workforce than there are men (Kalyani and Kumar, 2001, Wikipedia). In urban India women have impressive number in the workforce and they are at par with their male counter parts in terms of wages, position at the work place (Singh and Hoge, 2010). In rural India, agriculture and allied industrial sectors employ as much as 89.5% of the total female labour (Asia's women, 2006, Wikipedia). In overall farm production, women's average contribution is estimated at 55% to 66% of the total labour. According to a 1991 World Bank report, women accounted for 94% of total employment in dairy production in India. Women constitute 51% of the total employed in forest-based small-scale enterprises (Asia's women, 2006, Wikipedia). Agriculture (including allied activities) accounted for 14.6 per cent of the Gross Domestic Product in 2009-10 but its role remains critical as it accounts for about 58.2 per cent of the employment in the country (Economic Survey 2010-11). Apart from being the provider of food and fodder, its importance also stems from the raw materials that it provides to the industry. The

prosperity of the rural economy is also closely linked to agriculture and allied activities.

According to population census of India 2001, out of total rural population of 741.7 million, there are about 402.5 million rural workers of which 127.6 million are cultivators, 107.5 million are agricultural labourers and 167.4 million are other farm workers, out of which 6 million are engaged in livestock, forestry and plantations. In other words, pure agricultural workers constitute nearly 58.4 per cent of the total rural workers, of which 31.7 percent are owner cultivators and 26.7 percent are mainly agricultural wage earners (Agriculture Statistics at a Glance, sourced from Registrar General of India, New Delhi 2001). Of the total agricultural labourers, 38.0 per cent were female and 61.9 percent male workers. Also among livestock, forestry and plantation workers, 78.3 percent were male workers and 21.7 percent were female workers. About 99.2 percent of agricultural workers were reported to be unorganized and unprotected. The latest available agricultural census data (Government of India, Agricultural Census Division, and Ministry of Agriculture 2002) also reveal that about 78 percent of operational holdings in the country are marginal and small, having less than 2 hectares. About 13 percent holdings have 2 to 4 hectares and 7.1 per cent have 4 to 10 hectares of land (Haque 2003).

Table-2.1
Rural Population and Agricultural Workers (in millions)

Year	Total Rural Population	Cultivators	Agricultural Labourers	Other Farm Workers	Rural Worker
2001	741.7	127.6	107.5	167.4	402.5
	(72.22)	(31.7)	(26.7)	(41.6)	(100.0)

Source: Registrar General of India, New Delhi, 2001

Census figures show similar trend as regards increase in women's share of agricultural employment in the post-reform period. Between 1991 and 2001, the agricultural sector saw a decline in rural main workers from 183 million to 171 million, a reduction of 11.7 million male and a mere 0.5 million female workers-taking women's share in the main agricultural workforce from 27 per cent to 29 per cent (Table 2.2). This trend would have been extended into the new millennium. We would know this for sure once the data for 2011 becomes public.

Table 2.2: Main workers in agriculture, 1991 & 2001
(In millions)

Year	Persons	Male	Female
Cultivators			
1991	110.7	88.5	22.2
2001	103.6	78.3	25.4
Agricultural labourers			
1991	74.6	46.2	28.4

2001	63.5	41.1	22.4
Plantation, livestock, forestry, fishing, and allied activities			
1991	6	4.7	1.3
2001	10.3	6.7	3.6
All agricultural workers			
1991	191.3	139.4	52
2001	177.4	126	51.4

Source: Saxena Naresh C., Women, Land and Agriculture in Rural India, Pp-11http://www.unwomensouthasia.org

Male migration is affecting traditional social norms too. As men migrate in search of better-paid work, women in rural India are taking over agricultural work in the villages. They face meagre wages, long hours, hazardous work and sexual harassment (WTO, 2010). The existence of patriarchy at all levels also intertwines with the work-related problems of women.

2.1.1.1.1 Agricultural Land Use in the Himalaya Region

Emergence of land use changes is a continued evolutionary process set in from the beginning of advancement of human civilization. In a historical perspective, hunting and gathering from the wild was the starting step for securing survival. This gave rise to shifting agriculture followed by settled agriculture. Shifting agriculture continues to be the major agricultural system on the forest slopes in north-eastern tribal belts, while its occurrence in the central and western Himalaya is rare at present. Settled agriculture on terraced slopes in mid elevations (up to 1800-2000m above MSL) or unterraced gentle slopes in high elevations (above 1800-2000 m MSL) is the major agricultural land use in the central and western Himalaya. Diversity of domesticated crops in the region is very high when compared with low land agricultural systems. Crop diversity is managed by mixed cropping and/ or with crop rotation. Valleys all through the Himalaya are much more intensively cropped than the slopes.

Technological innovations such as fertilizers, pesticides and high yield crop Varieties which transformed low land agricultural areas, could not change the mountain Farming system to the same extent, on account of mountain specific constraints. Dependence on forests for maintaining soil fertility in crop lands or expansion of agricultural land itself thus was not substituted by the new technologies. As forests and livestock provide material and energy inputs in traditional mountain farming systems, expansion of traditional agriculture runs the risk of forest degradation. So, in order to meet the present and future challenges meeting sustainability criteria, the traditional systems need to be adapted in ways which enhance crop yields but not at the environmental and social costs (Ramakrishnan et al., 1992).

2.1.1.1.2 Women's Significant Contribution to Agricultural Production in the Himalayan Region

(Indian Himalaya)The urban sprawl is exceedingly high in the state of Mizoram where about 46% of population is urban. Himachal Pradesh and Sikkim are the least urbanized states. Males outnumber females in all areas except for rural areas of Uttar Pradesh Hills and Himachal Pradesh. States in the north-eastern region have achieved a higher level of literacy as compared to those in the central and western Himalaya. Agriculture is the focal activity of hill dweller all through the region. Excepting the state of Tripura, the proportion of women cultivators is more than that of men. In Tripura, more women are reported to be engaged as agriculture labourers and in other occupations.

(Shiva, 1991) In overall farm production, women's average contribution is estimated at 55% to 66% of the total labour with percentages, much higher in certain regions. In the Indian Himalayas a pair of bullocks works 1064 hours, a man 1212 hours and a woman 3485 hours in a year on one hectare farm, a figure that illustrates women's significant contribution to agricultural production. (Sujaya, C.P. 2001) is also of the same opinion.

2.1.1.1.3 Sikkim Agriculture Sector Before and After the Merger with India In 1975

(Lama, 2001, pp.46) 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. In the past low productivity, negligible marketable surplus and other institutional inadequacies, which plagued the economy, led to agricultural backwardness. 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 the last two decades. Introduction of new crops (including wheat, rajmah, rape and mustard), extension of more areas under high-yielding and improved varieties of seeds, increased use of fertilizers and pesticides and expansion of area under double or multiple cropping have been successful in converting agriculture from subsistence farming into an economically viable venture.

- **Land Reform in Sikkim**

(Lama, 2001, pp.34) Among the numerous land reform measures adopted by the State Government; the most notable are the enactments of Sikkim Agricultural Land Ceiling and Land Reforms Act 1977, Cultivators Protection Act 1985, and the Land Bank Scheme of 1995.The Land Bank Scheme is the latest welfare scheme introduced by the Government of Sikkim to consolidate land reform measures in the State. Under this scheme the landowners donate a certain part of their land, entirely voluntarily, to the government. This land is then distributed to the landless (Sukumbasis), identified by the department concerned on the basis of a detailed survey. A landless household is now entitled to half an acre of land, with the settlement deed carrying the names of both husband and wife. The upper limit of the land cost has been fixed at Rs. 25,000. The success of this scheme reinforces the fact that the programme of land reforms implemented so far has not led to any significant redistribution of land in Sikkim. This has had adverse effects on both social cohesiveness and agricultural productivity.

2.1.1.1.4 The Status of Women in Sikkim

- (Lama, 2001, pp.33-34) The State seems to have recorded several achievements, reflected also in the level of the HDI and GDI, in the social sectors. In Sikkim, women constitute nearly 47 per cent of the total population. Their social position in the State seems to be better than that in the rest of the country. Women also play a major role in trading activities, which allows them to participate in decision-making far more than in most other States in India. In contrast to the unfavourable sex ratio in the population as a whole, the number of women in government employment is greater than that of men. The role of women's empowerment for a just society was highlighted in the Beijing Conference (1995). The status of women in Sikkim—their economic contribution, socio-cultural autonomy, authority, involvement in the decision-making process within the household—varies across communities. The practice of polyandry among tribal communities could be one of the variables explaining the higher value attached to women. Similarly, local religious practice also plays a role in influencing the status of women (Dhamala, 1985).

- **Women Participation in Different Farm Operations in Sikkim**

Sikkim has a tradition of collective decision making by communities through the institution of the 'Dzumsa'. However traditional institutions do not witness a significant role for women. The empowerment of women however, has to be at the core of state strategies and action. Still a woman

is considered to be an asset in the household and commands a bride price, but she has no rights of inheritance. It is only when a daughter remains unmarried that parents customarily transferring some property to her. Participation of women in economic activities is high in Sikkim. The women, especially in the rural areas, are involved in agricultural operations from sowing to harvesting. It has been their responsibility traditionally, to collect fuel wood and fodder for the family, and fetch water from dharas (springs) in vessels which they carry in a doko (basket) on their backs. They are responsible for all domestic tasks including the caring for domestic animals. Women also work as paid agricultural labourers, construction workers, and take part in economic activities like selling of vegetables in the market place. They contribute to the income of the family also through their traditional skills in spinning and weaving. Given the geographical conditions of rugged steep terrain, heavy rainfall etc., the women have to directly bear the brunt of all climatic hazards. The heavy load of work in the daily lives of Sikkimese women has serious implications for their health. This is more so because the families are large in Sikkim—30 per cent of rural families and 22 per cent of urban families have more than 6 members. Heavy workload coupled with early marriages, between 16–20 years; take their toll on women's health. This is reflected in the declining sex ratio in the age group of 29–60 in Sikkim.

(Rahman et. al. 2009) In Sikkim, though men and women do almost all works from land preparation to seed storage. But at the same time, their role depend more on the family situation than on gender or ethnicity. In a family with more male members, male works in the fields, whereas in families with fewer men, women work equally with men. Purchasing of seed is generally done by men. Men do the ploughing while men and women do the hoeing and digging. Sowing, planting, manure application, harvesting is done by both men and women. Mulching is done mostly by men, although women help as when required. Weeding is done by women. In Sikkim, mother rhizome extraction is done by women but its sale is looked after by men. In Meghalaya, Mizoram and Nagaland, women play a significant role in retail selling of Ginger.

(Sadangi et al., 1996)The study found that in rural areas the women belonging to higher caste families are socio-economically better and possess some landed properties. Due to their higher social status, they do not like to engage themselves in difficult field work or in the fields of lower caste people.

- **Women in Animal Husbandry**

(Bhasin, 1995)India is dominated by the rural population and due to backwardness, bulk of them are engaged in primary activities. Among the occupations, majority of the people are engaged in primary activities in India. Sikkim being a mountainous state, among the primary occupations, livestock rearing plays an important role in maintaining the livelihood pattern of the hill dwellers. So, animal husbandry sector is the main source of supplementary income for the rural households of Sikkim. Livestock production had always been an integral part of the rural livelihood in Sikkim. The livestock wealth of Sikkim still constitutes a natural resource base with immense livelihood implication.

According to (Verma, 1992) Animal Husbandry is predominantly a male affair in case of high, economic status as majority of them employ, permanent male labour to look after the animals, whereas it is predominantly a female affair in case of farmers of medium and low socio-economic status. On an average, a woman devotes 3.5 hours per day for animal husbandry activities against only 1.6 hours per day devoted by men in this category.

2.1.1.1.5 Women and Ownership of the Land

- **Women Work the Land but do not Inherit it**

(Sridhar Lalitha, 2003) The new Human Development in South Asia 2002 report which was launched in Chennai, India, on 16 May 2003, under the aegis of the United Nations Development Programme (UNDP) and the M.S.Swaminathan Research Foundation (MSSRF) says that women are mostly denied of the right to own land. In South Asia, land is not only an economic factor of production; its ownership also reflects the economic power structures within society that guarantee access to important agricultural inputs. Both laws and customs prevent women from owning land. Under specific religious laws women are entitled to smaller shares than men. Islamic law in South Asia (and some Christian sects) provides for a half-share for daughters. Even when women inherit land, certain additional conditionalities may be attached. In Nepal, for instance, only unmarried daughters above the age of 35 can inherit land. Also, customarily, women do not want to risk incurring hostility from male family members that may result in violent acts committed against them. The report cites land-motivated 'witch killings' in Bihar, India, as one example. It has also reported gender discrimination in rural remuneration and says that the women in agriculture sector are overburdened as more men are migrating to urban areas or abroad.

Therefore, for more food security it emphasizes the importance of agriculture, the mainstay of the South Asian economies for the development purposes. It equally accentuates that due acknowledgment should be given to its major contributor i.e. women.

- **Women Who Own Property are Less Likely to Face Marital Violence**

(Info Change News & Features, August 2003) A joint study by Pradeep Panda of the Centre for Development Studies Trivandrum, and Bina Agarwal of the Institute of Economic Growth, Delhi, has analysed this issue in some detail, though not much literature is seen on the issue. The survey covered 502 married rural and urban women within the age-group 15-49, in Kerala's Trivandrum district. This was a good location for the survey as Kerala has several traditionally matrilineal communities that recognize women's property claims and therefore has a sufficient sample of women who own property. In this study four categories came up for analysis: physical and psychological abuse, long-term violence (violence that had occurred at least once during the woman's married life) and current violence (violence that had occurred within the past year). It also looked at various forms of physical violence including slapping, hitting, kicking, beating, and psychological abuse -- insults, belittlement, threats, etc. The surveyed households covered every income category. The respondents' average age was 33 years, the average length of marriage was 12 years, and, in 78% of the cases, the marriages were arranged (two-thirds were with the woman's consent). About 43 households belonged to traditionally matrilineal castes. Overall, 34% of the sampled women owned either land or a house or both. Some 6% owned only land, 14% had only a house and 15% had titles to both. While the majority of propertied women belonged to traditionally matrilineal castes, 35% of the matrilineal caste women did not own property.

Despite Kerala's favourable human development indicators, the survey revealed a high incidence of both physical and psychological violence towards women. The study's findings did bear out the fact that ownership of immovable property by women is associated with a dramatically lower incidence of both physical and psychological harassment, as well as long-term and current violence. For example, as many as 49% of the women who owned neither land nor house suffered long-term physical violence, compared with 18% and 10% respectively of those who owned either land or a house, and 7% of those who owned both.

The effect of property ownership on psychological violence is even more dramatic. While 84% of property-less women suffered abuse, the figure was a much lower (16%) for women who owned both land and a house. The ownership of property also offers women the option of leaving

an abusive environment -- of the 179 women experiencing long-term physical violence, 43 left home. The percentage of women leaving home was much higher among the propertied (71%) than among those without property (19%). Moreover, of the women who left home, although 24 returned, 88% of the returning women were property-less. Few propertied women returned. In contrast to a woman's property ownership status, there seems to be no clear relationship between risk of violence and employment status, except if the woman has a regular job. This reduces the risk only of long-term physical violence. Employment does not offer the same protection to women as does property ownership. Many women are unpaid workers on family farms or have insufficient earnings to rent a place for themselves. Rented accommodation is not readily available to women and there are social barriers to be considered. Indian landlords are often suspicious of single women tenants. Land access enhances a woman's livelihood options and gives her a sense of empowerment.

- **Women and Property Rights in Sikkim**

(Chandrakala Diyali, pp-72) The Indian Hindu succession Act of 1956, established the currently prevalent Hindu Personal laws, inheritance or marriage; which govern other religious communities like Sikh, Jain and Buddhists in India. It is not applicable to the Bhutia-Lepchas people in Sikkim, though they are Buddhists by religion barring a handful of Christian Lepchas. The Hindu laws, except Hindu marriage act of 1955 have not been extended or enforced in Sikkim even after its merger into the Indian union in 1975. So the Bhutia-Lepchas people in Sikkim are still governed and guided by their customary laws; in respect of succession, inheritance and also of marriage. As the Bhutia Lepchas people of Sikkim follow the patriarchal family system, all the property either movable or immovable; belong to the father or head of the family. After the death of the father the eldest of his sons becomes the head of the family and takes charge of the property. As far as the property matters are concerned, the women except for their movable personal belongings, ornaments and utensils etc. have no locus-stand and legal rights in the family property. But according to unwritten norms of the society there are ample provisions for safeguarding the interest of the female members of the family. This is the social principal that has to be followed by every family's head. Though the Bhutia-Lepchas women has no legal rights in the property ,usually the daughters, sisters, aunts and near cousins are given gifts of immovable assets in the form of livestock, utensils, ornaments and other useful materials etc. The rich and well to do family sometimes may give a piece of cultivated land or a house to the daughters or sisters. But that they give out of compassion not as per law. The daughters or sisters can take those gifts along

with them when they marry and go away from their parental house. The laws which, Bhutias and Lepchas are governed by, does not allow the daughter the right to inherit the properties of their father even when there are no sons. If a Bhutia-Lepchas man dies leaving behind his widow and daughter only, with no sons, the widow shall inherit the property only for her life and on her death, the property shall revert back to male agnates of her late husband but not the daughter. Women are not entitled to sell, transfer or mortgage that property of her late husband. The Bhutia-Lepchas women may, however, acquire property by way of gift or under a will from her father or other relations. But under the Married Women Property Regulations Act, 1962, if Bhutia-Lepchas women marry a non Bhutia-Lepchas person, she will forfeit her rights to such properties.

2.1.1.1.6 Women and NREGS

- **Reasons to justify Women's Participation under NREGS**

There are various explanations for the varying participation of women workers under the MGNREGS. Factors that have encouraged women worker's participation include the nature of the job not requiring special knowledge and skill (Krishnaraj et. al. 2004) in the context of MEGS; outmigration of male family members (Bhatty, 2006; Mehrotra, 2008; Talukdar, 2008); provisions in the act- like work within a radius of five kilometres from the house, enables the employment opportunity being available at the doorstep (Bhatty, 2006; Khera and Nayak, 2009); a tradition of rural women working in other's fields (Narayanan, 2008); the provision in (Schedule II (34)) of equal, non-discriminatory wages (Sudarshan, 2008; Khera and Nayak, 2009); and innovative experiments in implementation like the female mate system in Rajasthan (Khera, 2008), synergisation of MGNREGS with Kudumbashree in Kerala (Vijayakumar and Thomas, 2008) and in Bihar, gender differential tasks for uniform (minimum) wages (Pankaj, 2008).

- **Mahatma Gandhi NREGA Ensuring Rural Water Security in Sikkim: A Success Story (IPR, News Service 2010, website)**

The case study which was conducted in Namthang Block located in the south-central part of Sikkim and lies in the watershed of the Tista River showed how the construction of roof water harvesting tanks (under MG-NREGA) helped the people of the area in resolving the fundamental water scarcity problem.

Farming is the main stay of the rural population of this drought prone area and in spite of availability of land, labour and farming skills; water was proving to be the biggest constraint in successfully raising agriculture crops thereby stagnating the rural incomes. There is water shortage especially from Oct to March because there is hardly any rainfall during these months and nearly 76% of the households suffer from water scarcity during winter. So, they decided to create water storage tanks which could be filled up from the perennial spring water. Under MG- NREGA guidelines, contractors, middlemen and nominees are banned and the villagers mostly women took upon themselves to directly implement these works jointly with the Block and Village level officers. Most of the households had completed 100 days during the financial year 2009-10.

The people planned to take up 20 such tanks in each ward, with a total target of 140 such tanks in the 7 wards of Chuba Phong GPU which was amongst the driest. This was the first time that such spring water storage tanks of about 10,000 liter capacity each and costing about rupees 97,000 each have been taken up under MG-NREGA.

Namthang inhabitants used to face a lot of problems due to lack of water. They used to carry water a long way, which was very tiresome and difficult. Scarcity of it was resulting the farms to get dried up and ruining the cultivation. They suffered great domestic problems also because of insufficient finances. For any kind of cultivation like chilly, tomatoes, spinach, water plays an important role. So, construction of roof water harvesting tanks helped them in resolving this fundamental problem. This scheme proved to be very beneficial and act as an asset for them.

Chuba Phong village beneficiary are making use of every single drop of water, either through rain or other sources. They are getting the water from roof channel and pour it in the harvesting tank in order to fill it up, and make use of it in the farming at the time of scarcity to convert dry and barren land into arable one. With this type of water conservation NREGA scheme they are able to earn income even during non-monsoon months.

2.1.1.1.7 Secondary Sector in Sikkim

• (Lama, 2001, pp. 17-18) The structural change, generally reflected in the shift from the primary to the secondary sector, is virtually absent in Sikkim. Industries, in fact, are still a low priority item in Sikkim's plan process. In Sikkim, the structural shift has been slower than in the country as a whole. In 1995–96, India's shares were 30.58 per cent (primary), 25.47 per cent

(secondary) and 43.94 per cent (tertiary), while the respective shares for Sikkim were 52 per cent, 13 per cent and 34 per cent.

- (Singh, E. Bijoykumar, 2009) The paper has analysed the nature of growth, both at the aggregate level and sectorial level, among the eight states in the North Eastern Region (NER) using NSDP data. It has studied that during the entire period the share of primary sector has declined substantially and that of tertiary has increased. Table 2.3 shows that by 2006-7 except for Manipur tertiary sector has become the predominant sector in all the states. In Manipur due to a spurt in construction activities secondary sector surpassed the tertiary sector. Besides Manipur Arunachal Pradesh is another state with a high share of secondary sector. Except for Arunachal Pradesh and Manipur (in which due to a spurt in construction activities, the contribution of secondary sector surpassed the tertiary sector and dominates in the annual growth rate), the main source of growth in per capita income is tertiary sector. In none of the states in the North-Eastern region is the primary sector the main source of growth though it contributes a significant proportion in Arunachal Pradesh, Assam and Sikkim. It shows the growing role of the non-commodity producing sector in the growth of the economy. The falling share of primary sector in income generation along with the high share in employment indicates falling productivity in this sector. The benefits of growth accrue largely to the small portion of workers in the tertiary sector. This will accentuate the extent of inequality.

The study also shows that in terms of the more encompassing measure of development i.e. human development index, three out of the five states whose HDI have been estimated had HDI higher than that of all India. Thus the income gap has been made up by better performance in education and health. Low rural unemployment rate need not necessarily mean abundant work opportunities in rural areas. It may be attributed to the inability of the rural labour force to remain unemployed for long because of their poverty. This indicates the strength of social capital which needs to be nurtured to attain higher level, by not insisting on mainstreaming.

Only Sikkim registered higher growth rate after the break in tertiary sector which has become more dominant than the primary sector in most of the states. This result further substantiates the irrelevancy of economic policy.

Table-2.3

Share of primary, secondary and tertiary sector in total NSDP (1999-2000 price) (As percentage of National Summary Data Page (NSDP)**

	Primary			Secondary			Tertiary		
	1980-1	1990-1	2006-7	1980-1	1990-1	2006-7	1980-1	1990-1	2006-7
Arunachal Pradesh	46.70	46.84	25.07	16.73	18.28	32.59	36.57	34.88	42.34
Assam	43.01	39.42	34.20	14.99	14.56	15.50	42.00	46.01	50.30
Manipur	43.83	35.93	24.66	18.22	15.72	39.00	37.95	48.34	36.34
Meghalaya*	62.16	46.68	32.37	15.48	11.30	15.33	22.36	42.02	52.10
Mizoram*	24.24	16.24		14.15	16.07		61.61	67.69	
Nagaland	40.49	23.32	34.91	7.42	13.73	13.59	52.08	62.95	51.49
Sikkim	39.93	43.62	21.69	14.13	20.13	26.21	45.94	36.25	52.10
Tripura	53.01	46.19	25.57	20.26	5.34	21.05	26.72	48.47	53.38

Source: Singh, E. Bijoykumar (2009)
Note: * terminal year for Mizoram is 2007-8
**The 1999-2000 series has been constructed by splicing the trend values of the values for the period 1980-1 to 1998-99.

- **Sectorial Contribution in Sikkim Economy**

Table-2.4

Gross State Domestic Product (GSDP) at Factor Cost by Industry of Origin in Sikkim, {(At Current Prices based on 2004-05 Series) (2004-2005 to 2010-2011)}: (Rs. in Lakh)

Sector	**2004-**	**2005-**	**2006-**	**2007-**	**2008-**	**2009-**	**2010-**
Agriculture	28520	31600	32757	38201	43106	48998	56998
Forestry & Logging	3744	3194	3247	3243	3798	3948	4102
Fishing	78	90	103	115	125	155	182
Agriculture and Allied	**32342**	**34884**	**36107**	**41559**	**47029**	**53101**	**61282**
Mining & Quarrying	208	227	235	251	495	564	705
Sub Total of Primary	**32550**	**35111**	**36342**	**41810**	**47524**	**53665**	**61987**
Manufacturing	**6720**	**7253**	**8638**	**10611**	**11896**	**12461**	**13420**
Manu-Registered	3373	3780	4537	5501	6507	6656	7079
Manu-Unregistered	3347	3473	4101	5110	5389	5805	6341
Construction	33451	40739	42787	46732	53627	61048	76341
Electricity, Gas and Water Supply	9775	9522	10570	18162	50451	105933	126688
Sub Total of Secondary	**49946**	**57514**	**61994**	**75505**	**115974**	**179442**	**216449**
Industry	**50154**	**57741**	**62230**	**75756**	**116469**	**180006**	**217154**
Transport, Storage & Communication	**7158**	**7950**	**8748**	**9961**	**11817**	**15064**	**19122**
Railways	0	0	0	0	0	0	0
Transport by other Means	4678	5228	5768	6427	7333	8937	10552

Storage	62	65	79	94	113	136	165
Communication	2417	2657	2900	3440	4371	5991	8405
Trade, Hotels and Restaurants	9025	9883	11248	12964	14679	16420	18658
Banking & Insurance	4494	5235	6568	7874	8681	9781	11020
Real Estate, Ownership of Dwellings and Business Services	17375	19242	21116	26598	31107	36469	42776
Public Administration	25398	30432	33763	35213	45232	97773	113109
Other Services	27986	33944	36366	40710	47930	65428	82080
Services	**91436**	**106686**	**117808**	**133319**	**159446**	**240935**	**286765**
State Domestic Product (Rs. in Lakh)	173932	199311	216145	250634	322944	474042	565201

Source: Central Statistical Organization (CSO) (As on 02.08.2011).

Table-2.5

Gross State Domestic Product (GSDP) at Factor Cost by Industry of Origin in Sikkim, {(At Constant 2004-05 Prices) (2004-2005 to 2010-2011)}: (Rs. in Lakh)

Sector	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Agriculture	28520	29852	29918	31325	33020	35336	37206
Forestry & Logging	3743	3742	3701	3613	3422	3412	3402
Fishing	78	84	89	89	89	94	101
Agriculture and Allied	**32342**	**33677**	**33708**	**35027**	**36531**	**38842**	**40709**
Mining & Quarrying	208	217	225	239	391	404	458
Sub Total of Primary	**32550**	**33895**	**33933**	**35266**	**36922**	**39246**	**41167**
Manufacturing	**6720**	**6877**	**7413**	**8500**	**9264**	**9359**	**9676**
Manu-Registered	3373	3467	3698	4252	4807	4821	5006
Manu-Unregistered	3347	3410	3715	4248	4457	4538	4670
Construction	33451	37923	39338	40706	39350	43047	49319
Electricity, Gas and Water Supply	9775	11042	13039	16523	39951	76064	82530
Sub Total of Secondary	**49946**	**55842**	**59790**	**65729**	**88565**	**128470**	**141525**
Industry	**50154**	**56059**	**60015**	**65969**	**88956**	**128874**	**141983**
Transport, Storage & Communication	**7158**	**7982**	**8856**	**9915**	**11296**	**13305**	**16199**
Railways	0	0	0	0	0	0	0
Transport by other Means	4678	5023	5238	5401	5740	6315	66
Storage	62	63	75	83	90	98	108
Communication	2417	2895	3542	4431	5466	6892	9411
Trade, Hotels and Restaurants	9025	9234	9356	9831	10312	10899	11353
Banking & Insurance	4494	5639	7261	8794	9236	10458	11842
Real Estate, Ownership of Dwellings and Business Services	17375	17920	18603	21657	24061	25164	26751
Public Administration	25398	28911	31401	32213	35863	60889	63487

Other Services	27986	31539	33203	34436	37266	45880	51894
Services	**91436**	**101225**	**108680**	**116846**	**128034**	**166595**	**181526**
State Domestic Product (Rs. in Lakh)	173932	190962	202404	217841	253521	334311	364218

Source: Central Statistical Organization (CSO) (As on 02.08.2011).

Gross State Domestic Product (GSDP) at factor cost by industry of origin in Sikkim at constant 2004-05 prices in Table-2.5 shows that during the entire period the share of primary sector has grown only by 26.47%, while growth in secondary sector which has registered a substantial increase of 183.3% even surpassed the tertiary sector which grew by 98.5% during these years. Secondary sector has become the predominant sector in the state mainly due to a spurt in electricity, gas and water supply activities of the secondary sector.

- **Migration to Urban Areas Involves both "Push" and "Pull" Factors**

The decision to migrate involves both "push" and "pull" factors (Lewis, 1954; and Harris and Todaro, 1970).The Lewis model explains migration as a transfer of labour from labour-surplus sectors (rural areas/ The Subsistence Sector) to labor deficit-sectors (urban areas/The capitalist) until a balance is reached. The Harris-Todaro model on the other hand, postulates that migrants assess various labour market opportunities available in the rural and urban sectors and choose the one that maximizes their expected gains. This model explains some of the deficiencies inherent in the Lewis model such as the rise in rural-urban migration in the context of rising urban unemployment. Overall, some empirical studies found that economic push factors (such as, the lack of rural credit, unemployment, and rural poverty) are most important; while others suggest that economic pull factors (such as, perception of high wages from urban employment) are dominant.

- **Solid Waste Management is the Number One Civic Problem of Gangtok**

(UDHD, website) Solid Waste Management is one of the most pressing problems of the entire city of Sikkim but, mainly of Gangtok. With most of the people moving towards Gangtok, highly unhygienic conditions prevail in many areas that do not have any regular service of solid waste collection. It is a common practice in such areas to throw the household garbage into the nearest water course (Jhora) where it not only chokes the Jhora, but causes a danger to public health by way of purification, breeding of insects and mosquitoes etc. A problem in improving solid waste collection has been coverage of inaccessible houses and lack of service in the outlying areas, which are very much urban but not covered under the jurisdiction of notified town area. In view

of the difficult topography and many houses being located in inaccessible areas, improving solid waste collection may well be described as the number one civic problem of Gangtok. With the increasing physical growth of the city and development trends, it has become an urgent need to plan for a feasible and sustainable solid waste management, as an integral part of proposed urban development.

- **Use of Fire-wood has not changed Over a Period of Time in the State**

Figures in tables 2.6 and 2.7 for households by type of fuel used for cooking confirm the fact that though state government is providing huge amount of subsidy/almost free distribution of LPG connections, still there is widespread use of fire-wood for cooking. As is evident from the tables below, over a period of ten years i.e. from 2001-2011, though the use of LPG for cooking has increased from 19 to 41 percent, but the use of fire-wood for cooking has been decreased only from 65 to 53 percent. The tables below are also revealing that the use of biogas for cooking has not increased.

Table-2.6
Households by Type of Fuel Used for Cooking

Type of fuel used for cooking:	Total	%	Rural	%	Urban	%
Total	104,738	100.0	91,723	100.0	13,015	100.0
Fire-wood	67,661	64.6	67,189	73.3	472	3.6
Crop residue	827	0.8	802	0.9	25	0.2
Cow dung cake	65	0.1	59	0.1	6	0.0
Coal, lignite, charcoal	76	0.1	61	0.1	15	0.1
Kerosene	15,201	14.5	11,200	12.2	4,001	30.7
LPG	19,718	18.8	11,402	12.4	8,316	63.9
Electricity	521	0.5	519	0.6	2	0.0
Biogas	93	0.1	89	0.1	4	0.0
Any other	3	0.0	3	0.0	-	0.0
No cooking	573	0.5	399	0.4	174	1.3

Source: Table H-10: Census of India 2001, available at
http://www.censusindia.gov.in/Census_Data_2001/States_at_glance/State_Links/11_sik.pdf

Table-2.7
Households by Type of Fuel Used for Cooking

Type of fuel used for cooking:	Total	%	Rural	%	Urban	%
Total	128131	100	92,370	100	35,761	100
Fire-wood	67,310	53	65,418	70.8	1,892	5.2
Crop residue	769	1	685	0.7	84	0.2
Cow dung cake	219	0	198	0.2	21	0.05
Coal, lignite, charcoal	100	0	34	0.03	66	0.1
Kerosene	5,633	4	2,656	2.8	2,977	8.3
LPG	52,871	41	22,438	24.2	30,433	85.1
Electricity	333	0	307	0.3	26	0.07
Biogas	117	0.09	84	0.09	33	0.09
Any other	37	0	28	0.03	9	0.02
No cooking	742	1	522	0.5	220	0.6

Source-HH-10 Series Tables, Census of India 2011, available at http://www.censusindia.gov.in/2011census/hlo/District_Tables/Distt_table/11/HH3410-1100DCRC.pdf

2.1.1.2 Bangladesh

- **Women's Activities are Confined to the Home and Homestead in Rural Areas**

(Wennergren Boyd E. et. al., 1986) The status of women in Bangladesh is a product of many years of cultural, social, and religious traditions. The practice of purdah in this predominantly Muslim society with its condition of female dependence and gender segregation has provided a strong historical basis for establishing women's roles and attendant division of labor within the household. In rural areas, women's activities are limited primarily to the home and homestead. Overall, the inferior status of women has been detrimental to their access to education, nonagricultural employment, and participation in political activities. The system however is being challenged, as poverty is forcing destitute women from traditional roles and even in the urban middle class, economic pressures are pushing women into employment outside the home. Employment options are restricted by the slow pace of economic development and the critical absence of job skills. Education for women is seen as a priority element in Bangladesh's development strategy.

- **Education and Loans from NGOs Proved to be More Effective in Providing the Landless an Access to Land Rather than any Re-Distributive Land Reform**

(Akanda, 2008) This research analysed the changing pattern of land market under a land decreasing condition. Several re-distributive Land Reforms were undertaken to balance landholdings in favour of the land-poor under 'landlord biased' agricultural policies in Bangladesh (Griffin, et al,

2002). Those reforms were ineffective, not only because of problems in implementation but also decreases in owned land per household after sub-divisions among heirs (Rahman, 1998).This study has not suggested any re-distributive land reform because even the landless was lately found to purchase land using their non-farm incomes and loans from NGOs. Therefore, education and other supporting programs for non-farm income generation would be more effective to provide the landless an access to land rather than any re-distributive Land Reform. Unequal distribution of privately owned land is one of the critical agrarian problems in rural Bangladesh (US country studies 2011, website).

- **Inequality of Land Ownership as a Key Factor for Farm Income Inequality**

Some previous research focused on the changes in land ownership using macro-level data. (Hossain, 1989) identified that the inequality of land ownership as a key factor for farm income inequality. (Islam and Omori, 2004) also identified this inequality as a major factor for income inequality. In land market analysis, (Hossain, et al. 2003) observed a decreasing trend of land transactions through purchases and sales during 1987 and 2000. This was because many farmers facing a hazard tried to overcome it by engaging in non-farm activities rather than selling land. However, land purchase was found negative for land-poor farmers. (Griffin, 1974) stated that land-rich farmers could buy-out lands from land-poor farmers using their surplus production. However, (Griffin, et. al 2002) reported that the inequalities of land ownership were not changed at all in rural Bangladesh during 1991 and 1995.

- **Inequality in Female's Share of Different Sized Landholders**

Since there was no institutional law, so, no land was transacted as share given to females in the sub-clan in the earlier years of the 'reckless creation of inequality under deceptive land market' phase. Subsequently, medium and large farmers were found to give land to female sharers since the late 1940s and it was higher during 1945 and 1965 because of having many wives and daughters. However, the number of marriage decreased after enacting the Muslim Family Law in 1961 (WRC, 2000). The land shares of wives were not shown as it was ultimately gone to sons after their death. However, there were two wives of a deceased household took land away for having no child. In the 'reaching to average distribution under distressed land market' phase, land shares of females was given by the large and medium farmers. The female sharers belonging to large farmers used to get large amount of land and they were unwilling to waive their claim.

However, female sharers of small farmers did not claim strongly because they might lose their access to fathers' houses after taking a small amount of land. Moreover, it was not easy to get land through court cases if the sons were not willing to give. As per the opinion of a lower court judge, land ownership was depended on deed, tax payment certificate and possession. Taking possession was found difficult even after getting the court order.

2.1.1.3 Nepal

- **Contribution of Women is Higher Relative to That of Men in Agriculture**

As far as women in Asian countries are concerned, **Nepalese** women are equally involved in both field and post-harvest work in crop production. Ploughing is considered a man's job, whereas all other work, though shared by men, is mostly undertaken by women. Collecting and carrying compost to the field is normally performed by women (Katuwal, 1990, website). Women's involvement is more in producing major crops such as rice, maize, wheat, etc. (Regmi and Weber, 1997). In both rain fed and irrigated agriculture time spent by women is higher relative to that of men. In rain fed areas women devote 12.36 hours per person per day, whereas men do only 9.03 hours. Similarly, in irrigated zones women put in 11.61 hours per person per day whereas men do only 7.85 hours (Sharma, 1995).

- **Women's Contribution in Traditional Allied Sector is Tedious, Tiring and Time Consuming**

Women in rural **Nepal** have a very close relationship with forests. Collecting fuel wood meets 95% of the cooking-energy consumption (Denholm, 1991). Collecting fodder and other forest products is most tedious and tiring, which has traditionally and primarily been performed by women (Ojha, 1989). Women's task of buffalo raising requires a great deal of daily care the year round. An improved buffalo eats about two head loads of fodder per day, besides prepared feed (Bhatt et. al. 1994). More than three-fourths of household time spent collecting forest a product is done by women (Kumar and Hotchkiss, 1989). As deforestation advances and forest products become increasingly scarce, women are the ones who must walk further afield to collect fuel and fodder, adding hours to their already long work days. Where deforestation is high, time needed to collect one load of fuel wood increases by 75% and less time is allocated to agricultural activities (Kumar and Hotchkiss, 1989).

- **No Due Consideration is given to Economic Activities of Women and Hence Remained Excluded from Surveys**

40.4% of women and 59.6% of men over the age of 10 are considered economically active. This indicates a lower economic participation by women as compared to men (CBS, 1996). This is due to the fact that activities such as weeding and harvesting, home gardening, livestock and poultry rearing, and fuel and water collection, which are almost exclusively performed by women, are not considered economic activities and hence excluded from surveys. The vast majority of the economically active population (81.2%), particularly in rural Nepal, is engaged in agriculture and allied industries. The proportion of the persons engaged in this sector was substantially higher among women (90.5%) than among men (74.9%) (SD, Websites).

2.1.2 Africa

- **Women are the principal players in Ghana's agricultural sector**

(Zaney G. D., 2011, website) Statistics from a research conducted by Action aid International in collaboration with Action aid Ghana reveal that there are about 3.4 million farm households in Ghana with smallholders, whose average farm size is only 1.2 hectares, accounting for 80 per cent of farm production. According to the research results, the most widely-grown food crops are maize and cassava, yam and plantain and cocoa and palm oil while over 80 per cent of households own livestock. The research results also show that women constitute more than half of the agriculture labour force in Ghana and produce about 70 per cent of the country's food. Of those involved in agro- processing, women constitute 95 per cent while of those in food distribution, women constitute 85 per cent. Women are, therefore, principal players in Ghana's agricultural sector which remains the leading economic sector, contributing about 32 per cent of Gross Domestic Product (GDP). Indeed, Ghanaian women do most of the planting, weeding, harvesting and transporting of food produce and are also dominant in food crop farming while most farming households in Ghana are also engaged in the processing of food such as maize, cassava, groundnuts and fish – in which women are also dominant.

- **Women and their Participation in Ghana Agriculture**

(IFAD, 1998, website) evaluation of the "Upper-East Region Land Conservation and Smallholder Rehabilitation Project (LACOSREP)" recognizes that in Ghana, as in much of the rest of the

world, women are increasing their contribution to household food security. Household food insecurity is a seasonal problem in some parts of Ghana, such as the north, occurring every year between February and July. In agriculture, women pitch in wherever and whenever they can. (Amu Nora Judith, website) Women usually conduct income-generating activities of one kind or another during the slower periods in agriculture. The large majority of these are traditional, low-capital input and labour-intensive activities. They cover a fairly typical range, including charcoal-selling, household-based food processing, crafts such as basket-weaving and petty trading among others. Women switch from one activity to another according to what is most likely to be profitable at a given time. Women with childcare or other heavy domestic obligations (such as the care of the sick or elderly) may select a less profitable off-farm productive activity in order to combine domestic and productive responsibilities. The income women generate from their operations may be small, but it plays a significant role in meeting family food needs. This is particularly the case when a harvest is poor. Women also buy clothing for babies and children and often pay for school fees and health care. In carrying out these micro and small-scale activities, women are hampered by lack of time, lack of literacy skills and poor marketing opportunities. In recent years, more women are also entering seasonal or long-term migration to earn income. This used to be a matter of shame, but attitudes about it have now changed. Not only does migration take pressure off the family food supply, but it also results in occasional remittances (IFAD, 1998, website).

- **Education Enables Women to Assert and Defend their Land Rights**

(Kwapong, O.2008) This study looked at the issue of land and its effect on women, migrants, youth and the urban poor in Ghana. Factors such as high levels of illiteracy and ignorance of the law, high cost of enforcement of the law, interference by extended family, fear of extended family and limitations in respect of access to justice impedes women's control over land. So, it was emphasized that in addition to putting in systems to support the most affected in land issues, adult education is crucial for improving the land situation of the marginalized in society. (Quisumbing and Otsuka, 2001) is also of the same opinion and suggested that it will enable them to assert and defend their rights. (Wily and Hammond, 2001) observe that insecurity of tenure affects not only economic poor but also those who assess land belonging to others: tenants, share croppers, youth and women.

- **Transfer of Land to Women Depends Upon the Female Labour Demand for Weeding**

(Quisumbing Agnes R. et. al., 2004) On the issue of women and land in Ghana's Western Region, the study has revealed that land allocation is a predominantly male affair. Women, who are divorced, widowed, separated, or have no male children with their husbands appear the worst hit in terms of access to agricultural land resources. Family and marital relationships provides access to land to women. Gifts and inheritance (in the absence of a male heir) is also creating opportunities for women's ownership of land. On the possibility of women owing or accessing lands through gifts, (Quisumbing Agnes R. et. al., 2004) emphasize that women's land rights have been strengthened rather than weakened over the time. Gifts are allowed by the extended family only if wives and children help the husband establish cocoa fields which require a lot of female labour for weeding. The increasing transfer of land to wives and daughters is consistent with the increasing demand for female labour as land use intensifies. But in cases where women's labour is less important for cash cropping, individualization might still decrease women's control over land (as argued by other writers on women's land rights in Sub-Saharan Africa, e.g., Lastarria-Cornhiel, 1997).

2.2 Females in Decision Making in Farming

2.2.1 Asia

2.2.1.1 India

- **The Major Decision Makers in Agricultural Activities are Men**

The extent of participation in the decision-making activities in house hold and agriculture related and other socio-culture affairs reflects the status of women in the family as well as in society. The major decision makers in agricultural activities are men even though women perform more in agricultural related activities than men. Even they need not be consulted at the time of purchase of animals or change of crop. An average, women spend 14 hours a day working in and outside the home. During harvesting season she spends about 16 hours a day (Chaudhary Sarmishta, 2004).

In decision making regarding selection of crop for the season, procurement and sowing seeds of new varieties, breeds of animals, selling of fodder, milk and animals and procurement of fertilizers, the senior most males of the family are involved. Women were found to bring information

regarding new technologies from aanganwadis and self-help groups (SHGs) but for the adoption of new technologies, the final decisions were taken by male members of the family. This may also be because of the low risk bearing capacity of farmers in that region due to droughts and low soil fertility (Mishra Seema, et al. 2008).

Sethi (1991) also confirms the poor participation of women in agriculture sector in Himachal Pradesh, where women's opinion is normally not considered in the matters related to participation in developmental activities. The social role as a decision maker in the production and the distribution of products and their participation and representations in village developmental activities has not changed over the time. In all such social relations men continue to dominate the scene and there exists no party of decision making in gender relations.

Majority of the women in Manipur are the bread earners of their families, many of them the only bread earners. Being main earners, women had no time even to concentrate on their own plight. It was found that Manipur is economically far below on the ladder. There is no major industry. Agriculture is at subsistence level. There is land scarcity due to tremendous rise in the population. The social neglect of women and daughters is a matter of concern. They are subjected to heavy work both within and outside the home from an early age. They are less likely to receive medical help when they are sick. In the hills, much of the work is done by women and there is "iron like grip" rigidity in the division of labour. They work quietly and are invisible in any decision making bodies (Brara, N. Vijaylakshmi 2006).

Vaish, S. (1999) The different parameters in decision making of ladies were studied and the result showed that the main constraints in taking decisions about rice production technology were a lack of technical know-how (100%); lack of education in women (92%), men thinking that they know better (72%), the dominance of men in agriculture (69%) and opportunities not provided by men (59%). Sharma, (1992) also holds the similar views on the constraints faced by women in farming sector.

- **Role in Decision-Making Increased with the Implementation of Interventions**

The impact of interventions on women in a project being implemented in rural areas of District Pauri,Nainital and Udhamsingh Nagar in Uttaranchal , found increased role of "women as a group" in solving community problems by their 'shramdan'. Participation in Panchayati Raj institutions and their role in decision-making had also increased. Study suggests that the State could

capitalize on project interventions in agriculture and horticulture by developing a brand name for Micro enterprise products of SHGs from Uttaranchal (Joshi, Meenakshi 2004).

- **Tribal Women have More Say in Family Decisions**

While tribal women have more say in family decisions than their non-tribal counterparts, they also share more responsibilities (Awais Mohammad et. al.2009). Preparing food and providing for drinking water is solely their responsibility so they operate closely with the forests from where they get water, fuel and minor products including edible fruits, tubers, flowers, vegetables and berries.

- **Political Empowerment and Decision Making**

The 73rd and 74th Amendments (1993) to the Indian Constitution have served as a breakthrough towards ensuring equal access and increased participation in political power structure for women, laying a strong foundation for their participation in decision making at the local levels. The (Panchayati Raj Institutions) PRIs plays a central role in the process of enhancing women's participation in public life. The PRIs and the local self-Governments should be actively involved in the implementation and execution of the National Policy for Women at the grassroots level.

Following case study shows that women were benefited by political empowerment.

The case study of (Mittal, Priyanka Mukherjee, 2010, website) found that in distant villages of Orissa in India, a small army of women took up the cudgels of advocacy to bring about changes in their lives. It happened only through the active intervention of Dan Church Aid's partner Nari Suraksha Samiti (NSS). To empower women and build their agencies, NSS is committed to its objective to train and create leadership of women enabling them to participate on the path of development. Pramila Pradhan, Bharati Behera and Tunni Sahu are all ward members (representatives of the local self-government) in the Angul district of Orissa in Eastern India. They are women who have stepped out of their households and home bound duties to work for the larger causes of their villages, families and women.

The ladies also felt proud in sharing the views that after forming a federation of women and strengthening themselves, they are in a position to raise their voices and to do a number of activities which they wanting to do earlier and to solve a number of issues specific to woman which were never raised and the opinion never sought.

The ladies shared their experience of problems faced in delegating their duty **as decision maker** like- stray comments from some male members, half-heartedly support from the family members etc. But without caring much about these hurdles they moved ahead and slowly started getting the support of everybody when people realized that the ladies under their leadership have got the passion and will power to do something good for everybody.

2.2.1.2 Nepal

- **Nepalese Women Play a Significant Role in Decision Making**

As far as participation of women in Asian countries is concerned it is found that in **Nepal**, in addition to routine domestic work, women play a significant if not a predominant role in agriculture production. One participatory research project found that women work more as participants and decision makers, share the responsibility of planting, transplanting, weeding, harvesting, carrying grains to the mill for grinding, including collecting wood, water and fodder (Axinn, 1977), in agriculture than men in the high mountain areas, equal to or more than men in the middle hills and slightly less than men in the terai region (Sontheimer et. al. 1997). Women, alone or together with men, both as participants and decision makers, share the responsibility of planting, transplanting, weeding, harvesting, carrying grains to the mill for grinding, including collecting wood, water and fodder (Axinn, 1977). (Timsina Dibya, et. al., 1989) also holds the similar views.

Perceptions and priorities of women do not depend upon age, castes or education alone. They are rather inter dependent and also influenced by several other –external– factors, such as the access of women to extension services, exposure to short-term training, individual or extra cash income (e.g., from the sale of vegetables). The practical knowledge of older women, complemented by the more science-based knowledge of the younger more formally educated women, can also contribute to better use of the limited available land resources. Women in villages that are more easily accessible have generally a better understanding of modern technologies. These women also have better access to markets for better cash income, which -in turn- gives them more influence on farming decisions (Aryal S. S. et. al., 2004).

2.3 Access of Rural Women to Productive Resources in Farming

- **Theoretical Focus**

Access is the right or opportunity to use, manage or control a particular resource (Nichols et al. 1999). Resources may be economic (e.g. Land and credit), political (e.g. Participation in local

government and community decision-making) and social (e.g. education and training).

The process, when disadvantaged women have the ability to control their own environment by gaining greater access to material and intellectual resources, (Musokotwane et al. 2001) called this process as 'empowerment'.

Many studies (IFPRI, 2000; Grace, 2005; Pitt et al., 2006) have already found that access to productive resources for women enhances knowledge on farm management and income generation, develops bargaining and decision-making power, improves children's schooling and health, increases self-confidence and social networks and provides security in old age.

Poverty alleviation in rural areas is significantly related to women's increased access to productive resources (Adereti, 2005). Thus, efforts to build social capital among rural women are necessary for sustainable production and household food security through provision of facilitating resources (Meludu et al., 1999; Flora, 2001). At the same time, raising social awareness of people about the symptoms, causes and consequences of oppressive economic, cultural, familial, religious and legal practices is necessary for changing traditional gender roles and mindsets (Acharya, 2003).

2.3.1 Asia

2.3.1.1 India

2.3.1.1.1 Education - Social Empowerment of Women*

Social change simply means a change in people, in their relationships with each other and with the things in their environment. Uncontrolled social change can get us into serious trouble. So, it is very important to take steps that will bring a positive change in it. As external force is required to bring a body from the state of rest to motion, but, it should be controlled one to move it in the guided direction. Education is a strong and useful external weapon to make an effective social change to break the inertia in this regard.

Education is widely accepted as a leading instrument for promoting economic growth. For India, here growth is essential if the country is to climb out of poverty, education is particularly important. Education without doubt, is the most fundamental prerequisite for empowering women in all spheres of society. Studies show that when women are supported and empowered with

*"Education Status of Farming Females – A Study of Rural Area of Sikkim in North- Eastern India" Nidhi Dwivedy "International Journal of Social Sciences and Interdisciplinary Research" Vol.2 (2), February -2013, Pp. 36-48, ISSN: 2277-3630.

all of society benefits, their families are healthier, more children go to school, agricultural productivity improves and incomes increase. In short, communities become more resilient. However, without education of comparable quality and content to that given to sons and men, women are unable to understand the problem in the right perspective, excel in any field and advance within them. So, equal access to education for women and daughters should be dealt on priority basis. Special measures should be taken to eliminate discrimination, universalize education, eradicate illiteracy, create a gender-sensitive educational system, increase enrolment and retention rates of daughters and improve the quality of education to facilitate life-long learning as well as development of occupation/vocation/technical skills by women. Reducing the gender gap in secondary and higher education should be a focus area.

In India, the female literacy rate is lower than the male literacy rate, though it is gradually rising (Singh, S. 2007). Compared to sons, far fewer daughters are enrolled in the schools, and many of them drop out due to poor sanitation facilities in the school (Kalyani and Kumar 2001, Wikipedia). According to the National Sample Survey Data of 1997, only the states of Kerala and Mizoram have approached universal female literacy rates. According to majority of the scholars, the major factor behind the improved social and economic status of women in Kerala is literacy (Kalyani and Kumar2001, Wikipedia). In urban India, daughters are nearly at par with the sons in terms of education. However, in rural India daughters continue to be less educated than the sons. A study by the USAID has found that countless women in the developing world are removed from the information age because of their lower levels of education and negative attitudes towards other forms of achievement. “Without access to information technology, an understanding of its significance and the ability to use it for social and economic gain, women in the developing world will get further marginalized from the mainstream of their communities, their countries and the world” (USAID, 2001).

2.3.1.1.2 Extension Service

Men and women have been growing crops and raising livestock for approximately 10,000 years. Throughout this period, farmers have continually adapted their technologies, assessed the results, and shared what they have learned with other members of the community. Though the exact time the first extension activities took place is not known, but, it is a well-known fact that at least 2,000 years ago, Chinese officials were found creating agricultural policies, documenting practical knowledge, and disseminating advice to farmers (Trager, J. 1996).

The birth of the modern extension service has been attributed to events that took place in Ireland in the middle of the 19th century. Between 1845–51(Jones, G.E. and Garforth, C.1997) the Irish potato crop was destroyed by fungal diseases and a severe famine occurred known as Great Irish Famine. The British Government arranged for "practical instructors" to travel to rural areas and teach small farmer how to cultivate alternative crops. This scheme attracted the attention of government officials in Germany, who organized their own system of traveling instructors. It has been experienced ever since that training acted as forefront exercise meant for providing extra knowledge, skill and attitude to the trainees. This finally became the main force behind strengthening of extension support in any development scheme or project. Any scheme is thus incomplete if Training and Extension work is not incorporated in it.

Dissemination of new technology through extension workers to the ultimate users is very important, so that they can adopt these scientific practices of crop cultivation in their farms. A large amount of support is provided by International development organizations such as the World Bank and the Food and Agriculture Organization (FAO) of the United Nations to agricultural extension in the developing countries.

A productive agricultural economy relies upon a well prepared agricultural workforce (Samy, 2003) and sound and healthy livestock capital base. These are of potential importance not only to the farmers, but also to animal welfare, public health and food supply. So, extension programme/information/sources to educate the farmers, related to animal health to ensure the continued productivity of livestock is of potential importance (Jensen, English, and Menard, 2009).

The irony of the fact is that women are not perceived as ‘farmers’ even when they do most of the farm work. As a result, agricultural extension and information on new technologies are almost exclusively directed to men, even when women are increasingly responsible for farm work (Kelkar 2011). Women may be aware of local resources as well as constraints in marketing, but their awareness is poor about new developments like improved dry land farming techniques and varieties suitable for unfavourable soil and moisture conditions. This is probably due to lack of communication and virtual absence of extension programmes, which would directly benefit women.

2.3.1.1.3 Self Help Groups (SHG)*

Self-help groups are started by non-profit organizations (NGOs) that generally have broad anti-poverty agendas. Self-help groups are seen as instruments for a variety of goals including empowering women, developing leadership abilities among poor people, increasing school enrolments, and improving nutrition and the use of birth control.

Self-Help Group typically comprises a group of rural poor having homogenous social and economic backgrounds (so that they can freely interact with each other with in the group); all voluntarily coming together to save regular small sums of money, mutually agreeing to contribute to a common fund and to meet their emergency needs on the basis of mutual help. By poor one should be guided by the living conditions and this has nothing to do with poverty line. People living above poverty line (APL) can also form SHG like BPL**.** Members should be between the age group of 21-60 years. It may be registered or unregistered.

Members make small regular savings contributions over a few months until there is enough capital in the group to begin lending. Funds may then be lent back to the members or to others in the village for any purpose. By doing this they learn financial discipline through savings and internal lending which proves to be very helpful when they use bank loans.

In the early 1980s, the Government of India (GoI) launched the Integrated Rural Development Programme (IRDP), a large poverty alleviation credit program, which provided government subsidized credit through banks to the poor. It was aimed that the poor would be able to use the inexpensive credit to finance themselves over the poverty line.

Also during this time, NABARD conducted a series of research studies independently and in association with MYRADA, a leading non-governmental organization (NGO) from Southern India,

*"The Membership Status of Farming Females – A Study of Rural Area of Sikkim in North Eastern India" Nidhi Dwivedy, "Research Journal of Economics & Business Studies" Volume:02, Number: 01, November -2012, Pp. 150-168, ISSN : 2251-1555.

which showed that despite having a wide network of rural bank branches servicing the rural poor, a very large number of the poorest of the poor continued to remain outside the fold of the formal banking system. It also appeared that what the poor really needed was better access to these services and products, rather than cheap subsidized credit. Against this background, a need was felt for alternative system of credit, which would fulfil the requirements of the poorest, especially of the women members of such households. The emphasis therefore was on improving the access of the poor to microfinance rather than just micro-credit.

To answer the need for microfinance from the poor, the past 25 years has seen a variety of microfinance programs promoted by the government and NGOs. In 1999, the GoI merged various credit programs together, refined them and launched a new programme called Swaranjayanti Gram Swarazagar Yojana (SGSY). The mandate of SGSY is to continue to provide subsidized credit to the poor through the banking sector to generate self-employment through a self-help group approach and the program has grown to an enormous size.

- **SHG Bank Linkage**

Microfinance programmes like the Self-Help Bank Linkage Programme (SHG) in India have been increasingly hailed for their positive economic impact and the empowerment women. This is based on the view that women are more likely to be credit constrained.

A most notable milestone in the SHG movement was when NABARD launched the pilot phase of the SHG Bank Linkage programme in February 1992 and around 500 SHGs were linked with branches of half a dozen banks across the country. This was the first instance of mature SHGs that were directly financed by a commercial bank. The core of SHG bank linkage in India has been built around an important aspect of human nature-the feeling of self-worth.

The linking of SHGs with the financial sector was good for both sides. The banks were able to tap into a large market, namely the low-income households and the SHGs were able to scale up their operations with more financing and they had access to more credit products. In addition to the financial aspect of SHGs, the non-financial areas such as social security and gender dynamics are also affected by such movement.

- **Self-Help Groups in Sikkim**

In India, many SHGs are 'linked' to banks for the delivery of microcredit. As on 31 March 2009,

a cumulative number of 42.24 lakh SHGs have been assisted by various banks. But, this response is not as good in Sikkim. As on 31 March 2010, out of 2817 SHGs, only 848 groups have been credit linked in the state.

It has been experienced that the success of SHG linkage programme depends to a large extent upon the presence of good NGOs. Unfortunately, good NGOs are not very much present here in Sikkim thereby hindering the linkage process. However, to a large extent this problem has been met by the presence of local youth group, local women group and cooperative societies. The Rural Management and Development Department is also making an endeavour to promote more number of SHGs and their savings be linked with various branches of commercial banks.

Rural poverty and indebtedness are the causes of underdevelopment in rural areas. Lack of equal opportunity and gender bias has rendered rural women vulnerable in their social life and self-development. So, in order to improve their socio-economic condition, women are to be organized and suitable economic activities are to be provided to them under farm, non-farm, business and service sector. Some economists argue that true women empowerment takes place when women challenge the existing norms and culture, to effectively improve their well-being. Keeping these things in view, 33.33% of the target is reserved for women in different Government sponsored programmes, which is monitored periodically. In Sikkim there is vast potential for providing assistance to women under activities like- dairy, goatery, piggery, poultry, mushroom cultivation, bee-keeping, horticulture, agro processing, vegetable cultivation. Under PMEGP, SGSY, KVIC/KVIB programmes, special preference is given to women borrowers in order to improve their socio economic condition.

- **NGO'S Proved Successful in Inculcating the Credit Responsibility in Women**

In India, despite government policy directing various credit agencies to give preference to women in extending credit to the poor, women have not benefited. Non-governmental organizations (NGOs) are important intermediaries which help women gain access to credit and understand financial transactions.

(Singh Y K, 2007) Self-Help Groups (SHGs) have emerged in order to help poor women to secure inputs like credit and other services. The concept of SHG in India was introduced in 1985. Self-Help Groups are small, economical, homogeneous, affinity groups of rural poor who are voluntarily ready to contribute to a common fund to be lent to their members as per the group

decision. Many rural development programmes like 'Swarn Jayanti Gram Swarozgar Yozana' (SGSY) which is a combination of six rural development programmes, are based on the self-help group strategy. It is a viable alternative to achieve the objectives of rural development and to get women's participation in all rural development programmes. A greater percentage of women were impacted positively by being members of SHGs. Women's participation in SHGs enabled them to discover inner strength, gain self-confidence, social and economic upliftment.

(Viswanath Vanita, 1989) The assessment of the work of two NGOs in South India: Institute of Development Studies (IDS) and Grama Vikas shows that the Grama Vikas model is more effective because Grama Vikas' collective programs implemented by the women provide them with practical experience in the management of credit and help them understand financial responsibility. IDS brokers loans for the women from commercial banks and rely on group discussions among women about credit use to inculcate responsibility in them.

(Chandel et. al., 2008)In Uttar Pradesh, more than half of the farmers are women but their participation in departmental training and extension programmes is very limited. Only a few women have been recognized as progressive farmers. The knowledge and skill of women needs to be incorporated into the development of modern farm technologies by scientists. The blending of farm women's indigenous wisdom with modern technologies is also important.

- **Some of the Successful Stories of Vedanta's (SHG)**

(Thapar Ruby, 2010) Vedanta's Self Help Group (SHG) program aims at empowering women through financial independence. The main thrust of the economic activities is to enhance income from existing resources and create additional opportunities of employment to optimize local resources and skill. These SHG's have been engaged in enterprises like mushroom cultivation, poultry, goatery, puffed rice processing, vermicomposting, leaf plate making, pisciculture and others. Empowering women in this manner not only make them an active member within their households but also helps in the development of their villages. Below are given some of the successful stories of Vedanta's (SHG).

In Kalahandi district, the Jeebika Project was launched in collaboration with Shakti, a local NGO, who trained the women on leaf plate stitching. The SHG are organized into SHG Cluster, wherein the whole project area has been divided into 4 clusters on basis of geographic distribution. Each SHG of a village comes under the village level cluster and all village level clusters come

under geographic cluster an apex body. Role of the cluster is for backward and forward linkages with market accessibility and bargain power. It helped women in empowering them economically and also escalating their income by eliminating the middlemen.

At Bharat Aluminium Company Ltd. (BALCO), small efforts of the SHG group which was formed under the Watershed Development Project in Bhatgaon in Korba district helped in improving their lives as well as economic prosperity of the villagers which was marred by the home-made liquor.

At Hindustan Zinc Limited (HZL), with the capacity building of the members of SHGs in "Peda (Sweet) Making" and linkage of the SHGs with banks, they are able to cash on an opportunity to cater for the local area demand.

At The Madras Aluminium Company Ltd (MALCO), with the capacity building of the members of SHGs in stone embroidery work on sarees and plain cloth and also with their introduction to some textile shops in Erode and Salem, SHG women members became economically independent by marketing their local skill and by getting regular work.

SHG members of Sterlite Industries India Ltd. (SIIL), by getting training in the preparation of herbal hair oil changed their lives by engaging themselves in producing scented herbal oil and marketing their products at cultural festivals in temples and exhibitions.

SHG members of SESA GOA were provided with skill development training in multiple disciplines like making of vermicelli, notebooks & files, chilli pulverizing, masala powder making etc. under a project called 'Micro Enterprises Promotion' for women SHG members. The trained women soon made themselves economically independent by starting vermicelli production, masala powder making and bag making unit.

2.3.1.2 Nepal

- **Social Norms and Customary Laws are a Barrier to Women's Equitable Access**

In Asia , women's access to inputs in farming in **Nepal** shows that despite women's important

role in agriculture, traditional social norms and customary laws which generally are biased in favour of men, are a barrier to women's equitable access to productive resources (Kumar and Hotchkiss, 1989).

(W B 2008) Caste and ethnicity-based discrimination constitute a barrier to access resources for women within many ethnic and low-caste groups. Although caste-based discrimination was abolished in 1963, over 200 forms of commonly practiced types of caste-based discrimination have been identified which include: limitation to socially-sanctioned roles; obligation to carry out demeaning tasks; and prohibition to access common water sources. Thus, the lack of access to and control over productive resources is the main factor limiting women's equal participation in economic activities, thereby hampering the human development process (Acharya, 2003).

2.3.1.3 Bangladesh

- **Various Socio-Cultural and Structural Barriers Affect their Access to Resources**

Out of a total population of 149.7 million in **Bangladesh**, women constitute 74.4 million (PRB, 2005). The majority, who are mostly poor, vulnerable and marginalized, live in rural areas. They play an important role in seed production, animal husbandry, fisheries, post-harvest management, conservation of biological diversity, management of energy and family (Anon., 1995). Despite their tremendous contribution to food production and well-being for the household, rural women are underestimated and overlooked in development strategies .Various socio-cultural and structural barriers affect their access to formal and non-formal institutions and extension services (Murshid and Yasmeen, 2004). However, women's property rights are highly constrained in Bangladesh, as it is governed by religious laws. Under the Muslim Law, a daughter inherits one-half the share of her brother, a wife receives only one-eighth of the deceased husband's property while a mother gets one-sixth (ADB, 2001; Ramachandran, 2006). Due to lack of land ownership, women are getting inadequate attention by many development agencies. For example, the agricultural extension delivery services in Bangladesh are still concentrated on male farmers and consequently, fail to reach the majority of rural women with modern information and technologies. Access to resources is one of the elements of women's empowerment and a base for the attainment of the Millennium Development Goals (MDGs).

The extent of accessibility of rural women from three villages of Mymensingh District in **Bangladesh** showed that the women had better opportunities for rearing livestock and availing capital.

However, their access to extension services, training, technologies, institutions, land and production inputs were limited. Lack of technical knowledge and land ownership, heavy household chores and some socio-cultural constraints like (restricted mobility and male resistance) hindered women's access to productive resources (Parveen, Shahnaj2008).

2.3.2 Africa

- **Access to Productive Resources Shows Mixed Response**

(Spring Anita, 1987) An examination of the gender division of labour of **African women** shows that so-called "traditional" patterns have given way to suitability with women involved in all aspects of production either routinely or when male labour is unavailable due to a change in marital status or to out-migration. The semi-autonomous nature of women within the household and the diverse types of households are detailed in order to show the diverse responsibilities of men and women for the procurement of food and other commodities. Although some women earn a good living from agriculture and can assure family food security and/or generate surplus sales, most women tend to be among the lower resource farmers. This is not because they are deficient in farming skills, but because they lack access to labour, land, credit, training, and mechanization, especially in years of agricultural intensification.

(World Bank, 2008I) "In Mozambique, agriculture is essential for economic growth, because the sector employs 80 percent of the labour force". Staying in agriculture, while providing food security for the household, works out disadvantageous for women: it implies a lower productivity than in the non-agricultural sector and, what is more, it can be disempowering as men control the cash.

(Maarten van Klaveren et.al. 2009) The report shows that most of the Mozambican population still survives in subsistence agriculture. As men have dominated the movement of adults out of agriculture into wage and self-employment in non-agricultural sectors, the agricultural labour force is increasingly made up of women. Between 1996 and 2002-03 the share of all women in work employed in agriculture fell by over 6% points, but in 2002-03 it still concerned the overwhelming majority of nearly nine of ten women. Agriculture is female-intensive in Mozambique. In 2002-03, women constituted about 62% of the active agricultural labour force. Female-heads of households in rural areas are particularly constrained, both in time –mostly working very long hours per day-- and in income sources. Between 1996 and 2002-03, commercial services—such as transport,

food preparation, finance, and telecommunication—saw their output grow slightly slower than GDP did, but employment in these services tripled.

(Davison Jean, 1987) The paper argues that while women of **Mozambique (Africa)** have generally benefited from the redistribution of land since independence, access to other resources and control over decision-making vary according to the type of development project in which women participate. Of the two projects discussed in this paper, women in the state-sponsored cooperative have better access to the group's resources and decision-making arenas than women in the bilaterally aided rice scheme.

(Roncoli Carla Maria, 1985) The examination of the position of women in traditional societies in **Ghana** with regard to their access to the means of productions and the changes brought about by the commoditization of the economy and the incorporation of such groups in the national society points out that the process of "development" has negatively influenced women's opportunities for economic improvement and self-determination, and terminates with a recent example of the impact of planned "development" on women as small-scale farmers.

Development stakeholders have come to realize that socio-economic and gender-disaggregated agricultural data are essential for the planning of effective responses to matters such as poverty, food insecurity and the HIV/AIDS pandemic. (Baden, 1997) identified some gender based differentiations within the household including access to productive resources, control over family labour, rigidities in division of labour, inequality in consumption and responsibility for domestic expenditure. (Tamale, 2004) argues that the non-recognition of women's labour for domestic chores is reinforced by the unequal allocation of resources. (Amu Nora Judith, website) concludes that with no land as collateral and restricted access to formal credit, they have primarily relied on informal sources such as family, friends and traditional moneylenders. These sources can have high interest rates, or they may not always have the funds available for making loans.

- **Integration of Women is a Must in Farming Systems Research and Extension**

(Spring Anita, 1987) Farming systems research and extension (FSR/E) methodology has several phases (pre-diagnostic, diagnostic, technology design, testing, and dissemination) that should include information about the sexual division of labour, resource allocation, income generation, and knowledge of farming practices; yet gender is often left out of FSR/E by both researchers and extensionists. FSR/E practitioners usually rely on extensionists to locate, interview, and select

trial cooperators. The extension staff members, who tend to be predominantly men, target male farmers for these and other extension activities. Therefore, there are very few women extensionists — women who are not trained who are concentrated in the lower ranks, and who tend to be assigned to home economics rather than to agricultural programs. A case study from Malawi shows that it was uncommon for women to be included in FSR/E work as trial farmers or in recommendation domains.

Considering this complex situation, the researcher has attempted to examine some of the productive resources accessible to rural women and explored enabling and limiting factors, with the intention of making them powerful agents for change over time.

2.4 Agriculture and Allied Sector

Agriculture is the mainstay of the Indian economy because of its high share in employment and livelihood creation. It supports more than half a billion people providing employment to 52 per cent of the workforce. Its contribution to the nation's GDP is about 18.5 per cent in 2006-07. It is also an important source of raw material and demand for many industrial products, particularly fertilizers, pesticides, agricultural implements and a variety of consumer goods.
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. India's varied agro-climatic conditions are highly favourable for the growth of large number of horticultural crops, which occupy around 10 per cent of gross cropped area of the country producing 160.75 million tons.

Department of Agriculture and Cooperation under the Ministry of Agriculture is organized into 24 divisions and a 'Technology Mission on Oilseeds, Pulses and Maize'. It has 4 attached offices; 21 subordinate offices; 2 public sector undertakings; 7 autonomous bodies; and 11 national-level cooperative organizations under its administrative control. In addition, two authorities, namely, the 'Protection of Plant Varieties and Farmers Rights Authority' and the 'National Rain-fed Area Authority' have been set up. Besides, the Department essentially supplements and complements the efforts being made by the state governments to promote agricultural production and productivity.

Agriculture being a State subject, it is the responsibility of the State Governments to ensure

growth and development of the sector within their respective State. Accordingly, separate departments have been set up in several States.

Several significant initiatives have been taken in recent years by the Government in order to reverse the downward trend in agricultural production. They are Rashtriya Krishi Vikas Yojana (RKVY); National Policy for Farmers 2007, the primary focus of this policy is on 'farmer' defined holistically and not merely on agriculture. In that sense, it is much more comprehensive than an Agriculture Policy. The objective is, inter alia, to improve the economic viability of farming through substantially improving net income of farmers. Needless to say, there is emphasis on increased productivity, profitability, institutional support, and improvement of land, water and support services apart from provisions of appropriate price policy, risk mitigation measures and so on.), Expansion of Institutional Credit to Farmers, National Rural Health Mission, National Food Security Mission, Rashtriya Krishi Vikas Yojana to incentivize the states to invest more in agriculture, Integrated Food Law, Legislative Framework for Warehousing Development and Regulation, Protection of Plant Varieties and Farmers' Rights (PPVFR) Act, 2001, National Bamboo Mission, etc.

The rapid growth of agriculture is essential not only for self-reliance but also for meeting the food and nutritional security of the people, to bring about equitable distribution of income and wealth in rural areas as well as to reduce poverty and improve the quality of life. Growth in agriculture has a maximum cascading impact on other sectors, leading to the spread of benefits over the entire economy and the largest segment of population.

2.4.1 Fisheries

There exists several investment opportunities in the sector for the entrepreneurs world over. But, there are several challenges and issues facing the fisheries development in the country, such as, accurate data on assessment of fishery resources and their potential in terms of fish production; development of sustainable technologies for fin and shell fish culture; yield optimization; harvest and post-harvest operations; landing and berthing facilities for fishing vessels and welfare of fishermen; etc.

In the high altitude areas with snow-fed rivers, there is perhaps ample scope of culture of fishes like Brown and Rainbow trout, Scale and Mirror carps, Leather carps etc. Due to extensive network of rivers in the Himalayan mountain region, there is a tremendous potential for pisciculture.

There are several examples of successful fish culture in plains, but hill and mountain areas are still lacking in this sphere. Non-availability of flat land, fish seeds, appropriate technology, training and marketing are some of the obstacles in the way of commercial fishery in the hill regions. Therefore, culture fishery is not well developed in these areas and people depend on capture fishery. In Sikkim, an extensive enterprise for fish culture does not exist except for some stray fish farms being developed.

2.4.2 Sericulture*

Silk is a way of life in India. Over thousands of years, it has become an inseparable part of Indian culture and tradition. No ritual is complete without silk being used as a wear in some form or the other and is also called as The Queen of Textiles. It is characterized by exquisite qualities like the natural sheen, inherent affinity for dyes, vibrant colours, high absorbance, light weight, resilience and excellent drape, etc. Sericulture and Silk Textiles Industry is one of the major sub-sectors comprising the textiles sector. Sericulture is an agro-based cottage industry. Sericulture refers to the mass-scale rearing of silk producing organisms in order to obtain silk. Sericulture is an agro-based labour intensive industry. The major activities involved in a sericulture industry are:

a) Cultivation of silkworm food plants
b) Rearing of silkworms for the production of raw silk
c) Reeling the cocoons for unwinding the silk filament and
d) Other post-cocoon processes such as twisting, dyeing, weaving, printing and finishing.

Sericulture is one of the most labour intensive sectors, combining activities of both agriculture (sericulture) and industry. India is ranked as the second major raw silk producer in the world. It is this position along with its immense employment potential that makes sericulture and silk, indispensable in the Indian textile map.

Sericulture is one of the rural based agro industries with global reach. While providing sustainable income and employment opportunities to the rural poor who are the main practitioners, silk production activity fetches annual export earnings of more than US$600 million (http://www.seri.ap.gov.in/poten_part_women_seri.pdf). Some unique features of the silk sector are its rural nature, agro based, ecologically and economically sustainable activity for the poor, small and marginal farmers, agriculture labour and women in particular. Many studies indicated that 60% of the activities in the pre-cocoon and post-cocoon sectors are carried out by women.

*"Empowering Farming Females through Sericulture-A Study of Rural Area of Sikkim in North- Eastern India", Nidhi Dwivedy, "Asian Journal of Management (AJM)" 3(4): Oct.-Dec.,2012, Pp. 219-228, ISSN- 0976- 495X.

2.4.2.1 Women in Sericulture

Sericulture is a small scale industry which is an important entrepreneur for rural families. The role of women as agricultural labourers in mulberry cultivation is important because mulberry garden requires labour from the beginning for pruning, weeding, application of farm yard manure, fertilizers and other jobs. An acre of land optimally requires 10 labourers out of which 7 would be women (Rani Usha J., 2007). The main work involves plucking of leaves for feeding the silkworms. At the rearing houses the activities that are performed by women are as follows:

a) Cleaning the rearing house, before the silkworm are raised.
b) Getting the trays ready for further extension of bed.
c) Feeding the worms after the 3rd instar which has to be done 4-5 times per day.
d) Changing the bed in each of the trays. (At least 56-60 trays will be there, by the time they reach the 5th instar)
e) Placing the worms in the mount ages i.e. around 120 of them.
f) Harvesting the cocoon.
g) Cleaning the cocoon and removal of floss grading.
h) Marketing of cocoon though very few women takes up this job, as it takes time in the market.

When the crop of rearing is over, women have to clean and get the trays smeared with cow dung and get ready for the next rearing. (Chelladundi, 1999) in his study on 'Employment generation in Sericulture' concluded that sericulture provides two types of employment:-

a) Direct – mulberry cultivation and cocoon rearing
b) Indirect –Reeling, twisting, warping, dyeing and weaving.

The role of sericulture in generating employment and income is discussed in a very clear-cut manner. The criterion of employment and income in silk reeling units is also dealt with Radha (Krishna et al. 2000) in their study on 'Silk and Milk- an economic package for rural upliftment' explained that an acre of irrigated mulberry generates as much as one lakh rupees per year through transaction of cocoons and provide full employment to a minimum of 5 men throughout the year. Silk is a high value but low volume product accounting for only 0.2 % of world's total textile production. It churns out value added products of economic importance.

2.4.2.2 Types of Silk

India holds the monopoly on producing the Muga silk. It is the only one cash crop in agriculture sector that gives returns within 30 days. Sericulture emerged as an important economic activity, becoming increasingly popular in several parts of the country, because of its short gestation period, quick recycling of resources. It suits very well to all types of farmers and exceptionally for marginal and small land holders as it offers rich opportunities for enhancement of income and creates own family employment round the year (http://business.gov.in/agriculture/current_scenario_sericulture.php).

There are five major types of silk of commercial importance, obtained from different species of silkworms. The five verities of silk may be divided into two broad categories:-

i.) **Mulberry Silk**
ii.) **Vanya Silk or Non-Mulberry Silk** (all other varieties of silk fall in this category)

i.) Mulberry Silk

It comes from the silkworm, Bombyx mori L. which solely feeds on the leaves of mulberry plant. The bulk of the commercial silk produced in the world comes from this variety. In India, the major mulberry silk producing States are Karnataka, Andhra Pradesh, West Bengal, Tamil Nadu and Jammu and Kashmir which together accounts for 92 % of country's total mulberry raw silk production.

- **Climate**

Mulberry can be grown up to 800 m MSL. For the optimum growth of mulberry and good sprouting of the buds, the mean atmospheric temperature should be in the range of 13^{o} C to 37.7^{0} C. The ideal temperature should be between 24 and 28^{0} C with relative humidity of 65 to 80 percent and sun shine duration of 5 to 12 hours per day. Mulberry can be grown in a rainfall range of 600mm to 2500mm. Under low rainfall conditions, the growth is limited and requires supplemental irrigation. On an average, 50mm once in 10 days is considered ideal for mulberry.

- **Soil**

Slightly acidic soils (6.2 to 6.8 Phosphorus) free from injurious salts are ideal for good growth of

mulberry plant. Saline and alkaline soils are not preferred.

ii.) Temperate Tasar Silk:

It is generated by the silkworm, Antheraea mylitta which mainly thrive on the food plants Asan and Arjun. Tasar (Tussah) is a copperish colour, coarse silk mainly used for furnishings and interiors. In India, the major tasar silk producing States are Jharkhand, Chhattisgarh and Orissa, Maharashtra, West Bengal and Andhra Pradesh.

a) **Tropical Tasar silk or Oak Tasar Silk**:

It is a finer variety of tasar generated by the silkworm, Antheraea proyeli J. which feeds on natural food plants of oak. In India, it is mainly produced in the sub-Himalayan belt of India covering the States of Manipur, Himachal Pradesh, Uttar Pradesh, Assam, Meghalaya and Jammu and Kashmir.

b) Muga Silk:

It is a golden yellow colour silk obtained from semi-domesticated multivoltine silkworm, Antheraea assamensis. These silkworms feed on the aromatic leaves of Som and Soalu plants. Muga Silk is the pride of Assam and is an integral part of the tradition and culture of the State.

c) Eri Silk (or Endi or Errandi):

It is the product of a domesticated silkworm, Philosamia ricini that feeds mainly on castor leaves. It is a multivoltine silk spun from open-ended cocoons, unlike other varieties of silk. In India, this culture is practiced mainly in the North-Eastern States including Assam. It is also found in Bihar, West Bengal and Orissa. Ericulture is a household activity practiced mainly for protein rich pupae, a delicacy for the tribal. Resultantly, the eri cocoons are open-mouthed and are spun. The silk is used indigenously for preparation of chaddars (wraps) for own use by these tribals.

Geographically, Asia is the main producer of silk in the world and produces over 95 % of the total global output. But, bulk of it is produced in China, India, Japan, Brazil and Korea. India is ranked as the second major raw silk producer in the world. It contributes about 18% to the total world raw silk production.

Among the varieties of silk produced, mulberry silk accounts for 89.45%, followed by eri, tasar

and muga at 8.04%, 1.89 and 0.62%, respectively. About 40-45% of silk produced is from charka and about 40-45% is from cottage basins and the rest 10% silk is from multi-end reeling. It is this position along with its immense employment potential that makes sericulture and silk, indispensable in the Indian textile map. It is practiced in about 53,814 villages all over the country. It provides employment to about 6 million people, most of them being small and marginal farmers, or tiny and household industry mainly in rural areas. (http://business.gov.in/agriculture/state_departments_sericulture.php#top).

Sericulture is an eco-friendly agro-based labour intensive rural cottage industry providing subsidiary employment and supplementing the income of rural farmers especially the economically weaker section of the society. In the development of sericulture industry, the role of State Governments has customarily been the expansion of sericulture activity and provision of farmer level extension as well as other support services, including credit facilitation.

India being blessed with prevalence of favourable climatic conditions, mulberry is cultivated in almost all states. But, traditionally sericulture is practiced in Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Jammu and Kashmir, which together accounts for 92 % of country's total mulberry raw silk production in the country. Muga is twined with the culture of Assam and has the monopoly. In the recent years, muga rearing is extended to other states like Mizoram, Arunachal Pradesh, Manipur, Uttarakhand, Andhra Pradesh, and West Bengal. Now, as a result of growing realization, sericulture is gaining ground in non-traditional areas too. Sericulture and Weaving in Meghalaya are the two most important cottage based, eco-friendly industries in the rural areas. The thrust area under sericulture sector is to boost up cocoon and silk production by development of systematic and economic plantation at sericultural farmers level so as to enhance the productivity per unit area. In-service training of technical personnel and training for the educated unemployed youth for self-employment are also provided. Andhra Pradesh produces all the four popular varieties of Silk worm cocoons namely Mulberry, Tasar, Eri and Muga. In Tamilnadu, the Handlooms, Handicrafts, Textiles and Khadi Department was formed in 1985. It is also concerned with the development of Sericulture in the State for the welfare of weavers / artisans.(http://business.gov.in/agriculture/policies_schemes_sericulture.php)

2.4.2.3 Policies and Schemes

There are several centrally sponsored schemes for promotion and development of sericulture sector, through which Government of India has been undertaking different activities like:

a) Creation of sericulture related infrastructure;
b) Development of nurseries and farms;
c) Expanding plantation areas;
d) Providing technical know-how to the rearers in production and marketing of co-coons;
e) Skill up-gradation and training programme, etc.

The Central Silk Board has been implementing the catalytic development programme for development of sericulture in collaboration with the State Governments and also through the cluster approach/SGSY programme of the Ministry of Rural Development.

It aims to promote adoption of improved technology practices in various activities like host plantation, seed production, rearing of silkworm, reeling and twisting, weaving, printing and dyeing for enhancement of production and productivity as well as up gradation of the quality of silk.

The basic objectives of the programme are technology absorption, investment generation, productivity improvement and employment generation. Supports is also given in the operations ranging from food plant cultivation to marketing of products in mulberry, tasar, eri, muga silk and producing quality cocoons and raw silk in the silk producing States. For this, financial assistance with the subsidy/assistance is also to be provided to the beneficiaries by both Silk Board and the concerned State Government.

Support and incentives are provided mainly to small and marginal farmers and small entrepreneurs, under both on-farm and off-farm activities, in mulberry and non-mulberry sectors. The Central Silk Board has been implementing various schemes/projects for the development of sericulture by monitoring the flow of funds. It also plays a pivotal role in advising the Government on matters related to the silk industry.

2.4.2.4 Some more valuable information in mulberry cultivation and sericulture-

These are some of the answers for the queries of the problems faced while carrying out sericulture with mulberry plantation in Pampore, which can prove to be very helpful, whosoever will be facing problem while carrying out such activity.

Tree plantation of mulberry is to be carried out in the month of July (rainy season). However,

under temperate conditions, it is done in the month of March and October. For mulberry plantation the soil should be slightly acidic (pH 6.2 to 6.8). Make bundle of 20 kilograms and preserve in vertical position as moisture loss in such position is minimum. Mulberry shoots are to be transported during cooler hours of the day. If they are to be transported to long distance and takes more than 30 minutes, they should be covered with wet gunny cloth, polythene sheet to reduce moisture loss from the leaf. However, for qualitative production of leaves the recommended package of practices, use of integrated nutrient management and integrated disease, insect and pest management is to be followed. So many intercrops can be grown with mulberry. The studies conducted at CSR and TI, Pampore have revealed that crops like saffron, peas, and beans can be cultivated as intercrop with mulberry without affecting the leaf quality and yield. The different high yielding mulberry varieties that can be grown as tree under Kashmir conditions are Goshoerami, KNG and TR-10 to get quality foliage besides high yield. The most preferable season for planting mulberry saplings in Kashmir is 1st week of March and October- November. Sericulture department of the state or its subunits in the particular area can be contacted. Serichlor' is used to disinfect the rearing houses. However, as it is carried out by the Government agencies, farmers will have not to bother. The quantity of solution required for disinfection of rearing houses is @ 2.0 liters / sq. meter or 140 ml / sq. ft. the hygienic measures which are required to be followed during rearing are - avoid borrowing rearing appliances, do not use appliances without disinfections, restrict entry of persons into rearing house, persons entering the rearing house must disinfect feet and hands before entering, sprinkle 5% bleaching powder in slaked lime at the passage of entrance, wipe the floor after each bed cleaning. Bed disinfectants used for prevention of diseases are RKO, Resham Jyothi, Vijetha, Ankush etc. Vijetha as bed disinfectant was tested and was found to give best result over others. There should be cross ventilation as higher % of CO2 in the rearing house is injurious to health of larvae. Spinning larvae can be identified by these features - these larvae feed less, become soft, litter becomes light brown colored which can be crushed with fingers, skin becomes gradually transparent, crawl here and there in search of space for spinning, larvae tend to move to darker areas.(http://www.csb.gov.in/faq/csrti-pampore/)

In reality, it is an occupation by women and for women, because women form more than 60% of the workforce and 80% of silk is consumed by them. The nature of work involved in the sericulture industry such as harvesting of leaves, rearing of silkworm, spinning or reeling of silk yarn and weaving are carried out by women. Keeping in mind the major role played by the women in the industry, exhaustive training programmes have been organized for them. Till date, about 2500

farm women have been trained from different States like Karnataka, Andhra Pradesh, Tamil Nadu, Kerala and Maharashtra. Important disciplines which boosts the skill and income like Integrated Nutrient and Disease Management, Young Age silkworm Rearing, Composite Rearing, Integrated Pest and Disease Management, Silkworm Seed Production, Value Addition to By-products of Sericulture Industry and Drudgery reduction through ergonomically sound appliances are intensively covered during the training.

Due to continuous R and D output in sericulture, several technologies have been evolved and due to this, production cost of cocoon has been reduced considerably. Recently, with the enforcement of these new research findings both in mulberry cultivation and silkworm handling has become more economical, the silk industry is now being practiced as a main profession and as a major cash crop of the country in many States (http://business.gov.in/agriculture/future_prospects_sericulture.php).

2.4.2.5 Hindrances of Sericulture

The Indian sericulture industry is currently facing several problems which have restricted full utilization of its potential. Some of the major problems are given below.

- **Produce Good Quality Bivoltine Silk:**

Indian silk yarn is of poor quality, which not only affects our competitiveness in the world market, but has also resulted in a preference for imported yarn in the domestic market. Though the Indian breeds have the potential to produce the good quality of bivoltine silk, the problem arises due to lack of:

a) Sufficient thrust on the adoption of improved technologies;
b) Strict disease control measures;
c) Quality leaf due to insufficient inputs to mulberry garden;
d) Appropriate montages;
e) Grading system for cocoons;
f) Quality-based pricing system as well as use of young age silkworms.

Bivoltine yarn is sturdier and is used by the power loom industry. But only 5% of the silk produced in India is bivoltine because its production requires much more attention and resources. It also yields just two crops in a year, as against the yield of four to six crops by multi-voltine silk.

Even the farmers do not have any incentive to switch to bivoltine silk yarn production because the difference between the selling price of bivoltine and multivoltine silk is not much.

- **The Other Factors Responsible for it are:**

a) Insufficient adoption and proliferation of technology packages developed through Research and Development efforts;
b) No effort to increase the area under mulberry;
c) Fragmented and ad hoc approach;
d) Non-involvement of private partners in a big way in seed production; farming and reeling;
e) Non-penetration of the schemes;
f) Improper forward and backward linkages; and
g) Dumping of cheap Chinese raw silk and fabric.

It is necessary to encourage farmers to move from production of multivoltine silk to bivoltine silk through proper incentives. At the same time it must be ensured that adequate amount of multivoltine is available for the handloom sector to continue production. Its production in the country continues to be unsteady and fluctuates from year to year. With its uniqueness, non-mulberry silk production in India has a great potential for value added exports.

- **Need for Quality Based Pricing:**

Reeling sector is an input-dependent activity and its operations are influenced heavily by three factors, namely, cocoon quality, cocoon price, and cocoon supply. But due to absence of quality-based price fixation, there has been very little quality control.

Given the fact that the scope for enhancing the production of silk in the country by expanding the cultivable area is limited, hence, vertical expansion through productivity increase by using advanced technology and skilled man-power is the only option. In fact, emergence of new sericulture technology has not only reduced the production risks (drudgery) but has also increased the potential cocoon yield/unit area, relative to the traditional technology.

2.4.3 Floriculture

Human cultivation and use of saffron has more than 3,500 year's timeworn association. Saffron, a spice derived from the dried stigmas of the saffron crocus (Crocus sativus), has through history remained among the world's most costly substances. With its bitter taste, hay-like fragrance, and

slight metallic notes, the Apo carotenoid rich saffron has been used as a seasoning, fragrance, dye, and medicine. Saffron is a genetically monomorphic clone native to Southwest Asia; it was first cultivated in Greece. (http://en.wikipedia.org/wiki/History_of_saffron)

Saffron is cultivated in Pampore town of Pulwama district in the state of Jammu and Kashmir. Pampore is located at 34.02°N 74.93°E. It has an average elevation of 1,574 metres (5,164 feet). The town is situated on the eastern bank of Veth also known as Jehlum (in Urdu).

India's saffron consumption is estimated at 20 tons a year, half of which is met by Iran, Spain and China, world's major saffron producers. Kashmir is one of the only four producers of saffron in the world, barely consumes a fraction of what it produces. Most of its output goes to the plains with exports of just about 4,000 kg. Historically, Pampore has remained Kashmir's main saffron grower for over thousand years (The Economic Times, 2011, website).

Pampore derives its name from its erstwhile name which was called ‘Padma pore’ which meant ‘Land of Gold’ (Saffron). Saffron crocus is an autumn-flowering perennial plant. Experts said it grows best in friable, loose, low-density, well-watered and well-drained clay-calcareous soils with high organic content. The delicate saffron flowers begin to grow after the first rains and the blooming period is usually around mid-October, following which the flowers are harvested. Raised beds are traditionally used to promote good drainage, they said. According to experts, the saffron grown in Pampore is of the “best quality”. Saffron the spice, also called ‘Kesar’ and ‘Zaffran’ in Kashmir, has medicinal properties and is known to help cure mild Alzheimer’s disease, heart disease, gastrointestinal ailments and depression. It is sold for Rupees 85,000 per 85 grams in the domestic market, and offers livelihood to saffron farmers in five districts across the state. At an elevation of 5100 feet above sea level and sprawled all across the Eastern bank of the Jhelum River, Pampore has Mediterranean Maquis which is best suited for the cultivation of Saffron. Today, Saffron is used as a seasoning, colouring, aromatic and curative agent.

2.4.4 Apple Growing

The apple is a native of South Western Asia. During 1990s, the European settlers introduced apple in the two valleys of La-chen and La-chung **in Sikkim**. It is also cultivated in Yuksum area of North Sikkim (Government of Sikkim, Krishi Bhawan 1). It requires for two to three months cold temperature below 40^0 F. In India it is grown generally at an elevation of 1600-2300 metres (Government of Sikkim, Krishi Bhawan 2).

2.5 Traditional Knowledge in Plants, Agriculture/related activities and its Management/Practices by Female Farmers

Indigenous Knowledge (IK) can be broadly defined as the knowledge that an indigenous (local) community accumulates over generations of living in a particular environment. This definition covers all forms of knowledge – technologies, know-how skills, practices, plant knowledge and its use, and beliefs – that enable the community to achieve stable livelihoods in their environment. A number of terms are used interchangeably to refer to the concept of IK, including Traditional Knowledge (TK), Indigenous Technical Knowledge (ITK), Local Knowledge (LK) and Indigenous Knowledge System (IKS).

In 2001, Government of India, set up the Traditional Knowledge Digital Library (TKDL) as repository of 1200 formulations of various systems of medicine in India namely (AYUSH) Ayurveda, Yoga (1500 Yoga postures i e. asana), Unani, Siddha and Homeopathy. Along with this Tibetan Medicine is also prevalent in the Himalayan Region translated into five languages — English, German, French, Spanish and Japanese (Know Instances, 2010 and (TK). India has also signed agreements with the European Patent Office (EPO), United Kingdom Trademark and Patent Office (UKPTO) and the United States Patent and Trademark Office to reduce commercialization of traditional medicines by giving patent examiners at International Patent Offices access to the TKDL database for patent search and examinations purposes (India Partners, and CSIR 2010).

According to the World Health Organization (WHO), 80% of the population in developing countries relies on traditional medicine, mostly in the form of plant drugs for their health care needs. (Wambebe, 1990) and (Manandhar, 1980) also hold the similar view. Additionally, modern medicines contain plant derivatives to the extent of about 25%. The demand for these medicinal plants is increasing both in developing and the developed countries because the disease curative property of its derivatives are non-narcotic having no side effects. (Bhattarai, 1988 and Justice, 1981) reported that when modern health care fails, the patient frequently turns to use of indigenous health care. This is the reason behind dramatic increase in the exports of medicinal plants in the last decade. The ecosystems of the Himalayas, the Khasi and Mizo hills of northeastern India, the Vindhya and Satpura ranges of northern peninsular India, and the Western Ghats contain nearly 90 percent of the country's higher plant species and are therefore of special importance to traditional medicine. Although, a good proportion of species of medicinal plants do occur

throughout the country, peninsular Indian forests and the Western Ghats are highly significant with respect to varietal richness (Parrota, 2001). Himalayan Region is known as the home land of these plants. Some of them are found at very high altitude which generally cannot live elsewhere. Because of the development activities are taking place in the State, hundreds of species are now threatened with extinction. If these practices continuous, there is every possibility that whatsoever resource of them is available with us may get extinct, so, every effort should be done to conserve them. It is estimated that there are over 7800 medicinal drug manufacturing units in India, which consume about 2000 tons of herbs annually (Singh H.P., 2001).

Traditional knowledge encompasses the beliefs, knowledge, practices, innovations, arts, spirituality, and other forms of cultural experience and expression that belong to indigenous communities worldwide. In many cases, traditional knowledge has been orally passed for generations from person to person. Traditional knowledge can also reflect a community's interests. Some communities depend on their traditional knowledge for survival. The rationale for protecting traditional knowledge centres on questions of fundamental justice and the ability to protect, preserve and control one's cultural heritage. There is also the concomitant right to receive a fair return on what these communities have developed: many areas of traditional knowledge have potentially lucrative applications.

2.6 Challenges Faced by Women

- **Health Problems Due to Drudgery Prone Agricultural Work**

(NCW, 2004).This study was undertaken to assess the status of women who are involved in agriculture. The population of females increased from 117 million to 407 million between 1901 and 1991. A sectorial profile of the female work force indicated that more than 80% female workers are engaged in the agriculture sector in rural India. High percentage of independent participation of women (43%-81%) was observed in all homestead activities like cooking, cleaning, collection of fuel, fetching water, care of children, etc. Independent participation of women was found to be very marginal in major crop production (1%), post-harvest activity (2%), livestock management (6%), and entrepreneurial activities (0%). This indicated the involvement of men in skilled agricultural work, and limiting the role of women to drudgery prone, unskilled activities like weeding, transplanting, harvest cleaning, grading, etc. The drudgery involved in household and agricultural work is tremendous and leads to several health problems. It has been seen that the most common occupational health hazard of women is overwork.

- **No Recognition of Women's Participation**

(Kulkarni, 1 9 8 3) It is unfortunate that because of centuries of inertia, ignorance and conservatism, the actual and potential role of women in society has been ignored, preventing them from making their rightful contribution to social progress. Even in the context of the "Green Revolution" which is considered a successful breakthrough in the "food sufficiency" campaign of India, there is no recognition or specific mention of women's participation. The lack of education, burden of family work and poor economic status were some of the serious problems women faced while lack of information, lack of technical knowledge, lack of training and lack of time were other problems. (Uma Rani et. al, 2003) also shares the similar views and suggested that there is a need to reform the social security system to recognize the value of women's labour at home.

- **Agro-Processor Women Lost their Incomes and Livelihoods in the Competitive World**

(NCW, 2005, pp-185) 'Impact of WTO on Women in Agriculture', released in January 2005, studies the plight of rural Indian women through public hearings in Punjab, West Bengal, Karnataka and Bundelkhand. This is the first such assessment of the gender impact of the WTO and the globalization of agriculture. The study claims that owing to the switching over the policy's stand of making agriculture a commercial operation, the status of women in agriculture has declined. The second part of report which deals with reports on the jan sunwais reveals about 'Public Hearing held in Bundelkhand' that the landless women of Bundelkhand complained that they had no property rights, and demanded that their right to property be recognized. Women of the region have traditionally been agro-processors and have the expertise in preparing gur, achaar, van papad, soaps, herbal concoctor for common ailments, rassi (rope) and baskets from kaans grass and baans (bamboo).In this competitive world, since there is shrinking demand of these products, so, most of the agro-processing units in the region have been closed down which rendered them jobless. But now as the market is flooded with plastic rope and plastic baskets, women have stopped making rope and baskets from the traditional grasses and bamboo also. They do not find market for soap and herbal concoctor ether and paper either, so they have stopped these activities also. On the whole, women have lost their incomes and livelihoods in the agro-processing sector. But they want the revival of the agro-processing sector in the region, as well as market for their produce.

- **Double Workload Does not allow looking after themselves**

(Gill J K et. al. 2007)Farm women were of the opinion that their participation in agricultural activities means their families were able to improve the overall standard of living. As regards the impact of farm women's participation on the social status of the family, farm women felt that they were able to spend more money on social rituals and had better interaction with people in the village than their non-farm women counterparts. But at the same time they noticed a negative impact on their personal health since they had less leisure time to relax, fatigue due to a double workload, uncomfortable working positions and frustration when their work was not recognized because no credit was given to the wives' financial contribution. They also felt the negative impact on their children because they were unable to help their children with their studies and that consequently, their children lacked interest in their studies because the women were busy performing agricultural and allied activities in addition to their household responsibilities. These findings are supported by (Kaur, 1996).

- **Plight of the Schedule Caste (SC) Women**

The access of women particularly those belonging to weaker sections including Scheduled Castes/Scheduled Tribes/ Other backward Classes and minorities, majority of whom are in the rural areas and in the informal, unorganized sector – to education, health and productive resources, among others, is inadequate. Therefore, they remain largely marginalized, poor and socially excluded.

(NCW) 1998 Schedule Caste (SC) women agricultural labourers who worked in fields of high caste landlords were exposed to all sorts of humiliation and abuse, including sexual harassment. Under the age old concepts of Artha, Dharma, Kama and Moksha, the economic dependence of SC households on agriculture, has over the centuries created a divide between those who own lands and those who do not own lands. In rural areas, it was always the SC women agricultural workers who were at the receiving end.

- **Exploitation of the Traditional Knowledge of Tribal Women**

The history and traditional knowledge of agriculture, particularly of tribal communities, relating to organic farming and preservation and processing of food for nutritional and medicinal

purposes is one of the oldest in the world. Concerted efforts will be made to pool, distil and evaluate traditional practices, knowledge and wisdom and to harness them for sustainable agricultural growth. (Awais Mohammad et. al.2009)Because of economic and social backwardness, low level of literacy, terms of patents and intellectual property rights arising out of various international treaties/instruments on trade and common property resources such as TRIPs and WTO represent a real threat to the economic livelihood of the tribal women and a source of potential exploitation of their resource base as bio-diversity expressed in life forms and knowledge is sought to be converted into private property and treated as an open access system for free exploitation by those who want to privatize and patent it.

- **The Productivity of Female Labour is Low**

According to (Joshi, 1999), the productivity of female labour is low. It is also very low in agriculture sector. At the price level of 1980-81, in 1950- 51, the productivity per labour was Rs. 2305 which increased to Rs. 2794 and further increased to Rs. 3157 in 1990. The productivity has not doubled in last 40 years in agriculture sector whereas the mining and mineral sector productivity per labour is Rs. 13417, manufacturing sector of Rs. 11099, power gas and water supply sector Rs. 14608, construction sector of Rs. 16210, commerce and business Rs. 13136 and in other service sector, it is Rs. 14625. Thus productivity of agriculture labour is very low compared to other sector. It is also observed that the productivity of female agriculture labour is really low compared to that of male labour. Female agricultural labours do not enjoy any maternity leave and do not get proper rest after childbirth.

- **Various Obstacles to the Official System of Credit**

Despite the constraints of the unofficial system of credit, it is still today widely used and very useful for small producers and for rural women in particular. Since there are numerous obstacles in obtaining the official credit system (from public or private national banks, rural banks, or development banks), many people still retain the unofficial system as a source of savings and loans even if this alternative has a number of negative implications. Rural women often use this system as they need small amounts of cash and the loans are granted according to social, relational and cultural conditions, and not according to purely economic conditions which would not allow women to benefit from them. Rural women have little access to information concerning official savings/loans institutions. In fact, dissemination of information from bank regarding rural credit is also a problem with the rural environment in general, and with women in particular mainly

because of illiteracy. The rare extension programs concern their operating and financial services, targeting mainly farmers, without worrying about the specific nature of female problems. This means that rural women have a very limited idea of the nature of institutional savings/loans facilities. Moreover, rural women are often considered as being insolvent because they are sub-sistence farmers, and are seen as a high-risk population for finance institutions. Banks and financial institutions hesitate to grant loans to women, as they are usually small loan takers and do not provide a good enough return for the banks.

- **Low Economic Position does not Allow Women to Afford Costly Inputs**

(Tiwari Nivedita, 2010), The discouraging agricultural price policy of the government makes growers nervous while discrimination in remuneration/wages for women working in the field and their poor purchasing power does not allow them to get the necessary inputs. Agricultural inputs available in the market are very costly, while the supply of electricity is irregular and government seed/fertilizer stores do not make the necessary inputs available to women farmers or at the right time, or in the quantity needed. Diesel generally disappears from the market at irrigation and threshing times when it is needed most. There are no special training programmes to develop women's agricultural practices and technological skills.

- **Low Agricultural Income Lead to Ill Treatment**

(NCW, 2005, pp-177-184) The second part of report which deals with reports on the 'jan sun-wais' reveals about 'Public Hearing held in Bundelkhand' that the traditional central role of women in the food chain is being broken with the onset of the globalized food industry. This has led the women to bear the skewed costs of displacement. As the income of farmers in general and women in particular are eroded they are displaced from productive roles, and the patriarchal power system that controls the assets further erodes the status of women leading to their margin-alization and increased violence against them. The report says that occupying almost 70,000 square kilometers of the central plains in India, the Bundelkhand stretches over twelve districts of northern Madhya Pradesh (MP) and five districts of Southern Uttar Pradesh (UP). Because of the remoteness of the region, basic infrastructural facilities are lacking here. As such the area has one of the lowest levels of economic and human development in the country forcing the inhabitants to live in poverty. Agriculture plays an important role in the Bundelkhand economy and it is not considered a commercial activity here. The principle crops in the area are cereals such as wheat, rice, and barley. Crop productivity is among the lowest in the country, and even the value of

agricultural production per hectare in the region is 1.4 times less than for Central India. Women play an equal role in agriculture. The women want to do farming of traditional crops, like their traditional wheat, rice and pulses. But they are unable to find a market of their fine rice varieties, and the policy of the state does not allow rice of the region, like Kanda and Katka, to go to other states, which is not a favourable policy for women. The rice variety mushkin of the region is one of the finest varieties, yet state does not allow the variety to be exported to other states. As the market for this rice is not enough within the region, so this variety is in danger of getting lost. These traditional fine rice varieties are not bought by the state, and neither are they allowed to sell them in other states. These way farmers would tend to stop growing the traditional varieties, which would then get lost. Because of decline in farmers' incomes women are getting ill-treated in their homes. Violence against women is growing at an alarming rate. Men are turning to liquor, which adds to women's problems in a low-income household. They suffer from malnutrition and also harassed for dowry. Women farmers are unable to get loans from banks, as they fail to provide any security to the bank.

- **Health Hazards of Agro-Chemicals**

(Chekkutty N. P., 2005), The research project 'Impact of WTO on Women in Agriculture', conducted in combination with public hearings from various parts of the country, offers an in- depth analysis of the impact of WTO policies on women in India. NCW chairperson Poornima Advani released the report in January 2005. She notes that most farm operations in India are traditionally women-centred. Women are the providers of food, the custodians of our crop biodiversity heritage and food diversity. Our food security depends mainly on the work of women. One of the impacts of WTO which has been exhibited in it says that as globalization shifts agriculture to a capital-intensive chemical-intensive system, women bear the disproportionate costs of both displacement and health hazards. The introduction of herbicides and weedicides, as part of commercial farm operations, has badly affected women, as they have a monopoly over weeding and hoeing. Women farm workers are also more exposed to health hazards like gynaecological infections, arthritis, and intestinal and parasitic infections, with no medical allowances for treatment, due to the increased use of agro-chemicals.

- **Lack of Technical Background and Awareness Hinders the Adoption of New Technology**

(Meena, HR, 2006)In Udaipur district of Rajasthan various constraints perceived by farmers in

the adoption of recommended Jatropha cultivation were studied to prevent soil deterioration and poverty. This technology has a huge potential for replication nationwide and improving the livelihood of many. It can be used to replace petrol/diesel, for soap production and for climatic protection. Jatropha can help to increase rural income, promote self-sustainability and alleviate rural poverty. But at present this crop is not cultivated on scientific lines and is merely grown as fencing or a wild plant. The present findings are in accord with the findings of (Neelam, 2006).Lack of technical guidance and information, Inadequate training facilities for acquiring skills about Jatropha cultivation technology, Lack of suitable plantation schedule, Long gestation period of Jatropha, Lack of knowledge about scientific cultivation of Jatropha, Lack of awareness of economic value of Jatropha seeds, , Adverse climatic and edaphic factors for the survival of plants i.e. climatic factors of the area are not suitable for cultivation of Jatropha plants in the summer season are some of the reasons for non-adoption of its cultivation. (Chandel et. al., 2008) Women farmers lack knowledge and skills of the latest technologies of farm-related operations. Agricultural practices, non-availability of technology and inputs are the major constraints faced by farm women. These findings are supported by the findings of (Umale et al. 1991) and (Meena, 2005).

- **Work in the Unorganized Sector is Not Counted and Hence Remains Invisible**

The social and demographic profile of the workers in plantation sector such as rubber indicates certain interesting patterns. The sex wise segregation of the workers reveals stinking skewed distribution of work force with lower participation of women. However a probing into the poor participation of women in the occupation revealed the invisible participation of women (Remesh, 2004). Quite often, the male tapers are found supported by female members and even children of the family. The male tapers get considerable assistance from their family members for collecting the latex, transportation of latex and preparation of rubber sheets; Usually the male tapers start tapping in the pre early hours of the day and the women and children are found joining the work with a lag of two-three hours. Here; though the work is carried out collectively, the contribution of women and children remain invisibles as they are neither recognized nor remunerated as assistants. The lower absorption of women labour in rubber holdings has been cited as a major issue in the development discourse of the state of Kerala, with the commendable increase in the area under the crop at the cost of female labour intensive crops such as paddy. Too sure of the officials of Rubber Board of India, this argument was one of the factors that tempted the Board to choose a logo that illustrated female tapers at work. The lower participation of women during the initial hours of tapping is mainly due to their engagement in domestic chores. Preparing breakfast and

lunch, sending the younger ones to schools, cattle care and so on carried out by women members, before joining along with some food as helpers during later hours in the morning.

(SEWA, website) Self Employed Women's Association (SEWA) is a trade union registered in 1972. It is an organization of poor, self-employed women workers. These are women who earn a living through their own labour or small businesses. They do not obtain regular salaried employment with welfare benefits like workers in the organized sector. They are the unprotected labour force of our country. Constituting 93% of the labour force, these are workers of the unorganized sector. Of the female labour force in India, more than 94% are in the unorganized sector. However their work is not counted and hence remains invisible.

- **Illiteracy Paves the Way for Discrimination against Wages**

The Plantation Labour Act, 1951 as Amended in 1981, is an Act to provide for the welfare of labour, and to regulate the conditions of work, in plantations. According to this Act, in every plantation, effective arrangements shall be made by the employers to provide and maintain at convenient places in the plantation, a sufficient supply of wholesome drinking water to all workers, medical facilities, canteen, crèches, recreation facilities, educational facilities, housing facilities and annual leave with wages and maternity benefits. In most schools, there is a provision of free mid-day meal for the children of those employees drawing a monthly salary of Rs. 750. Every plantation, employing 50 or more women workers, also provides crèches.

In India, plantation sector occupies a unique position due to its agro industrial features and large number of women in employment. Women are more preferred by the plantation authority because they can be employed on low wages and are more committed. Also they can be easily convinced for the unauthorized deduction from wages, as well as delayed wages because of their subservient nature and low level of education and awareness (Bhadra, 1991).

(NCW, 2005, pp-4-5) The first part of the report is an overview about the assessment of the gender participation and an in-depth analysis of the impact of WTO policies on women in Indian agriculture. In this report the data compiled by Labour Bureau, Government of India from annual returns under the Plantation Labour Act, 1951 shows that nearly 10.9 lakh persons were employed in the plantation sector, comprising 10.2 lakh in tea, 30680 in coffee, 27302 in rubber, 3463 in cardamom, 2696 in cinchona and the remaining in other plantations. At all India level, 50 percent workers in tea and coffee plantations, 34 percent workers in rubber, 62 percent workers in cardamom, 38 percent workers in palm oil and 45 percent in cinchona were women.

However, only 20 to 25 percent of the plantation workers who are employed in large estates above 25 acres and who come under the purview of the Plantation Labour Act get such benefit. About 75 to 80 per cent holdings in tea, coffee and rubber are small and marginal where workers have access to free housing facility, free electricity and drinking water facilities and sometimes even medical care, they do not generally receive many of the benefits indicated above. Particularly women workers do not have access to maternity benefit in smaller estates based on personal interviews. Also the wage rates of these workers are less by Rs. 10 to 20 as compared to those working in larger estates where the workers are organized. Besides, they do not get subsidized rations unlike the organized plantation workers. The report also shows that a substantial part of farm operations in Kerala involve various types of plantations including tea, rubber and coconuts. Ever since economic liberalization became the development mantra, the report states, Kerala has been at the receiving end. Flooded with cheap, highly subsidized agricultural imports, Kerala's agrarian economy has been thrown out of gear. Whether it is imports of palm oil, rubber, coffee or tea, almost every aspect of the state's socio-economy has been negatively impacted. Women carry the heavier work burden in food production, but because of gender discrimination they get lower returns for their work. When the WTO destroys rural livelihoods it is women who lose the most. When the WTO allows dumping, which leads to a drop in farm product prices, women are hit the hardest because their incomes go down further.

The Ministry of Rural Development, Government of India launched on October 2, 1993 the employment programme 'Employment Assurance Scheme (EAS)' to provide gainful assured employment, particularly during the lean agricultural season, in manual work to at least one able-bodied person in poor families, particularly in rural areas. The impact assessment was conducted in two rural development blocks of Mizoram, India. The guidelines clearly stated that equal remuneration should be paid to men and women workers for the same work or work of a similar nature and there should be no discrimination while employing men and women workers. Results of interviews with Village Councils (VCs) revealed disparity in the payment of wages to men and women (Lalnilawma, 2009). Though it could not be verified, the wages paid as recalled by some VCs were Rs. 80/- and Rs. 70/- per man-day for men and women respectively. Some VCs even paid Rs.60/- per man-day for women while men were paid rupees 80/- per man-day. The mode of Payment of wages was mostly made on the basis of attendance registers in cash on a weekly basis. The reason given by VCs for such disparity of wages was that they were not aware that equal remuneration had to be paid to men and women. Above all, it was a general assumption that women contributed less labour as compared to their men counterparts for the

same kind of work.

As described in the NSSO 66th Report, the male-female disparity in wages has continued to be significant, with male wages being 1.4 times the female wages as shown in table 2.8.

Table 2.8: Daily actual wages of male and female workers in 2009-10 (in Rupees)

	Men	Women
Urban private	132	77
Rural private	102	69
Rural public(other than MGNREGA	98	86
Rural MGNREGA	91	87

(NSSO 2011)

Thus, as per NSSO 66th Round, average wage/salary earnings per day received by male casual labours engaged in rural works other than public works was Rs. 102 and for females it was Rs. 69; while in urban areas, the wage rates for casual labours other than public works was Rs. 132 for males and Rs. 77 for females. The difference was also seen in public works, though not as stark as in private works. In rural areas, wage rates (per day) for casual labour in public works other than MGNREG public works was Rs. 98 for males and Rs. 86 for females. The difference was least for casual labour in MGNREG public works, where the wage rate (per day) was Rs. 91 for males and Rs. 87 for females (Women comprised 48 per cent of the person-days in MGNREGS).

2.7 Conclusion

In this chapter we have surveyed the literature on females participating in farming sector in countries of the Asia and the Africa. Studies covered under literature review of this chapter, all point to the conclusion that regardless the geographical area in the developing countries, the sociological condition of the females in farming sector in the selected areas is same. In the hilly areas of Nepal and Sikkim, ploughing is considered a man's job, whereas all other work, though shared by men, is mostly undertaken by women. It has been found that in all the surveyed areas, agriculture is the leading economic sector with majority of its land holdings is small and women are the principal players in it. As small land holdings do not generate much income for them, therefore households in these areas were found rearing cattle and small animals in order to augment their source of income as well as consumption of nutritious food and integrated farming. Women are responsible for most of the drudgery prone activities like planting, weeding, harvesting and transporting of the food produce. They are predominantly engaged in food crop farming and in

the processing of food items yet they are subjected to discrimination in land and cattle ownership. As far as decision making is concerned, it is found that they have more say in the activities of family decisions for which they share more responsibilities. Moreover, joint involvement in decision making has been observed in agricultural/animal and the related activities even though women perform more in agricultural related activities than men. Even they need not be consulted at the time of purchase of animals or change of crop. They face more difficulties than men in gaining access to resources such as land, market, credit and other productivity enhancing inputs and services. Female farmers in these countries are even constrained to formal education therefore are ignorant about the modern scientific and technologic technique. It has been seen in the literature survey that allied sectors (livestock rearing, floriculture, sericulture) are the occupations by women and for women, because women form more than 60% of the workforce in them. The nature of work involved in the allied sectors is mostly carried out by women and they can be gainfully employed in these sectors.

2.8 Research Gap

Our literature review finds a gap that female participation in farming sector has not been studied in Sikkim, though plenty of research is found in other parts of the India as well as in other countries the world over. This gap is mainly attributable to the following reasons:-

- **Social science research in the state of Sikkim is inadequate**

The place researcher selected for study is particularly important because social science research in the state of Sikkim is inadequate despite several incentives provided by the state. There are many reasons for this - including the fact that English education started off late and there are no secondary and senior secondary boards in Sikkim and the State is fully dependent on Central Boards. Very few scholars from North Bengal University and other universities have undertaken research on the socio-political and economic aspects of Sikkimese women. Though a few reports based on the Sikkim census data is found, but, published materials available in the market are based on visits to Gangtok but are not based on field-work analysis.

- **Availability of unreliable data of the North Eastern region before the launching of economic journal "NEDFi Databank Quarterly" on July 2002**

Data on the North Eastern region, though available, is mostly scattered and often proves difficult to gather. Moreover, much of such data collected is often unreliable. Non-availability of reliable

and authentic data on the region often hampers in the making of sound investment decisions by entrepreneurs and business persons, policy directions by policy makers, research by students & others. Now "NEDFi Databank Quarterly" journal has made the research task easy by providing the reliable data of the region.

This research will therefore go some way in filling the major research gaps in sociological studies of participation of females in Sikkim farming sector, especially as it relates to the social relations within the agriculture networks and impacts on farmers 'livelihoods'. This piece of work will be useful for female farmers, development organizations, donors and policy makers, in formulating the development of effective initiatives and policies to support the empowerment of females participating in Sikkim agriculture in particular and females participating in agriculture at any other place in general, in an organic way.

CHAPTER III

METHODOLOGY

Chapter III
Methodology

3.1 The Exploratory Research Question

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

3.2 Objectives of the Study

The **main objectives** of the research work include:

3.2.1 To assess the following parameters:-

(a) Land/ cattle possession and their ownership by the Sikkimese female farmers.

(b) Decision making rights viz-a-viz use of land, plants and livestock.

(c) Employment intensity (Number of hours worked/day).

(d) Access to production resources, inputs, credit and technology of rural female farmers of Sikkim.

(e) The gender participation in crop production and animal husbandry and related activities in the rural area of Sikkim in North- Eastern India.

3.2.2 To assess their views on farming/family roles, integrated farming, Value addition and technology.

3.2.3 To assess their indigenous knowledge related to their farms/animals.

3.2.4 To assess the tangible and intangible contribution they are making to the State.

3.3 Scope of the Study

3.3.1 The study covers Land/cattle possession and ownership status of farming females of Sikkim.

3.3.2 The study includes Decision making rights viz-a-viz use of land, plants and livestock of farming females of Sikkim.

3.3.3 The study includes participation of farming females of Sikkim in farm, animal and related activities.

3.3.4 The study includes Employment intensity (Number of hours/day) of farming females of Sikkim.

3.3.5 The study includes access of farming females of Sikkim to production resources and inputs.

3.3.6. The study has assessed their views on farming/family roles, integrated farming and value addition and technology.

3.4 Delimitations of the Study

Married females living in rural areas who do not participate in farm/animal activities are excluded from the study. Also the male farmers of the rural Sikkim are not the part of the study.

3.5 The Hypotheses

Women function in farms with considerable restrictions/limitations.

To achieve the objective of the research it is expected that following hypotheses may be accepted or rejected:

3.5.1 Property (land/cattle) Ownership Status of Female Farmers:

Hypothesis Statement – There is discrimination in ownership of property (land/cattle) by women.
Ho – Ownership of property (land/cattle) by women is not more than that of men.
Ha - Ownership of property (land/cattle) by women is more than that of men.

3.5.2 Land Status

3.5.2.1 Possession of Farms Sizes with Women

Hypothesis Statement – No more farming females of rural area possess large landholdings.
Ho –Possession of large landholdings by women is not more than that of smaller one.
Ha - Possession of large landholdings by women is more than that of smaller one.

3.5.2.2 Type of Land Holdings with Women

Hypothesis Statement – More no. of females cultivators rather than agriculture labours are there.
Ho – Females cultivators are not more than agriculture labours.
Ha - Females cultivators are more than agriculture labours.

3.5.3 Participation in Decision Making of Farm/ Related Activities by Sample Farmers

Hypothesis Statement – Women are not consulted for decision making in farm, animal and related activities.

Ho – Decision making by women is not more in farm, animal and related activities.
Ha - Decision making by women is more in farm, animal and related activities.

3.5.4 Female Farmers Participation in Farms

3.5.4.1 Gender Wise Participation

Hypothesis Statement – Participation in farm, animal and related activities by women is more than that of men.
Ho – Participation in farm, animal and related activities by women is not more than that of men.
Ha - Participation in farm, animal and related activities by women is more than that of men.

3.5.4.2 Employment Intensity

Hypothesis Statement – Women work for longer duration than men in farm, animal and related activities.
Ho – Working hours of women are not more in farm, animal and related activities than that of men.
Ha - Working hours of women are more in farm, animal and related activities than that of men.

3.5.5 Accessibility

3.5.5.1 Accessibility of farming females to Production Resources

Hypothesis Statement – There is discrimination in accessibility of farming females of rural area to production resources.
Ho - Accessibility of farming females of rural area is not more to production resources.
Ha -Accessibility of farming females of rural area is more to production resources.

3.5.5.2 Accessibility of farming females to Production Inputs

Hypothesis Statement – There is discrimination in accessibility of farming females of rural area to production inputs.
Ho - Accessibility of farming females of rural area is not more to production inputs.
Ha - Accessibility of farming females of rural area is more to production inputs.

3.5.5.3 Credit Status

Hypothesis Statement – Credit status of farming females of rural area is not as good as that of men.

Ho – No more number of farming females of rural area avail credit on their name for commercial purposes by using formal institution.

Ha - More number of farming females of rural area avail credit on their name for commercial purposes by using formal institution.

3.5.5.4 Awareness Regarding Technology and Government Policies

Hypothesis Statement – More farming females of rural area are not aware regarding Technology and Govt. policies.

Ho – Awareness regarding Technology and Govt. policies is not more of rural farming females.

Ha - Awareness regarding Technology and Govt. policies is more of rural farming females.

3.5.6 Assessment of Female Farmer's Views on Farming/ Family Roles, Integrated Farming, Value Addition and Technology

Hypothesis Statement – More farming females of rural area hold the positive view for their participation in farming/ family roles.

Ho – no more number of sample female farmers hold the positive view for their respective participation in farming/ family roles.

Ha – more number of sample female farmers hold the positive view for their respective participation in farming/ family roles.

3.5.7 Looking After the Responsibilities of Children at Home

Hypothesis Statement – More farming females of rural area look after the responsibilities (nurturing, health, education, rituals ceremonies) of children at home.

Ho –no more number of sample female farmers looks after the responsibilities (nurturing, health, education, rituals ceremonies) of children at home.

Ha - more number of sample female farmers looks after the responsibilities (nurturing, health, education, rituals ceremonies) of children at home.

3.6 Nature of the Study

An empirical research is that which reports the results of a study that uses data derived from actual observation or experimentation. Empirical essentially means based on observation. This study is

empirical by nature, as the researcher is concerned to develop principles by arriving at generalizations and an aid to solve problems by improving knowledge, understanding skill and ability to make decisions.

3.7 Research Design

A research design is purely and simply the framework or plan for a study that guides the collection and analysis of the data. It is a blueprint that is followed in completing the study. This ensures that study remains relevant to the problem and employs economical procedures.

In essence exploratory studies are undertaken to better comprehend the nature of the problem where very few studies have been considered in the chosen area. Extensive interviews with many people are undertaken to get a handle on the situation and understand the phenomena. More rigorous research then proceeds. Some qualitative studies where data are collected through observation or interviews are exploratory in nature. Exploratory studies are also necessary when some facts are known but more information is needed for developing a viable theoretical framework. Therefore, after going through literature survey and the problem in detail, researcher thought that it was most feasible to use exploratory research design for the study. To a certain extent design has also been built around descriptive research, as the work required describing certain behaviours, strategies, beliefs etc. This research design has helped the researcher in enhancing familiarity with the problem under investigation and to clarify the concepts. It will help in finding out the new hypotheses that could be pursued by future researchers.

Basic methods of exploratory research are Literature Survey; Experience Survey; Analysis of Case Studies (Case studies have been a time tested research methodology. The researcher, for this research work also has attempted to find some good case studies that have failed or succeeded. This as well as literature survey has helped to propose model that would help planners and the government to make suitable policies). Interview schedule, was provided to the village heads. The female's participation in farming sector in developing countries was also studied. All these methods, were useful for the research work, therefore were accepted as parts of the research design.

3.8 Universe or Population

The universe or population for the study consists of total number of married females in rural areas who are employed in farming in the state of Sikkim. This forms the pivotal point of the present research.

3.9 Sampling Frame

A sampling frame may be defined as the listing of the general components of the individual units that comprise the defined population. For this research work the sampling frame consist of four parameters, described as below:

Table 3.1: Sampling Frame

Districts/ State	Circles		Revenue Blocks	
	Total	Sample	Total	Sample
East	21	06	40	15
West	21	06	32	11
North	07	04	30	05
South	23	08	45	15
Sikkim				**46**

3.9.1 **People:** The people include all those married females who work in the farms of rural area of the state of Sikkim.

3.9.2 **Area:** The area includes the four districts of the State namely East, West, North and South. Thus farming females of all the four districts become the basis of the study.

3.9.3 **Activities:** Management and participation in farm, animal and related activities are considered to be looked into for the study.

3.9.4 **Tools of the Study:** Tools of the study include all those statistical methods used for studying the participation characteristics of females working in farming sector.

3.10 Sampling Method

Approach where only a few units of population study are considered for analysis is called sampling method. For the present study because of severe time, money and geographical constraints, census method was not feasible. Therefore, sampling method was the only option left with the researcher. Further there are two broad methods of sampling namely probability and non-probability. As researcher had some knowledge of type of female labour participation in farming sector, use of non-probability sampling rather than probability sampling method, was considered to be more appropriate. But at some stages probability Sampling methods were also followed. Sampling methods adopted are as follows:

3.10.1 Sampling Method for Selected Area of Study

Multi-stage stratified random sampling technique of probability method is used to select the population from circles, revenue blocks and villages, then a combination of Judgment, Convenience and Quota sampling techniques of non-probability methods is decided upon for this study. Non-probability methods are of three types, namely Judgment, Convenience and

Quota sampling. The state has only four districts; so, all of them have been taken for the study. Initially, under the multistage stratified random sampling technique- a selection of a tentative list of circles and revenue blocks from all the four districts was made followed by a selection of villages to be visited at the second and a selection of respondents at the final stage. A final list of the respondents from different farm households was prepared based on convenience and their accessibility to the researcher by stratified random sampling.

3.10.2 Sample Size

Table 3.2: Selection of Sample Size

District/ State	Total area (sq.km)	%of total area	Population Concentration	% of total Population	Total* (irrigated+ unirrigated) land	Total no. of circle	No.of circles sampled	No. of female sample farmers
East	954	13.5	2,45,040	45.3	12,007.60 (23%)	21	6	80
West	1,166	16.5	1,23,256	22.8	12,552.95 (24%)	21	6	60
North	4,226	59.5	41,030	07.6	4,846.81 (9%)	07	4	30
South	750	10.5	1,31,525	24.3	17540.36 (34%)	23	8	60
Sikkim	7,096	100	5,40,851	100	51947.72 (100%)	72	24	230

Source- figures extracted from - (i) census 2001.
(ii)* Sikkim A Statistical Profile 2006-07.

Rural areas from all 4 districts of Sikkim have been selected. As is clear from the above table, though North district contains maximum area of the State i.e. almost 60%, but it holds only 7-8% of the population. On the contrary East district contains only 13% area of the State, but it holds maximum i.e. 45% of the population. So, for this study, maximum no. of females for data collection has been taken from East and minimum from North. **Here the size of the sampling female farmers from each district is neither proportional to the minimum size of the sampling female farmers of the district nor in the same ratio as is the percentage ratio of each district to the total population of the state. But the sample size of each district is just an indicative of the reason of taking maximum/minimum sampling units from that area.** A data collected from a total of 24 circles from all the four districts in Sikkim has been analysed. The district wise i.e. (East, West, North and South) distribution of circles selected is 6, 6, 4 and 8 respectively. A total of 80 females of farming community from East, 30 from North and 60 each from West and South districts have been interviewed. Data for 115 samples (50% of 230), has been collected by

the researcher herself, while for rest of 115 samples (40, 30, 15 and 30 from East, West, North and South respectively), has been collected through village heads by sending schedules to the village heads. Data thus collected from 230 females of the state, employed in farming sector has become the basis of the Primary Data analysis in this Study.

3.11 Sources of Data

There are two types of data available to a researcher, namely primary data and secondary data. In the proposed study the researcher has planned to use both types - secondary and primary data. Since the present study is the first of its kind and earlier research works are not available, therefore, the researcher has mainly relied on the primary data. However, the researcher has also exhausted the secondary data sources. Researcher has tried her best to use the secondary data in an effective manner to understand the frame, components and parameters of the problem undertaken.

The major secondary data sources which have been used by the researcher include reports, records, journals, state publications, professional publications, books, magazines, newspapers, websites etc. The researcher has also used primary data in order to fill the gaps and deficiencies and to update secondary data.

3.12 Data Collection Methods

For this research work, following methods of data collection have been used:

3.12.1 Secondary Data

Secondary information has been collected online, from magazine, journals and also from the libraries of Sikkim Manipal Institute of Technology, Majitar, Sikkim and Sikkim Manipal Institute of Medical Sciences, Gangtok, Sikkim. Besides this, data has also been collected from National Sample Survey Report, Census of India, relevant Central and State Government publications, Central and State agriculture, labour, women and child development department. In addition to this, the Krishi Vigyan Kendras (KVK), the “GB Pant Institute of Himalayan Environment and Development” (GBPIHED) located at Pangthang (Sikkim), ATMA (Agricultural Technology Management Agency in South and East districts) have been visited.

3.12.2 Primary Data

In order to collect qualitative data, three group discussion sessions were arranged separately in three villages namely (Syari, Sichey and Rawtey Rumtek); each group contained 10 participants. During these group sessions, several open-ended questions were asked from the respondents in order to collect deeper information about their accessibility to resources and their participation in different farms and the related activities along with many hidden facts and factors. Based on this information, the research instrument i.e. questionnaire containing dichotomous, multiple choice and open end questions was designed and a pre-test was conducted with 18 respondents for its necessary modification. It was then translated into Nepali also for the convenience of the farm population. Primary data was collected by researcher by visiting the farming females of rural area in Sikkim, using questionnaires. The primary data was collected between the months of March to September 2011 from all districts of Sikkim.

3.13 Data Analysis

As the nature of data collected is non-metric which is also referred as qualitative data, the ordinal scale of measurement is taken into account for access of a rural woman to productive resources, in decision making of different activities and to understand their views concerning different question which have direct bearing with the topic. Nominal scale of measurement is taken into account for their participation in farm, animal and related activities, ownership of livestock and land, credit status, education level, home responsibility status and membership status of any rural institution, in selecting a statistical tool and techniques for hypotheses testing.

Data has been analysed using the Statistical Package for the Social Science (SPSS) and some descriptive statistics, such as percentage, mean, standard deviation (SD), coefficient of variation (CV) and rank were used for descriptive interpretation of the data.

Access of a rural woman to productive resources and their participation in decision making of farm, animal and related activities has been measured using a five-point Discrete rating scale with a weight of 1 representing ‘no/poor access and no/poor decision making ’, 2 for ‘rare access and rare decision making’, 3 for ‘sometimes access and sometimes decision making’, 4 for ‘frequent access and frequent decision making’ and 5 for ‘always access and always decision making’. Finally, a rank order has been developed based on mean score obtained for each item. The accessibility and decision making is considered - ‘no/poor accessibility and no decision

making' with mean score values ranging from 1-1.50, 'limited' for 1.50-2.50, 'good' for 2.50-3.50, 'better' for 3.50-4.50 and 'best' for 4.50-5.50. Factor analysis of the data on production resources and decision making has also been done using Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity.

Ten-point Discrete rating scale with a weight of 1 to 10 has been used to analyse their views concerning different question which have direct bearing with the topic.

There is only one sample in the study. Also the study contains ordinal and nominal level data which can be analysed using parametric statistics; therefore One-Sample't'-test for inferential interpretation of the data has been run to understand the nature of relation between the variables.

- **Inferential Analysis**

One-sample t- statistic for each sample has been conducted to test the entire hypothesis. The t column in all the one-Sample t-test tables displays the observed t statistic for each sample, calculated as the ratio of the mean difference divided by the standard error of the sample mean.

The column labelled Sig. (2-tailed) displays a probability from the t distribution with 229 degrees of freedom df, calculated as (n-1). The value listed is the probability of obtaining an absolute value greater than or equal to the observed t statistic, if the difference between the sample mean and the test value is purely random. The Mean Difference is obtained by subtracting the test value from each sample mean. Test statistic represents the value pertaining to both. More than this value means female dominance and less than this means male dominance.

The 95% Confidence Interval of the Difference has been taken. It provides an estimate of the boundaries between which the true mean difference lies in 95% of all possible random samples of 230 females. At this level if value of't' is less than 1.96 and is also negative, then our null hypothesis is accepted else alternate hypothesis is accepted. For the inferences of the hypotheses, Information from literature survey has also been taken to support some assumptions.

Test statistic 2 has been used for inferential analysis of gender wise participation in farm and related activities of sample female farmers and ownership of livestock. It represents Participation/ownership of both (male and female). More than 2 mean female Participation/ownership and less than 2 means male Participation/ownership. 1.5 has been used for inferential analysis of credit status. Test statistic 3 has been used for inferential analysis of access and decision making in farm and related activities of sample female farmers. It represents sometimes access and decision

making by women. More than 3 means frequently/always and less than 3 means never/rarely access and decision making by women.

Farm women according to their socio-economic characteristic have also been studied. This has been analysed with SPSS. Cross-tabs tool of descriptive statistics in SPSS, using percentage for cells has been used to analyse for conclusion.

The Seven Steps followed for Hypothesis Testing –

Step 1 Set null and alternative hypothesis
Step 2 Determining the appropriate statistical test
Step 3 Setting the level of significance
Step 4 Setting the decision rule
Step 5 Collecting the sample
Step 6 Analysing the data
Step 7 Arriving at a statistical conclusion

3.14 Chapter of the Thesis are as under:

Chapter I : Introduction
Chapter II : Literature Survey
Chapter III : Methodology
Chapter IV : Result Analysis and Findings
Chapter V : Conclusion and Recommendations

3.15 Need of the study

3.15.1 For better understanding of policy implications of women empowerment

The researcher got motivated to choose this topic after going through the swelling literatures on empowerment of women and with voluminous amount of public expenditure on women empowerment schemes. It becomes imperative on the part of the researcher to understand the concept of empowerment of women in the farming sector of Sikkim State so as to have a better understanding of its policy implications.

3.15.2 To provide a basis for overcoming gender discrimination

India is famous as a great country of many cultures, traditions, religions and geographical characteristics. However, at the same time, India is also known as patriarchal nation. So, gender

equality plays a crucial role in uplifting the status of a woman to a great extent, which is very crucial in the era of revolutionary technological environment.

3.15.3 To highlight the invisible contribution of rural females so that it gets counted

The researcher found in the literature review that in rural India though the contribution of females in farm/animal and the related activities is enormous, but still invisible and does not get counted for. Due to this they have to face several challenges. This in turn limits the role of women to drudgery prone, unskilled activities forcing them to have poor socio-economic condition. The researcher also found in the literature review that rural women throughout the developing nations are having almost the same state of participation as well as the socio economic condition. Hence, in order of study in detail the socio economic condition of rural women and the activities they perform, the researcher has selected one of the North-Eastern States of India i.e. Sikkim. After analysing their present socio-economic state, the researcher will try to make a fair endeavour to suggest some points for the upliftment of the socio economic condition of the women. The researcher also believes that the suggestions given for them are universal in improving the socio-economic condition of rural women facing such problems.

3.15.4 To consolidate social science information in the state of Sikkim

The place researcher selected for study is particularly important because social science research in the state of Sikkim is inadequate despite several incentives provided by the state. There are many reasons for this - including the fact that English education started off late and there are no secondary and senior secondary boards in Sikkim and the State is fully dependent on Central Boards. Very few scholars from North Bengal University and other universities have undertaken research on the socio-political and economic aspects of Sikkimese women.

CHAPTER IV

RESULT ANALYSIS AND FINDINGS

Chapter IV
Result Analysis and Findings

In the preceding chapter objectives, scope, delimitations, hypotheses, research design, universe, sampling frame, sampling method, sample size, sources of data, data collection methods, methods of data analysis for hypothesis testing, chapter wise plan for thesis and need of the study have been discussed. In the present chapter we will be discussing about the analysis and the findings of the data collected according to the methodology discussed in the chapter III.

Result Analysis and Findings chapter has been subdivided into following categories:

(1) Livestock ownership/ possession of female farmers, **(2)** Land status which includes (i) Gender Wise ownership of land (ii) Possession of farms sizes with women (iii) Type of land holdings with women **(3)** Decision making by women in fourteen different farm, animal and related activ-ities **(4)** Gender wise participation in nineteen different crop production and animal hus-bandry and related activities by farming females and their employment intensity **(5)** Accessibility of farming females of rural area to seven production resources and five production inputs **(6)** Assessment of female farmer's views on farming/ family roles, integrated farming, value ad-dition and technology **(7)** Looking after the responsibilities of children at home by female farmers **(8)** Analysis of female farmers according to socio-economic condition **(9)** Female farmer's traditional knowledge in plants, agriculture and its related activities and its manage-ment/practices by female farmers of Sikkim **(10)** A model and a flow diagram of Integrated Low Investment Rain-Water Harvesting.

4.1 Definitions of the Terms Used in the Questionnaire to Collect Data

- In order to analyse the **land holding status**, three categories of farms sizes of the land for primary data collection has been taken into consideration i.e. Small (upto-2 hectare), Medium (2-10 hectare) and Large (10 & above). Here, it is important to mention that farm size up to 1.9 has been counted in small category, up to 9.9 in medium and rest in the large one. For agricultural surveys an abridged version could be used. But, this scale is chosen because FAO,

for the purposes of international comparisons, fits a statistical probability distribution to the national data and redistributes the number and area of holdings as per standard size classes (in hectares). Implementation of such a procedure becomes difficult if the number of size classes reported by the countries is too few. For facilitating cross-country comparison, FAO recommends to member countries to adopt a detailed distribution of classes for tabulation of "number and area of holdings", at least for the purpose of agricultural census. Also the Sikkim state uses this scale for the size of land holdings.

- In the **type of land holdings with women**, two types of distinctions are made – land owned/ possessed but not owned i.e. cultivators and neither land possessed nor owned i.e. agricultural labourers. Women who work mainly on their family farms are classified as 'cultivators' and women who work on somebody else's farm for a wage paid either in cash or in kind are classified as agricultural labourers. Thus while the former are self-employed, the latter are wage-employed, but in both cases, work in the sense of economically productive work – has got to be the principal criterion. Moreover, the category of cultivators covers both owner cultivators and tenant cultivators. As regards the type of work, both persons are doing actual cultivation involving manual work and persons engaged in active supervision or direction of cultivation fall in this category.

An agricultural labourer is defined as a person who works on another person's land, without exercising any supervision or direction in cultivation, for wages in money, kind or share of produce, but has no right or lease or contract on land on which she works.

- The definition of **farming females participating** in nineteen different crop production/animal husbandry and related activities in the rural areas of Sikkim used at the time of data collection is just shortened to their participation in these activities. This is so because any individual is counted as being in labour force if she is able to work to contribute in the economic activity. In the determination of the size of labour force, it is customary to exclude children below the age of 15 and old people above the age of 60, though in India/ other developing countries and also in the state of Sikkim, poverty forces people belonging to these groups also to work for bare subsistence. The term **'participation'** used in the questionnaire to collect data has however, excluded children below the age of 15 and but included the old people above the age of 60.

- **Measuring Access to Productive Resources**

Access means the ability of a rural woman to get socio-economic resources and accrue benefits from them. In this study seven socio-economic resources have been taken into consideration. The full meaning of these resources is illustrated below.

i. Access to Capital:

It includes the opportunity to get loans, micro-credit and banking services from any formal or informal institution.

ii. Access to Extension Services and Training:

It includes the opportunities female farmers get to have services from extension agencies like Department of Agriculture Extension (DAE)/Department of Livestock Services (DLF) to develop technical skill for production through training and obtaining information about development aspects from any extension agency.

iii. Access to Technologies and Government Policy:

It refers to awareness and the availability of cost-effective and appropriate technologies and Government policy for production, post-harvest and animal rearing tasks as well as its' reach to the female farmers. Some of these strategies and technologies adopted by the Department in the state include improved varieties/breeds, production of quality seeds, mixed cropping, soil reclamation by liming, seed treatment campaign, vaccines, artificial insemination and integrated farming through watershed approach. The scope of farm mechanization is limited as most of the cultivable land is hilly terrain with steep slopes. However, power operated Thresher, hand Winnower, hand Maize Sheller, power driven tillers and Iron Plough have been introduced. Because of hilly terrain, terrace farming is widely popular with bench farming on steep lands.

iv. Access to Production Inputs:

The study area covers the availability of technological inputs such as HYV organic seeds and saplings, fertilizers, pest management, recycling of farm waste for compost production, medicine for plants and animals and water source as well as its' reach to the female farmers.

v. Access to Livestock Rearing:

It includes the opportunity to rear poultry, cattle, pigs and goats for income generation. Livestock production is backbone not only of the state but of the Indian Agriculture as well and source of employment in rural areas for centuries. Whole system of rural economy has revolved around livestock production. Livestock keeping has multiple objectives and dimensions. They play multiple roles in rural social, economic and ecological systems. Since the state has a target of converting it into a fully organic state by 2015 and efforts are continued to replace the chemical fertilizers by using bio fertilizers and organic manures. So, manure was one of the dimensions to animal rearing.

vi. Access to Rural Institutions:

Any cooperative or formal or informal association/institution/group like- Joint Liability and Activity Group (JLG), Self-Help Group, Activity- based Group or Farmers' Club, which create opportunities for saving, taking loans, discussions and participation of women in any social events like agricultural fairs.

vii. Access to Education:

It includes the opportunity to gain formal education i.e. academic qualification.

4.2. Result Analysis and Findings

4.2.1 Livestock Ownership/ Possession of Sample Female Farmers*:

4.2.1.1 Ownership of Livestock Details:

A1, B1 C1, D1 and E1 in the (table-4.2.1.1.) below, represents Ownership of livestock namely - Cow (A1), Bullock (B1), Pig (C1), Goat (D1), Poultry (E1).

Statistics for Ownership of livestock by farming females of rural area namely - Cow (A1), Bullock (B1), Pig (C1), Goat (D1), Poultry (E1) has been given in table- 4.2.1.1. From the table we find that there are 230 valid scores and values of mean for them are 1.69 Cow (A1), 0 .21 Bullock (B1), 0.74 Pig (C1), 1.03 Goat (D1) and 2.13 Poultry (E1) respectively. Standard deviation is 0.721 Cow (A1), 0.410 Bullock (B1), and 0.876 Pig (C1), 1.146 Goat (D1), 1.196 Poultry (E1) and standard error of mean is 0.048 Cow (A1), 0.027 Bullock (B1), 0.058 Pig (C1), 0.076 Goat (D1), 0.079 Poultry (E1).

Table-4.2.1.1-One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q1.1A1	230	1.69	.721	.048
Q1.1B1	230	.21	.410	.027
Q1.1C1	230	.74	.876	.058
Q1.1D1	230	1.03	1.146	.076
Q1.1E1	230	2.13	1.196	.079

Table-4.2.1.2-Frequency of Possession and Gender-wise ownership of domestic animals by sample female farmers of Sikkim State

Status	No. owned	Cow		Bullock		Pig		Goat		Poultry	
		No. of respond-ents	Percent (%)	No. of respond-ents	Percent (%)	No. of respond-ents	Percent (%)	No. of respond-ents	Percent (%)	No. of respond-ents	Percent (%)
Possession	**0**	0	0	180	78	112	49	117	51	46	20
	1	84	36	11	05	70	30	09	04	05	02
	2	79	34	36	14	33	14	25	11	09	04
	3	34	14	02	02	08	03	14	06	10	04
	4	17	07	01	01	05	02	18	08	20	09
	5	09	04	00	00	01	01	17	07	31	13
	6	04	02	00	00	01	01	06	02	12	05
	7	01	01	00	00	00	00	04	02	13	06
	8	00	00	00	00	00	00	04	02	08	03
	9	01	01	00	00	00	00	00	00	05	02
	10 and more	01	01	00	00	00	00	16	07	71	32
	Total	**230**	**100**	**230**	**100**	**230**	**100**	**230**	**100**	**230**	**100**

*"Possession & Gender-Wise Ownership of Domestic Animals by Female Farmers of Sikkim" Nidhi Dwivedy, "Research Journal of Social Science & Management- RJSSM", Vol.02, No. 01, May 2012, Pp-87-93, ISSN : 2251-1571.

Gender-wise ownership	**Don't own**	**0**	**0**	**180**	**78**	**112**	**49**	**117**	**51**	**46**	**20**
	Male	106	46	50	100	78	66	19	17	13	07
	Female	35	15	0	0	13	11	30	26	134	73
	Both	89	39	0	0	27	23	64	57	37	20
	Total (own)	**230**	**100 (100)**	**50**	**22 (100)**	**118**	**51 (100)**	**113**	**49 (100)**	**184**	**80 (100)**
	Total (own +not own)	**230**	**100**	**230**	**100**	**230**	**100**	**230**	**100**	**230**	**100**

Source: Field Survey

4.2.1.2 The Status of Possession and Gender-Wise Ownership of Domestic Animals:

4.2.1.2.1 Cow

Data pertaining to milch livestock possession has not shown even a single respondent who is not rearing milch livestock. In the table 4.2.1.2 above, it is found that a vast majority of the sample female farmers i.e. (84%) are rearing milch cattle equivalents of 3 or below. Only 16% are having more than 3 cattle.

As far as ownership of milch animal is concerned, 46% of the sample female farmer respondents have reported the male ownership and a very meagre i.e. only 15% of them have informed the female ownership and 39% are holding the joint ownership of the animal.

- **District Wise Female Ownership of Cows:**

In table-4.2.1.3, for district wise gender ownership of domestic animal (cow), though in all the districts male dominance for the animal has been observed, yet, male dominance within the districts for cow is noticed the most in East district. Within the districts, in South female dominance is spotted the most, for cow. Surprisingly, in North female ownership is totally absent and in East it is almost negligible.

Table-4.2.1.3-Q1.1A1 * District Cross tabulation

			District				Total
			East	West	North	South	
Q1.1A1	Male	Count	52	25	15	21	113
		% within Q1.1A1	46.0%	22.1%	13.3%	18.6%	100.0%
		% within District	65.0%	41.7%	50.0%	35.0%	49.1%
		% of Total	22.6%	10.9%	6.5%	9.1%	49.1%
	Both	Count	27	24	15	23	89

		% within Q1.1A1	30.3%	27.0%	16.9%	25.8%	100.0%
		% within District	33.8%	40.0%	50.0%	38.3%	38.7%
		% of Total	11.7%	10.4%	6.5%	10.0%	38.7%
	Female	Count	1	11	0	16	28
		% within Q1.1A1	3.6%	39.3%	.0%	57.1%	100.0%
		% within District	1.3%	18.3%	.0%	26.7%	12.2%
		% of Total	.4%	4.8%	.0%	7.0%	12.2%
Total		Count	80	60	30	60	230
		% within Q1.1A1	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.1.2.2 Bullock

In the table 4.2.1.2 above, it has been found that a considerable amount of the sample female farmers i.e. 78% do not at all possess bullocks. Very few of them i.e. only 5% are rearing only one, 14% - two, 2% - three and only 1% has been found rearing four numbers of this animal. Ownership data for this animal shows that 22% of the respondents rear it and 100% male ownership for this animal has been spotted.

- **District Wise Female Ownership of Bullocks:**

In table-4.2.1.4, for district wise gender ownership of domestic animal (bullocks), in all the districts male dominance for the animal has been observed. Surprisingly, in all the districts female ownership absenteeism has been noticed for bullock. Within the districts, in East male dominance is spotted the most, for bullocks.

Table-4.2.1.4-Q1.1B1 * District Cross tabulation

			District				Total
			East	West	North	South	
Q1.1B1	Do not own	Count	62	54	21	44	181
		% within Q1.1B1	34.3%	29.8%	11.6%	24.3%	100.0%
		% within District	77.5%	90.0%	70.0%	73.3%	78.7%
		% of Total	27.0%	23.5%	9.1%	19.1%	78.7%
	Male	Count	18	6	9	16	49
		% within Q1.1B1	36.7%	12.2%	18.4%	32.7%	100.0%
		% within District	22.5%	10.0%	30.0%	26.7%	21.3%
		% of Total	7.8%	2.6%	3.9%	7.0%	21.3%
Total		Count	80	60	30	60	230
		% within Q1.1B1	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.1.2.3 Pig

It has been located in the table 4.2.1.2 above, that almost half of the sample farmers i.e. 49% do not possess it at all. But, 44% of them have stated rearing one/two pigs. Further, 3%, 2%, 1% and 1% of the respondents have reported rearing three, four, five and six pigs respectively.

Ownership data for those respondents who rear this animal has shown 66% of them are holding the male ownership and a very skimpy i.e. only 11% of the respondents are female owners and 23% are holding the joint ownership of the animal.

- **District Wise Female Ownership of Pigs:**

For district wise gender ownership of domestic animal (pigs), male dominance for the animal is observed in table-4.2.1.5 in all the districts. But, male dominance within the districts for pigs is noticed the most in West district. Within the districts, in East female dominance is spotted the most, for pigs.

Table-4.2.1.5-Q1.1C1 * District Cross tabulation

			District				Total
			East	West	North	South	
Q1.1C1	do not own	Count	40	32	5	35	112
		% within Q1.1C1	35.7%	28.6%	4.5%	31.3%	100.0%
		% within District	50.0%	53.3%	16.7%	58.3%	48.7%
		% of Total	17.4%	13.9%	2.2%	15.2%	48.7%
	Male	Count	20	24	16	18	78
		% within Q1.1C1	25.6%	30.8%	20.5%	23.1%	100.0%
		% within District	25.0%	40.0%	53.3%	30.0%	33.9%
		% of Total	8.7%	10.4%	7.0%	7.8%	33.9%
	Both	Count	13	4	3	7	27
		% within Q1.1C1	48.1%	14.8%	11.1%	25.9%	100.0%
		% within District	16.3%	6.7%	10.0%	11.7%	11.7%
		% of Total	5.7%	1.7%	1.3%	3.0%	11.7%
	Female	Count	7	0	6	0	13
		% within Q1.1C1	53.8%	.0%	46.2%	.0%	100.0%
		% within District	8.8%	.0%	20.0%	.0%	5.7%
		% of Total	3.0%	.0%	2.6%	.0%	5.7%
Total		Count	80	60	30	60	230
		% within Q1.1C1	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.1.2.4 Goats

As is evident from the table 4.2.1.2 above, that 51% of the respondents do not possess any goat, whereas 4% possessed one, 11% two, 06% three, 08% four, 07% five, 02% six, 02% seven, 02% eight and 07% possess ten/above of this animal. About 17% of female respondents are deprived of ownership of goat either singly or jointly i.e. 17% of the respondents are having male ownership, while 26% of the female farmers have reported about having the ownership rights of the animal.

- **District Wise Female Ownership of Goats:**

In table-4.2.1.6, male dominance for the animal (goat) in all the districts has been observed. Surprisingly, in West and South districts, no female ownership for the animal is noticed. But, male dominance within the districts for goat has been noticed the most in South district. Within the districts, in East district female dominance is spotted the most, for goat.

Table-4.2.1.6-Q1.1C1 * District Cross tabulation

			District				Total
			East	West	North	South	
Q1.1C1	do not own	Count	40	32	5	35	112
		% within Q1.1C1	35.7%	28.6%	4.5%	31.3%	100.0%
		% within District	50.0%	53.3%	16.7%	58.3%	48.7%
		% of Total	17.4%	13.9%	2.2%	15.2%	48.7%
	Male	Count	20	24	16	18	78
		% within Q1.1C1	25.6%	30.8%	20.5%	23.1%	100.0%
		% within District	25.0%	40.0%	53.3%	30.0%	33.9%
		% of Total	8.7%	10.4%	7.0%	7.8%	33.9%
	Both	Count	13	4	3	7	27
		% within Q1.1C1	48.1%	14.8%	11.1%	25.9%	100.0%
		% within District	16.3%	6.7%	10.0%	11.7%	11.7%
		% of Total	5.7%	1.7%	1.3%	3.0%	11.7%
	Female	Count	7	0	6	0	13
		% within Q1.1C1	53.8%	.0%	46.2%	.0%	100.0%
		% within District	8.8%	.0%	20.0%	.0%	5.7%
		% of Total	3.0%	.0%	2.6%	.0%	5.7%
Total		Count	80	60	30	60	230
		% within Q1.1C1	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.1.2.5 Poultry

Data for poultry in the table 4.2.1.2 above shows that only 20% do not own any while 02% of them possess one, 04% two, 04% three, 09% four, 13% five, 05% six, 06% seven, 03% eight, 02% nine and 32% ten and above of this animal. Ownership data for the animal shows that vast majority of female respondents i.e. 73% of them own it.

- **District Wise Female Ownership of Poultry:**

In table-4.2.1.7, for district wise gender ownership of domestic animal (poultry), though in all the districts female dominance for the animal is observed. But, within the districts, in East district female dominance is spotted the most, for poultry. Male dominance within the districts for poultry is noticed the most in South district.

Table-4.2.1.7-Q1.1E1 * District Cross tabulation

			District				Total
			East	West	North	South	
Q1.1E1	do not own	Count	24	6	2	14	46
		% within Q1.1E1	52.2%	13.0%	4.3%	30.4%	100.0%
		% within District	30.0%	10.0%	6.7%	23.3%	20.0%
		% of Total	10.4%	2.6%	.9%	6.1%	20.0%
	Male	Count	0	5	2	6	13
		% within Q1.1E1	.0%	38.5%	15.4%	46.2%	100.0%
		% within District	.0%	8.3%	6.7%	10.0%	5.7%
		% of Total	.0%	2.2%	.9%	2.6%	5.7%
	Both	Count	11	11	8	7	37
		% within Q1.1E1	29.7%	29.7%	21.6%	18.9%	100.0%
		% within District	13.8%	18.3%	26.7%	11.7%	16.1%
		% of Total	4.8%	4.8%	3.5%	3.0%	16.1%
	Female	Count	45	38	18	33	134
		% within Q1.1E1	33.6%	28.4%	13.4%	24.6%	100.0%
		% within District	56.3%	63.3%	60.0%	55.0%	58.3%
		% of Total	19.6%	16.5%	7.8%	14.3%	58.3%
Total		Count	80	60	30	60	230
		% within Q1.1E1	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.1.3 Inferential analysis of the Gender Wise Ownership of Domestic Livestock :

One sample‘t’-test is conducted to test our hypothesis.

Hypothesis Statement – There is discrimination in ownership of livestock by women.

Ho – Ownership of livestock by women is not more than that of men.
Ha - Ownership of livestock by women is more than that of men.

To test the hypothesis for ownership of livestock by sample farming females of rural area, one-sample t-test is conducted. The Mean Difference in table-4.2.1.8 below is obtained by subtracting the test value (which is 2 here in this table), from each sample mean. Test statistic 2 represents ownership of both (male and female). More than 2 mean female ownership and less than 2 means male ownership.

From the table table-4.2.1.8 we find that value of‘t’ for ownership of Cow (A1), Bullock (B1), Pig (C1), Goat (D1), is -6.492, -66.042, -21.745, -12.830 respectively which is less than 1.96 and is also negative. Mean difference column for them also shows negative values. Confidence intervals lie entirely below 0.0 for them, thus there are valid reasons for null hypothesis to be accepted for them, which says that ownership of these livestock by women is significantly not more than that of men i.e. not more than 2 on the average.

For the ownership of Poultry (E1), we find that confidence intervals do not lie entirely either above or below 0.0. Its value is positive for one limit and negative for the other limit. The value of‘t’ is 1.599, which is though lower than 1.96 but significance level is 0.111, which is greater than 0. But, if we look at the mean difference column, we find that for ownership of Poultry (E1), it is positive and also the upper limit of the confidence interval lies entirely above 0. Besides, the magnitude of upper limit is more than the magnitude of the lower limit. Consequently, we can say that our null hypothesis is rejected and alternate hypothesis is accepted. Female ownership for the Poultry (E1) is there.

Table-4.2.1.8-One-Sample Test

	Test Value = 2					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q1.1A1	-6.492	229	.000	-.309	-.40	-.22
Q1.1B1	-66.042	229	.000	-1.787	-1.84	-1.73
Q1.1C1	-21.745	229	.000	-1.257	-1.37	-1.14
Q1.1D1	-12.830	229	.000	-.970	-1.12	-.82
Q1.1E1	1.599	229	.111	.126	-.03	.28

4.2.2 Land Status*

4.2.2.1 Gender Wise Ownership of Land

- **Ownership of Land Details**:

Statistics for ownership of land by sample female farmers is shown in the Table - 4.2.2.1 below. From the table we find that there are 230 valid scores and a value of mean it is 1.55. Standard deviation is 0.623 and standard error of mean 0.041.

Table-4.2.2.1-One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q.1.2A2	230	1.55	.623	.041

Source: Field Survey

Frequency table in table-4.2.2.2 below shows that out of total 230 female sample farmers, 120 of them have admitted for male ownership of land, 94 for joint ownership and a very meagre number i.e. only 16 female farmers have acknowledged that land is on their name. The percentage column of the table as well as figure-4.6 give the clearer picture of the data. It shows that more than 50% replied in favour of male ownership of land, 41% for joint ownership and almost negligible i.e. only 7% of female sample farmers have confessed the ownership of land on their name.

Table-4.2.2.2-Frequency table for gender wise ownership of land

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	120	52.2	52.2	52.2
	Both	94	40.9	40.9	93.0
	Female	16	7.0	7.0	100.0
	Total	230	100.0	100.0	

Source: Field Survey

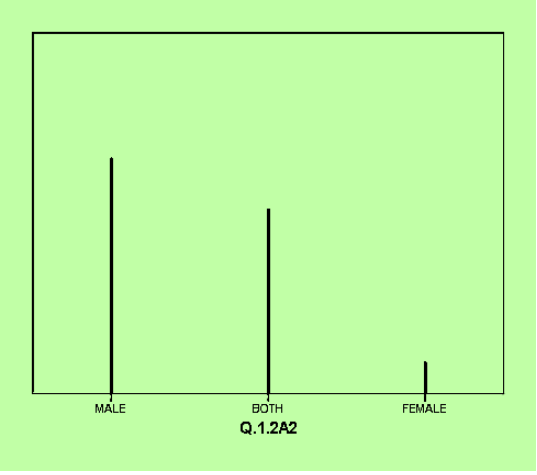


Figure-4.6,Q.-1.2A2
Gender Wise Ownership of Land

*"Gender Wise Status of Farm Land – A Study of Female Farmers in the Rural Area of Sikkim in North – Eastern India", Nidhi Dwivedy, Niranjan Upadhyay, Ajeya Jha, "International Journal of Research in Economics & Social Sciences" Volume 2, Issue 6 (June, 2012), ISSN: 2249-4642.

- It is our assumption that there is a gender discrimination in land ownership.

One sample‘t’-test is conducted to test our hypothesis

Ho – Ownership of land by women is not more than that of men.

Test statistic 2 represents ownership of both (male and female). More than 2 mean female ownership and less than 2 means male ownership. From the table 4.2.2.3 we find that value of‘t’ for gender wise ownership of land is -11.002 which is negative. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted, which says that ownership of land by women is significantly not more than that of men i.e. not more than 2 on the average.

Table-4.2.2.3-One-Sample Test

	Test Value = 2					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Q.1.2A2	-11.002	229	.000	-.452	-.53	-.37

Source: Field Survey

- **District Wise Ownership of Land by Female Farmers:**

In table-4.2.2.4, for district wise ownership of land by female farmers, male dominance for the land ownership has been observed in all the districts. But, within the districts, in East district male dominance for land ownership has been spotted the most. Female dominance within the districts for land ownership has been noticed the most in West district. Surprisingly, it is totally absent in North district.

Table-4.2.2.4-.1.2A2 * District Cross tabulation

			District				Total
			East	West	North	South	
Q.1.2A2	**Male**	Count	54	21	16	29	120
		% within Q.1.2A2	45.0%	17.5%	13.3%	24.2%	100.0%
		% within District	67.5%	35.0%	53.3%	48.3%	52.2%
		% of Total	23.5%	9.1%	7.0%	12.6%	52.2%
	Both	Count	22	28	14	30	94
		% within Q.1.2A2	23.4%	29.8%	14.9%	31.9%	100.0%
		% within District	27.5%	46.7%	46.7%	50.0%	40.9%
		% of Total	9.6%	12.2%	6.1%	13.0%	40.9%
	Female	Count	4	11	0	1	16
		% within Q.1.2A2	25.0%	68.8%	.0%	6.3%	100.0%
		% within District	5.0%	18.3%	.0%	1.7%	7.0%
		% of Total	1.7%	4.8%	.0%	.4%	7.0%
Total		Count	80	60	30	60	230
		% within Q.1.2A2	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.2.2 Farms Sizes Possesed by Sample Female Farmers

- **Possession of Size of Farm Land Details**:

Statistics for Possession of farms sizes by sample female farmers is shown in the Table-4.2.2.5 below. From the table we find that there are 230 valid scores and a value of mean it is 1.44. Standard deviation is 0.636 and standard error of mean 0.042.

Table-4.2.2.5-One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Q.1.2AA	230	1.44	.636	.042

Frequency table for possession of size of farm land in table-4.2.2.6 below shows that out of total 230 female sample farmers, 147 of them have admitted for small size of farm land, 65 for medium size of farm land and a very less number i.e. only 18 female farmers acknowledged that size of farm land is the larger one. The percentage column of the table as well as figure-4.7 give the clearer picture of the data. It shows that a huge 64% replied in favour of small size of farm land, 28% for medium and almost negligible i.e. only 8% of female sample farmers confessed that size of farm land is the larger one.

Table-4.2.2.6- Q.1.2AA Frequency table for possession of size of farm land					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	**Small**	147	63.9	63.9	63.9
	Medium	65	28.3	28.3	92.2
	Large	18	7.8	7.8	100.0
	Total	230	100.0	100.0	

Source: Field Survey

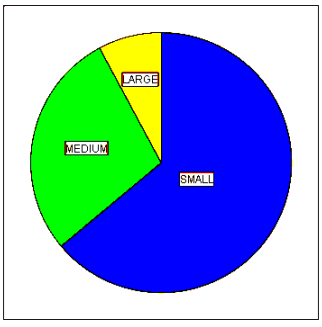


Figure 4.7-Q.1.2AA,
Possession of size of farm land

- It is our assumption that women farmers own small land holdings.

One sample‘t’-test is conducted to test our hypothesis.

Ho –Possession of large landholdings by women is not more than that of smaller one.

Test statistic 2 in table 4.2.2.7 represents possession of medium sized land holdings. More than 2 mean possession of large sized land holdings and less than 2 stands for possession of small sized land holdings. The value of't' is -13.373 which is negative. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted, which says that Possession of large farms by women is significantly not more than that of smaller one. This proves that most of the females possess small land holdings.

Table-4.2.2.7-One-Sample Test

	Test Value = 2					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Q.1.2AA	-13.373	229	.000	-.561	-.64	-.48

- **District Wise Possession of Farms Sizes by Sample Female Farmers:**

In table-4.2.2.8, for district wise possession of farms sizes by female farmers, possession of small size of farms by female farmers has been observed in all the districts. But, within the districts, in East district possession of small sized land has been remarked the most, in South district possession of medium sized land and again in East district only, possession of large sized land has been identified the most.

Table-4.2.2.8-Q.1.2AA * District Cross tabulation

			District				Total
			East	West	North	South	
Q.1.2AA	SMALL	Count	57	45	14	31	147
		% within Q.1.2AA	38.8%	30.6%	9.5%	21.1%	100.0%
		% within District	71.3%	75.0%	46.7%	51.7%	63.9%
		% of Total	24.8%	19.6%	6.1%	13.5%	63.9%
	MEDIUM	Count	17	12	11	25	65
		% within Q.1.2AA	26.2%	18.5%	16.9%	38.5%	100.0%
		% within District	21.3%	20.0%	36.7%	41.7%	28.3%
		% of Total	7.4%	5.2%	4.8%	10.9%	28.3%
	LARGE	Count	6	3	5	4	18
		% within Q.1.2AA	33.3%	16.7%	27.8%	22.2%	100.0%
		% within District	7.5%	5.0%	16.7%	6.7%	7.8%
		% of Total	2.6%	1.3%	2.2%	1.7%	7.8%
Total		Count	80	60	30	60	230
		% within Q.1.2AA	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.2.3 Type of Land Holdings with Sample Female Farmers

- **Type of Land Holdings with Sample Female Farmers Details:**

Statistics for Type of land holdings with sample female farmers has been shown in the Table-4.2.2.9 below. From the table we find that there are 230 valid scores and a value of mean it is 1.90. Standard deviation is 0.301 and standard error of mean 0.020.

Table-4.2.2.9-One-Sample statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q.1.2A1	230	1.90	.301	.020

Frequency table for type of land holdings with female farmers in table - 4.2.2.10 below shows that out of total 230 female sample farmers, 23 of them are the agriculture labours and 207 of them are the cultivators. The percentage column of the table shows that only 10% of sample female farmers are agriculture labours. On the other hand, a massive i.e. 90% of female sample farmers are cultivators. Things become more clear with the percentage column of the table as well as figure-4.8 given below.

Table-4.2.2.10- Frequency table for type of land holdings with women

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither land possessed nor owned (agri. labours)	23	10.0	10.0	10.0
	Land owned/ possessed but not owned (cultivators)	207	90.0	90.0	100.0
	Total	230	100.0	100.0	

Source: Field Survey

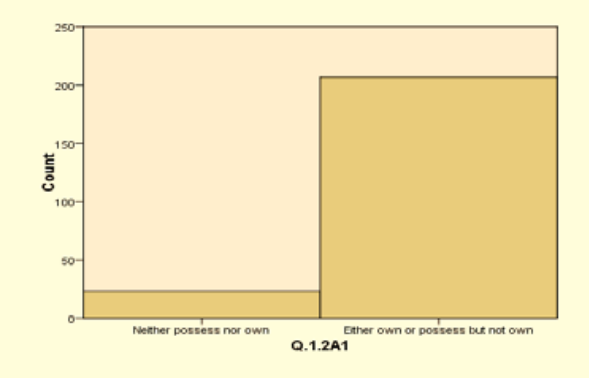


Figure-4.8, Q.1.2A1,
Type of Land Holdings

- It is our assumption that females cultivators are more rather than the agriculture labours.

One sample‘t’-test is conducted to test our hypothesis.

Ho – Females cultivators are not more than agriculture labours.

Test statistic in table 4.2.2.11 is 1.5. Less than this represents agriculture labours. More than 1.5 means cultivators. From the table 4.2.2.11, we find that confidence intervals lie entirely above 0.0 and also it is positive. Value of 't' for type of land holdings with women is 20.177 which is higher than 1.96, mean difference column for it also shows positive values. This is further confirmed by signifi-cance level which is 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for it is rejected and thus alternate hypothesis for it is accepted, which says that cultivators are more than agriculture labours.

Table-4.2.2.11-One-Sample Test

	Test Value = 1.5					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Q.1.2A1	20.177	229	.000	.400	.36	.44

- **District Wise Type of Land Holdings with Female Farmers:**

In table-4.2.2.12, for district wise type of land holdings with female farmers, female farmers as (cultivators) have been observed in all the districts. But, within the districts, in North district 100% female farmers as (cultivators) has been spotted. Not even a single female agriculture labour is noted in this District. Within the districts, East is the district having maximum numbers of cultivators as well as agriculture labours.

Table-4.2.2.12-Q.1.2A1 * District Cross tabulation

			District				Total
			East	West	North	South	
Q.1.2A1	Neither land possessed nor owned (agri. labours)	Count	14	5	0	4	23
		% within Q.1.2A1	60.9%	21.7%	.0%	17.4%	100.0%
		% within District	17.5%	8.3%	.0%	6.7%	10.0%
		% of Total	6.1%	2.2%	.0%	1.7%	10.0%
	Land owned/ possessed but not owned (cultivators)	Count	66	55	30	56	207
		% within Q.1.2A1	31.9%	26.6%	14.5%	27.1%	100.0%
		% within District	82.5%	91.7%	100.0%	93.3%	90.0%
		% of Total	28.7%	23.9%	13.0%	24.3%	90.0%
Total		Count	80	60	30	60	230
		% within Q.1.2A1	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.3 Participation in Decision Making of Farm and Related Activities by Sample Farming Females *

- **Descriptive Details and Analysis of Decision Making**:

(A), (B), (C), (D), (E), (F), (G), (H), (I), (J), (K), (L), (M), (N) in the table-4.2.3.1(i) below, represents decision making by women in fourteen different farm, animal and related activities namely - selection of crops of the season to be sown (A), selection of harvesting time (B), changing of crops (C), purchase of agricultural equipment (D), procurement of fertilizer (E), selection and procurement of seeds of new variety (F), selling of crops/cereals/ vegetables (G), purchasing/selling of livestock (H), selection of breed of animals (I), storage of green fodder for lean period (J), selling of surplus dry fodder (K), procurement of dry fodder from the market (L), selling of green fodder in the market (M), selling of milk/poultry items (N).

Statistics of decision making by women in (A), (B), (C), (D), (E), (F), (G), (H), (I), (J), (K), (L), (M) and (N) has been given in table-4.2.3.1(i). From the table we find that there are 230 valid scores and values of mean for them are 3.88, 3.73, 3.30, 2.83, 2.10, 2.85, 3.00, 2.46, 2.20, 2.85, 1.27, 1.64, 1.41 and 3.39 respectively. Standard deviation is 1.189, 1.235, 1.069, 1.043, 1.078, 1.072, 1.123, 1.088, 1.192, 1.379, .560, .801, .653, 1.231 and standard error of mean are .078, .081, .071, .069, .071, .071, .074, .072, .079, .091, .037, .053, .043, and .081.

Table-4.2.3.1(i)-One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q.2A	230	3.88	1.189	.078
Q.2B	230	3.73	1.235	.081
Q.2C	230	3.30	1.069	.071
Q.2D	230	2.83	1.043	.069
Q.2E	230	2.10	1.078	.071
Q.2F	230	2.85	1.072	.071
Q.2G	230	3.00	1.123	.074
Q.2H	230	2.46	1.088	.072
Q.2I	230	2.20	1.192	.079
Q.2J	230	2.85	1.379	.091
Q.2K	230	1.27	.560	.037
Q.2L	230	1.64	.801	.053
Q.2M	230	1.41	.653	.043
Q.2N	230	3.39	1.231	.081

*"Participation in Decision Making – A Study of Female Farmers in the Rural Area of Sikkim in North- Eastern India", Nidhi Dwivedy, Niranjan Upadhyay,"Research Journal of Humanities and Social Sciences"3(3): July-September,2012, Pp347-353, ISSN0975–6795.

- **Descriptive Analysis of Participation in Decision Making of Farm and Related Activities by Sample Farmers at Selected Sites of Sikkim State**

Descriptive analysis of Participation in decision making is done using the Statistical Package for the Social Science (SPSS) and some descriptive statistics, such as percentage, mean, standard deviation (SD), coefficient of variation (CV) and rank have been used to interpret the data.

In Table- 4.2.3.2 below, on the basis of mean score it can be said that sample female farmers get better chances in decision making for activities like- Selection of crops of the season to be sown, Selection of harvesting time. In these activities, their relative participation is also greater than that of men. They get good chance in decision making for- Selling of milk/poultry items, Changing of crops, Selling of crops/cereals/ vegetables, Purchase of agricultural equipment, Selection and procurement of seeds of new variety, Storage of green fodder for lean period. They get limited chance in decision making for-Selection of breed of animals, Procurement of fertilizer, Procurement of dry fodder from the market, Purchasing/selling of livestock. Availability of organic fertilizer at almost everybody' place was the reason told by the respondents for less participation in decision making in this particular ac-tivity. While decision making was found to be poor in activities like-Selling of green fodder in the market, selling of surplus dry fodder.

Table- 4.2.3.2-Participation in decision making of sample female farmers in Farm and related activities of Sikkim State

Decision making of Farm and related activities	Extent of decision making (%)					Mean*	Rank order
	1 Never	2 Rarely	3 Sometimes	4 Frequently	5 Always		
Selection of crops of the season to be sown	06(03)	25(11)	66(29)	26(11)	107(46)	**3.88 (30.64)**	**1**
Selection of harvesting Time	13(06)	24(10)	64(28)	40(17)	89(39)	**3.73 (33.1)**	**2**
Selling of milk/poultry Items	17(07)	33(14)	85(37)	33(15)	62(27)	**3.39 (36.3)**	**3**

Changing of crops	09(04)	44(19)	83(36)	58(25)	36(16)	**3.30 (32.3)**	**4**
Selling of crops/cereals/ vegetables	26(11)	36(16)	109(47)	29(13)	30(13)	**3.00 (37.4)**	**5**
Selection/procurement of seeds of new variety	23(10)	60(26)	97(42)	28(12)	22(10)	**2.85 (37.6)**	**6**
Storage of green fodder for lean period	50(22)	45(20)	68(30)	24(10)	43(19)	**2.85 (48.3)**	**7**
Purchase of agricultural equipment	28(12)	45(20)	115(50)	23(10)	19(08)	**2.83 (36.8)**	**8**
Purchasing/selling of livestock	55(24)	55(24)	92(40)	16(07)	12(05)	**2.46 (44.2)**	**9**
Selection of breed of animals	81(35)	65(28)	59(26)	06(03)	19(08)	**2.20 (54.1)**	**10**
Procurement of fertilizer	84(37)	70(30)	55(24)	12(05)	09(04)	**2.10 (51.3)**	**11**
Procurement of Dry fodder from the market	127(55)	60(26)	41(18)	02(01)	00(00)	**1.64 (48.8)**	**12**
Selling of green fodder in the market	157(68)	52(23)	21(09)	00(00)	00(00)	**1.41 (46.3)**	**13**
Selling of surplus dry fodder	180(78)	37(16)	13(06)	00(00)	00(00)	**1.27 (44.09)**	**14**

Source: Field Survey

* Mean values of items ranging from 1 to 5, where 1 indicates 'no chances in decision making' and 5 indicate 'best' chances in decision making. Figures in the parentheses of mean column indicate CV = (SD / Mean) × 100.

Figures in the parentheses indicate the % decision making

- **Inferential Analysis of Participation in Decision Making of Farm and Related Activities of Sample Farmers at Selected Sites of Sikkim State**

One sample't'-test is conducted to test our hypothesis

Hypothesis Statement – Women are not consulted for decision making in farm, animal and related activities.

Ho – Participation in Decision making by women is not more in farm, animal and related activities.

Ha - Participation in Decision making by women is more in farm, animal and related activities.

The Mean Difference is obtained by subtracting the test value (which is 3 here in this table), from each sample mean. Test statistic 3 represents sometimes decision making by women. More than 3 means frequently/always and less than 3 means never/rarely decision making by women.

From the table 4.2.3.1(ii) we find that confidence intervals lie entirely above 0.0 and also it is positive.The value of 't'for decision making in selection of crops of the season to be sown (A),

selection of harvesting time (B), changing of crops (C) and selling of milk/poultry items (N) is 11.256, 8.970, 4.193 and 4.822 respectively which is higher than 1.96, mean difference column for them also shows positive values. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for all these activities. We can safely say that null hypothesis for these activities is rejected and thus alternate hypothesis for these activities is accepted. Further, we conclude it by saying that decision making by women in these farm, animal and related activities is significantly more than 3 on the average. That means for these activities women frequently/always make decisions.

From the table 4.2.3.1(ii) we also find that value of't' for decision making in purchase of agricultural equipment (D), procurement of fertilizer (E), purchasing/selling of livestock (H), se-lection of breed of animals (I), selling of surplus dry fodder (K), procurement of dry fodder from the market (L), selling of green fodder in the market (M) is -2.529, -12.728, -7.576, -10.123, - 46.768, -25.698, -36.970 respectively which is negative. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely below 0.0 for all these activities. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted for these activities, which says that decision mak-ing by women is significantly not more than 3 on the average in these farm, animal and related activities. That means for these activities women never/rarely/ sometimes make decisions.

For activities i.e. Selection/procurement of seeds of new variety (F), selling of crops/cereals/ vegetables (G) and storage of green fodder for lean period (J), we find that value of't' is -2.092, 0.059 and -1.673, which is lower than 1.96. This is further confirmed by mean difference column for it also shows negative value (except for selling of crops/cereals/ vegetables (G) for which it is positive). But if we look at the significance level it is not 0 but has got the value which is .038, 0.953 and .096 respectively and also it is more than 0. Besides, the magnitude of upper limit is more than the magnitude of the lower limit for G and the magnitude of upper limit is less than the magnitude of the lower limit for F and J. We can safely say that Null hypothesis is accepted for (F) and (J). That means for these activities women never/rarely/sometimes make decisions for F and J.

Also we can safely say that null hypothesis is rejected for (G) and thus alternate hypothesis is accepted. Further, we conclude it by saying that decision making by women in these

farm/animal and related activities is significantly more than 3 for (G) on the average and that means for this activity women frequently/always make decisions.

Table-4.2.3.1(ii)- One-Sample Test						
	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q.2A	11.256	229	.000	.883	.73	1.04
Q.2B	8.970	229	.000	.730	.57	.89
Q.2C	4.193	229	.000	.296	.16	.43
Q.2D	-2.529	229	.012	-.174	-.31	-.04
Q.2E	-12.728	229	.000	-.904	-1.04	-.76
Q.2F	-2.092	229	.038	-.148	-.29	.00
Q.2G	.059	229	.953	.004	-.14	.15
Q.2H	-7.576	229	.000	-.543	-.68	-.40
Q.2I	-10.123	229	.000	-.796	-.95	-.64
Q.2J	-1.673	229	.096	-.152	-.33	.03
Q.2K	-46.768	229	.000	-1.726	-1.80	-1.65
Q.2L	-25.698	229	.000	-1.357	-1.46	-1.25
Q.2M	-36.970	229	.000	-1.591	-1.68	-1.51
Q.2N	4.822	229	.000	.391	.23	.55

- **Factor Analysis on decision making:**

Factor analysis of the data on decision making was conducted to identify the activities to which women have relatively less decision making.

Table-4.2.3.3 (i) - KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.660
Bartlett's Test of Sphericity	Approx. Chi-Square	475.179
	df	91
	Sig.	.000

Table-4.2.3.3 (ii) - Communalities		
	Initial	**Extraction**
Q.2A	1.000	.636
Q.2B	1.000	.729
Q.2C	1.000	.519
Q.2D	1.000	.507
Q.2E	1.000	.583
Q.2F	1.000	.470
Q.2G	1.000	.657
Q.2H	1.000	.653
Q.2I	1.000	.580
Q.2J	1.000	.420
Q.2K	1.000	.661
Q.2L	1.000	.400
Q.2M	1.000	.576
Q.2N	1.000	.820

Extraction Method: Principal Component Analysis.

Kaiser-Meyer-Olkin measure of sampling adequacy in table-4.2.3.3 (i) is found to be 0.660, which is more than 0.5 and hence the sample is considered adequate. Bartlett's test of sphericity was also conducted. The chi-square value is approximately 475.2 with a corresponding significance of approximately zero which confirms multivariate normality of the data.

In terms of women's participation in decision making in table-4.2.3.3 (ii), these 14 decisions can be crooked into 5 categories.

1. Selection of harvesting time (B), Selling of crops/cereals/ vegetables (G) and Selling of milk/ poultry items (N).
2. Selection of crops of the season to be sown (A) and Changing of crops (C).
3. Purchase of agricultural equipment (D), Selection and procurement of seeds of new variety (F) and Storage of green fodder for lean period (J).
4. Procurement of fertilizer (E), Purchasing/selling of livestock (H) and Selection of breed of animals (I).
5. Selling of surplus dry fodder (K), procurement of dry fodder from the market (L) and Selling of green fodder in the market (M).

Table-4.2.3.3 (iii) - Total Variance Explained						
Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	2.534	18.100	18.100	2.534	18.100	18.100
2	2.041	14.580	32.680	2.041	14.580	32.680
3	1.526	10.899	43.579	1.526	10.899	43.579
4	1.093	7.809	51.389	1.093	7.809	51.389
5	1.017	7.267	58.656	1.017	7.267	58.656
6	.891	6.367	65.023			
7	.860	6.140	71.163			
8	.768	5.487	76.650			
9	.700	5.002	81.652			
10	.631	4.508	86.161			
11	.566	4.041	90.202			
12	.546	3.902	94.104			
13	.449	3.209	97.314			
14	.376	2.686	100.000			
Extraction Method: Principal Component Analysis.						

From the data in table-4.2.3.3 (iii) we find that selection of crops of the season to be sown, selection of harvesting time, selling of milk/poultry items, changing of crops and selling of crops/cereals/ vegetables have an Eigen value more than 1 in figure 4.9 below, whereas others purchase of agricultural equipment, selection and procurement of seeds of new variety, Selection of breed of animals, procurement of fertilizer, procurement of dry fodder from the market, Selling of green fodder in the market, procurement of dry fodder from the market, storage of green fodder for lean period, Selling of surplus dry fodder and purchasing/selling of livestock have an Eigen value below 1, which implies that these are the decisions where women have less say in decision making. The governmental and social interventions must focus on these.

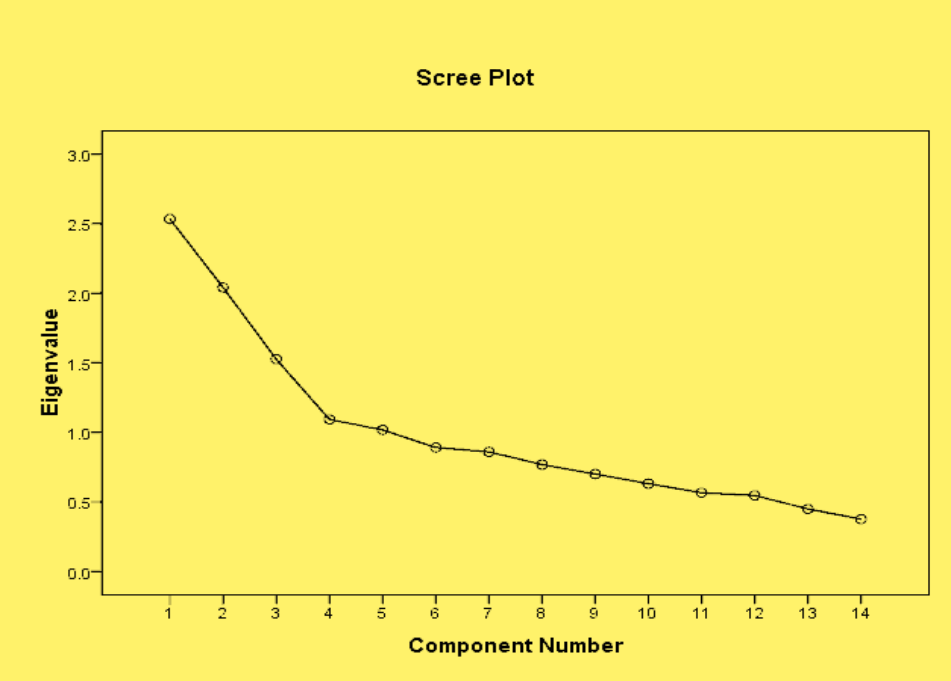


Figure-4.9, Scree Plot of Decision Making

- **District Wise Participation in Decision Making of Farm and Related Activities of Sample Farmers at Selected Sites of Sikkim State:**

In table-4.2.3.4, for district wise participation in decision making of selection of crops of the season to be sown by female farmers, though in all the districts female farmers are observed always participating in decision making of this activity. But, within the districts, in West district female farmers are spotted the most and in North (the least), always participation in decision making for this activity. Within the districts, 50% of female farmers in East and North are observed never participation in decision making for this activity.

Table-4.2.3.4 -Q.2A * District Cross tabulation

			District				Total
			East	West	North	South	
Q.2A	NEVER	Count	3	0	3	0	6
		% within Q.2A	50.0%	.0%	50.0%	.0%	100.0 %
		% within District	3.8%	.0%	10.0%	.0%	2.6%
		% of Total	1.3%	.0%	1.3%	.0%	2.6%
	RARELY	Count	7	6	3	9	25
		% within Q.2A	28.0%	24.0%	12.0%	36.0%	100.0 %
		% within District	8.8%	10.0%	10.0%	15.0%	10.9%
		% of Total	3.0%	2.6%	1.3%	3.9%	10.9%
	SOMETIMES	Count	23	15	8	20	66
		% within Q.2A	34.8%	22.7%	12.1%	30.3%	100.0 %

		% within District	28.8%	25.0%	26.7%	33.3%	28.7%
		% of Total	10.0%	6.5%	3.5%	8.7%	28.7%
	FREQUENTLY	Count	14	3	2	7	26
		% within Q.2A	53.8%	11.5%	7.7%	26.9%	100.0%
		% within District	17.5%	5.0%	6.7%	11.7%	11.3%
		% of Total	6.1%	1.3%	.9%	3.0%	11.3%
	ALWAYS	Count	33	36	14	24	107
		% within Q.2A	30.8%	33.6%	13.1%	22.4%	100.0%
		% within District	41.3%	60.0%	46.7%	40.0%	46.5%
		% of Total	14.3%	15.7%	6.1%	10.4%	46.5%
Total		Count	80	60	30	60	230
		% within Q.2A	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.3.5, for district wise participation in decision making of selection of harvesting time by female farmers, in East, North and South districts, female farmers are observed always participating in decision making of this activity. But, in West district maximum percentage of female farmers are spotted sometimes, participation in decision making for this activity. Within the districts, west is the district which has not found even a single female who does not participate in this activity. Within the districts, North is found to have maximum number of females who never participated in this activity.

Table-4.2.3.5 -Q.2B * District Cross tabulation

			District				Total
			East	West	North	South	
Q.2B	NEVER	Count	5	0	5	3	13
		% within Q.2B	38.5%	.0%	38.5%	23.1%	100.0 %
		% within District	6.3%	.0%	16.7%	5.0%	5.7%
		% of Total	2.2%	.0%	2.2%	1.3%	5.7%
	RARELY	Count	4	5	5	10	24
		% within Q.2B	16.7%	20.8%	20.8%	41.7%	100.0 %
		% within District	5.0%	8.3%	16.7%	16.7%	10.4%
		% of Total	1.7%	2.2%	2.2%	4.3%	10.4%
	SOMETIMES	Count	15	28	2	19	64
		% within Q.2B	23.4%	43.8%	3.1%	29.7%	100.0 %
		% within District	18.8%	46.7%	6.7%	31.7%	27.8%
		% of Total	6.5%	12.2%	.9%	8.3%	27.8%
	FREQUENTLY	Count	21	5	5	9	40
		% within	52.5%	12.5%	12.5%	22.5%	100.0

		Q.2B					%
		% within District	26.3%	8.3%	16.7%	15.0%	17.4%
		% of Total	9.1%	2.2%	2.2%	3.9%	17.4%
	ALWAYS	Count	35	22	13	19	89
		% within Q.2B	39.3%	24.7%	14.6%	21.3%	100.0 %
		% within District	43.8%	36.7%	43.3%	31.7%	38.7%
		% of Total	15.2%	9.6%	5.7%	8.3%	38.7%
Total		Count	80	60	30	60	230
		% within Q.2B	34.8%	26.1%	13.0%	26.1%	100.0 %
		% within District	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0 %

Source: Field Survey

In table-4.2.3.6, for district wise participation in decision making of changing of crops by female farmers, though in East district only, female farmers are observed always participating in decision making of this activity. But, in West district maximum percentage of female farmers are spotted sometimes, participation in decision making for this activity. In North and South districts, maximum percentage of female farmers is spotted frequently, participation in decision making for this activity. Within the districts, West and South are the districts which have not found even a single female who does not participate in this activity. Within the districts, North is found to have maximum number of females who never participated in this activity and East is the one, found to have maximum number of females who always participated in this activity.

Table-4.2.3.6 -Q.2C * District Cross tabulation

			District				Total
			East	West	North	South	
Q.2C	NEVER	Count	5	0	4	0	9
		% within Q.2C	55.6%	.0%	44.4%	.0%	100.0%
		% within District	6.3%	.0%	13.3%	.0%	3.9%
		% of Total	2.2%	.0%	1.7%	.0%	3.9%
	RARELY	Count	17	15	4	8	44
		% within Q.2C	38.6%	34.1%	9.1%	18.2%	100.0%
		% within District	21.3%	25.0%	13.3%	13.3%	19.1%
		% of Total	7.4%	6.5%	1.7%	3.5%	19.1%
	SOMETIMES	Count	19	32	10	22	83
		% within Q.2C	22.9%	38.6%	12.0%	26.5%	100.0%
		% within District	23.8%	53.3%	33.3%	36.7%	36.1%
		% of Total	8.3%	13.9%	4.3%	9.6%	36.1%
	FREQUENTLY	Count	19	3	12	24	58
		% within Q.2C	32.8%	5.2%	20.7%	41.4%	100.0%

		% within District	23.8%	5.0%	40.0%	40.0%	25.2%
		% of Total	8.3%	1.3%	5.2%	10.4%	25.2%
	ALWAYS	Count	20	10	0	6	36
		% within Q.2C	55.6%	27.8%	.0%	16.7%	100.0%
		% within District	25.0%	16.7%	.0%	10.0%	15.7%
		% of Total	8.7%	4.3%	.0%	2.6%	15.7%
Total		Count	80	60	30	60	230
		% within Q.2C	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.3.7, for district wise participation in decision making of Purchase of agricultural equipment by female farmers, in all the district maximum percentage of female farmers are spot-ted sometimes, participating in decision making for this activity. Within the districts, North is the district which has not found even a single female who always participate in decision making of this activity. Within the districts, west is the district which has not found even a single female who does not participate in this activity. East is the one, which has found maximum number of females, who always participated in this activity.

Table-4.2.3.7 -Q.2D * District Cross tabulation

			District				Total
			East	West	North	South	
Q.2D	NEVER	Count	16	0	7	5	28
		% within Q.2D	57.1%	.0%	25.0%	17.9%	100.0%
		% within District	20.0%	.0%	23.3%	8.3%	12.2%
		% of Total	7.0%	.0%	3.0%	2.2%	12.2%
	RARELY	Count	13	14	8	10	45
		% within Q.2D	28.9%	31.1%	17.8%	22.2%	100.0%
		% within District	16.3%	23.3%	26.7%	16.7%	19.6%
		% of Total	5.7%	6.1%	3.5%	4.3%	19.6%
	SOMETIMES	Count	25	41	12	37	115
		% within Q.2D	21.7%	35.7%	10.4%	32.2%	100.0%
		% within District	31.3%	68.3%	40.0%	61.7%	50.0%
		% of Total	10.9%	17.8%	5.2%	16.1%	50.0%
	FREQUENTLY	Count	13	4	3	3	23
		% within Q.2D	56.5%	17.4%	13.0%	13.0%	100.0%
		% within District	16.3%	6.7%	10.0%	5.0%	10.0%
		% of Total	5.7%	1.7%	1.3%	1.3%	10.0%
	ALWAYS	Count	13	1	0	5	19
		% within Q.2D	68.4%	5.3%	.0%	26.3%	100.0%
		% within District	16.3%	1.7%	.0%	8.3%	8.3%
		% of Total	5.7%	.4%	.0%	2.2%	8.3%
Total		Count	80	60	30	60	230
		% within Q.2D	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.3.8, for district wise participation in decision making of Procurement of fertilizer by female farmers, in all the district maximum percentage of female farmers are spotted never (except for West where it is maximum in sometimes), participating in decision making for this activity. Within the districts, North and South are the districts, which have not found even a single female who always participate in decision making of this activity. Within the districts, East is found to have maximum number of females who always participated in this activity.

Table-4.2.3.8 -Q.2E * District Cross tabulation

			District				Total
			East	West	North	South	
Q.2E	NEVER	Count	28	18	14	24	84
		% within Q.2E	33.3%	21.4%	16.7%	28.6%	100.0%
		% within District	35.0%	30.0%	46.7%	40.0%	36.5%
		% of Total	12.2%	7.8%	6.1%	10.4%	36.5%
	RARELY	Count	21	17	14	18	70
		% within Q.2E	30.0%	24.3%	20.0%	25.7%	100.0%
		% within District	26.3%	28.3%	46.7%	30.0%	30.4%
		% of Total	9.1%	7.4%	6.1%	7.8%	30.4%
	SOMETIMES	Count	18	22	2	13	55
		% within Q.2E	32.7%	40.0%	3.6%	23.6%	100.0%
		% within District	22.5%	36.7%	6.7%	21.7%	23.9%
		% of Total	7.8%	9.6%	.9%	5.7%	23.9%
	FREQUENTLY	Count	5	2	0	5	12
		% within Q.2E	41.7%	16.7%	.0%	41.7%	100.0%
		% within District	6.3%	3.3%	.0%	8.3%	5.2%
		% of Total	2.2%	.9%	.0%	2.2%	5.2%
	ALWAYS	Count	8	1	0	0	9
		% within Q.2E	88.9%	11.1%	.0%	.0%	100.0%
		% within District	10.0%	1.7%	.0%	.0%	3.9%
		% of Total	3.5%	.4%	.0%	.0%	3.9%
Total		Count	80	60	30	60	230
		% within Q.2E	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.3.9, for district wise participation in decision making of Selection/procurement of seeds of new variety by female farmers, in all the district maximum percentage of female farmers are spotted sometimes, participating in decision making for this activity. Within the districts, East is found to have maximum number of females who never participated in this activity and surprisingly East is the one, found to have maximum number of females also, who always participated in this activity.

Table-4.2.3.9 -Q.2F * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.2F	NEVER	Count	11	3	2	7	23
		% within Q.2F	47.8%	13.0%	8.7%	30.4%	100.0%
		% within District	13.8%	5.0%	6.7%	11.7%	10.0%
		% of Total	4.8%	1.3%	.9%	3.0%	10.0%
	RARELY	Count	19	18	8	14	59
		% within Q.2F	32.2%	30.5%	13.6%	23.7%	100.0%
		% within District	23.8%	30.0%	26.7%	23.3%	25.7%
		% of Total	8.3%	7.8%	3.5%	6.1%	25.7%
	SOMETIMES	Count	30	27	11	30	98
		% within Q.2F	30.6%	27.6%	11.2%	30.6%	100.0%
		% within District	37.5%	45.0%	36.7%	50.0%	42.6%
		% of Total	13.0%	11.7%	4.8%	13.0%	42.6%
	FREQUENTLY	Count	12	5	6	5	28
		% within Q.2F	42.9%	17.9%	21.4%	17.9%	100.0%
		% within District	15.0%	8.3%	20.0%	8.3%	12.2%
		% of Total	5.2%	2.2%	2.6%	2.2%	12.2%
	ALWAYS	Count	8	7	3	4	22
		% within Q.2F	36.4%	31.8%	13.6%	18.2%	100.0%
		% within District	10.0%	11.7%	10.0%	6.7%	9.6%
		% of Total	3.5%	3.0%	1.3%	1.7%	9.6%
Total		Count	80	60	30	60	230
		% within Q.2F	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.3.10, for district wise participation in decision making of selling of crops/cereals/ vegetables by female farmers, in all the district maximum percentage of female farmers are spotted sometimes, participating in decision making for this activity. Within the districts, East is found to have maximum number of females who never participated in this activity and surprisingly East is the one, found to have maximum number of females also, who always participated in this activity. Within the districts, West is found to have least number of females who never and North is found to have least number of females who always participated in this activity.

Table-4.2.3.10-Q.2G * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.2G	NEVER	Count	10	3	8	5	26
		% within Q.2G	38.5%	11.5%	30.8%	19.2%	100.0%
		% within District	12.5%	5.0%	26.7%	8.3%	11.3%
		% of Total	4.3%	1.3%	3.5%	2.2%	11.3%
	RARELY	Count	6	14	6	10	36
		% within Q.2G	16.7%	38.9%	16.7%	27.8%	100.0%
		% within District	7.5%	23.3%	20.0%	16.7%	15.7%
		% of Total	2.6%	6.1%	2.6%	4.3%	15.7%
	SOMETIMES	Count	32	33	10	35	110
		% within Q.2G	29.1%	30.0%	9.1%	31.8%	100.0%

		% within District	40.0%	55.0%	33.3%	58.3%	47.8%
		% of Total	13.9%	14.3%	4.3%	15.2%	47.8%
	FREQUENTLY	Count	13	6	4	6	29
		% within Q.2G	44.8%	20.7%	13.8%	20.7%	100.0%
		% within District	16.3%	10.0%	13.3%	10.0%	12.6%
		% of Total	5.7%	2.6%	1.7%	2.6%	12.6%
	ALWAYS	Count	19	4	2	4	29
		% within Q.2G	65.5%	13.8%	6.9%	13.8%	100.0%
		% within District	23.8%	6.7%	6.7%	6.7%	12.6%
		% of Total	8.3%	1.7%	.9%	1.7%	12.6%
Total		Count	80	60	30	60	230
		% within Q.2G	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.3.11, for district wise participation in decision making of Purchasing/selling of live-stock by female farmers, in West and South districts maximum percentage of female farmers are spotted sometimes, participating in decision making for this activity. Within the districts, East is found to have maximum number of females who never participated in this activity. East and South are the districts, found to have maximum number of females, who always participated in this activity. Within the districts, not even a single female in the West is found to always partici-pate in this activity.

Table-4.2.3.11-Q.2H * District Cross tabulation

			District				Total
			East	West	North	South	
Q.2H	NEVER	Count	33	9	8	5	55
		% within Q.2H	60.0%	16.4%	14.5%	9.1%	100.0%
		% within District	41.3%	15.0%	26.7%	8.3%	23.9%
		% of Total	14.3%	3.9%	3.5%	2.2%	23.9%
	RARELY	Count	11	16	18	9	54
		% within Q.2H	20.4%	29.6%	33.3%	16.7%	100.0%
		% within District	13.8%	26.7%	60.0%	15.0%	23.5%
		% of Total	4.8%	7.0%	7.8%	3.9%	23.5%
	SOMETIMES	Count	22	30	4	37	93
		% within Q.2H	23.7%	32.3%	4.3%	39.8%	100.0%
		% within District	27.5%	50.0%	13.3%	61.7%	40.4%
		% of Total	9.6%	13.0%	1.7%	16.1%	40.4%
	FREQUENTLY	Count	9	3	0	4	16
		% within Q.2H	56.3%	18.8%	.0%	25.0%	100.0%
		% within District	11.3%	5.0%	.0%	6.7%	7.0%
		% of Total	3.9%	1.3%	.0%	1.7%	7.0%
	ALWAYS	Count	5	2	0	5	12
		% within Q.2H	41.7%	16.7%	.0%	41.7%	100.0%
		% within District	6.3%	3.3%	.0%	8.3%	5.2%
		% of Total	2.2%	.9%	.0%	2.2%	5.2%
Total		Count	80	60	30	60	230
		% within Q.2H	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

In table-4.2.3.12, for district wise participation in decision making of selection of breed of animals by female farmers, in all the district maximum percentage of female farmers are spotted never (except for West where it has shown maximum in rarely), participating in decision making for this activity. Within the districts, north is the district, which has not found even a single female who always participate in decision making of this activity. Within the districts, East is found to have maximum number of females who always participated in this activity. Within the districts, East and North districts are found to have maximum number of females who never participated in this activity.

Table-4.2.3.12 -Q.2I * District Cross tabulation

			District				Total
			East	West	North	South	
Q.2I	NEVER	Count	25	12	25	19	81
		% within Q.2I	30.9%	14.8%	30.9%	23.5%	100.0%
		% within District	31.3%	20.0%	83.3%	31.7%	35.2%
		% of Total	10.9%	5.2%	10.9%	8.3%	35.2%
	RARELY	Count	21	23	5	16	65
		% within Q.2I	32.3%	35.4%	7.7%	24.6%	100.0%
		% within District	26.3%	38.3%	16.7%	26.7%	28.3%
		% of Total	9.1%	10.0%	2.2%	7.0%	28.3%
	SOMETIMES	Count	24	20	0	15	59
		% within Q.2I	40.7%	33.9%	.0%	25.4%	100.0%
		% within District	30.0%	33.3%	.0%	25.0%	25.7%
		% of Total	10.4%	8.7%	.0%	6.5%	25.7%
	FREQUENTLY	Count	0	2	0	4	6
		% within Q.2I	.0%	33.3%	.0%	66.7%	100.0%
		% within District	.0%	3.3%	.0%	6.7%	2.6%
		% of Total	.0%	.9%	.0%	1.7%	2.6%
	ALWAYS	Count	10	3	0	6	19
		% within Q.2I	52.6%	15.8%	.0%	31.6%	100.0%
		% within District	12.5%	5.0%	.0%	10.0%	8.3%
		% of Total	4.3%	1.3%	.0%	2.6%	8.3%
Total		Count	80	60	30	60	230
		% within Q.2I	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

In table-4.2.3.13, for district wise participation in decision making of Storage of green fodder for lean period by female farmers, in West and South districts maximum percentage of female farmers are spotted sometimes (except for East and North where it has shown maximum in never and rarely respectively), participating in decision making for this activity. Within the districts, North is the district, which has not found even a single female who always participates in decision making of this activity. Within the districts, East is found to have maximum number of females who always participated in this activity. Within the districts, North district is found to have maximum number of females who never participated in this activity.

Table-4.2.3.13 -Q.2J * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.2J	NEVER	Count	29	5	4	12	50
		% within Q.2J	58.0%	10.0%	8.0%	24.0%	100.0%
		% within District	36.3%	8.3%	13.3%	20.0%	21.7%
		% of Total	12.6%	2.2%	1.7%	5.2%	21.7%
	RARELY	Count	7	15	14	9	45
		% within Q.2J	15.6%	33.3%	31.1%	20.0%	100.0%
		% within District	8.8%	25.0%	46.7%	15.0%	19.6%
		% of Total	3.0%	6.5%	6.1%	3.9%	19.6%
	SOMETIMES	Count	19	20	11	19	69
		% within Q.2J	27.5%	29.0%	15.9%	27.5%	100.0%
		% within District	23.8%	33.3%	36.7%	31.7%	30.0%
		% of Total	8.3%	8.7%	4.8%	8.3%	30.0%
	FREQUENTLY	Count	9	6	1	8	24
		% within Q.2J	37.5%	25.0%	4.2%	33.3%	100.0%
		% within District	11.3%	10.0%	3.3%	13.3%	10.4%
		% of Total	3.9%	2.6%	.4%	3.5%	10.4%
	ALWAYS	Count	16	14	0	12	42
		% within Q.2J	38.1%	33.3%	.0%	28.6%	100.0%
		% within District	20.0%	23.3%	.0%	20.0%	18.3%
		% of Total	7.0%	6.1%	.0%	5.2%	18.3%
Total		Count	80	60	30	60	230
		% within Q.2J	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.3.14, for district wise participation in decision making of Selling of surplus dry fodder by female farmers, in all the districts maximum percentage of female farmers are spotted never participating in decision making for this activity. In all the districts frequent and always participation for the activity is not found. Within the districts, East district is found to have maximum number of females who never participated in this activity.

Table-4.2.3.14 -Q.2K * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.2K	NEVER	Count	60	48	19	52	179
		% within Q.2K	33.5%	26.8%	10.6%	29.1%	100.0%
		% within District	75.0%	80.0%	63.3%	86.7%	77.8%
		% of Total	26.1%	20.9%	8.3%	22.6%	77.8%
	RARELY	Count	13	11	8	5	37
		% within Q.2K	35.1%	29.7%	21.6%	13.5%	100.0%
		% within District	16.3%	18.3%	26.7%	8.3%	16.1%
		% of Total	5.7%	4.8%	3.5%	2.2%	16.1%
	SOMETIMES	Count	7	1	3	3	14
		% within Q.2K	50.0%	7.1%	21.4%	21.4%	100.0%
		% within District	8.8%	1.7%	10.0%	5.0%	6.1%
		% of Total	3.0%	.4%	1.3%	1.3%	6.1%

Total	Count	80	60	30	60	230
	% within Q.2K	34.8%	26.1%	13.0%	26.1%	100.0%
	% within District	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.3.15, for district wise participation in decision making of procurement of Dry fodder from the market by female farmers, in all the districts maximum percentage of female farmers are spotted never, participating in decision making for this activity. In all the districts frequent and always participation for the activity is not found. Within the districts, East district is found to have maximum number of females who never participated in this activity.

Table-4.2.3.15 -Q.2L * District Cross tabulation

			District				Total
			East	West	North	South	
Q.2L	NEVER	Count	51	25	14	37	127
		% within Q.2L	40.2%	19.7%	11.0%	29.1%	100.0%
		% within District	63.8%	41.7%	46.7%	61.7%	55.2%
		% of Total	22.2%	10.9%	6.1%	16.1%	55.2%
	RARELY	Count	18	20	10	11	59
		% within Q.2L	30.5%	33.9%	16.9%	18.6%	100.0%
		% within District	22.5%	33.3%	33.3%	18.3%	25.7%
		% of Total	7.8%	8.7%	4.3%	4.8%	25.7%
	SOMETIMES	Count	11	15	6	10	42
		% within Q.2L	26.2%	35.7%	14.3%	23.8%	100.0%
		% within District	13.8%	25.0%	20.0%	16.7%	18.3%
		% of Total	4.8%	6.5%	2.6%	4.3%	18.3%
	FREQUENTLY	Count	0	0	0	2	2
		% within Q.2L	.0%	.0%	.0%	100.0%	100.0%
		% within District	.0%	.0%	.0%	3.3%	.9%
		% of Total	.0%	.0%	.0%	.9%	.9%
Total		Count	80	60	30	60	230
		% within Q.2L	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.3.16, for district wise participation in decision making of Selling of green fodder in the market by female farmers, in all the districts maximum percentage of female farmers are spotted never participating in decision making for this activity. In all the districts frequent and always participation for the activity is not found. Within the districts, North is the district, which has not found even a single female who even sometimes participate in decision making of this activity. Within the districts, South district is found to have maximum number of females who never participated in this activity.

Table-4.2.3.16 -Q.2M * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.2M	NEVER	Count	45	40	22	49	156
		% within Q.2M	28.8%	25.6%	14.1%	31.4%	100.0%
		% within District	56.3%	66.7%	73.3%	81.7%	67.8%
		% of Total	19.6%	17.4%	9.6%	21.3%	67.8%
	RARELY	Count	18	18	8	8	52
		% within Q.2M	34.6%	34.6%	15.4%	15.4%	100.0%
		% within District	22.5%	30.0%	26.7%	13.3%	22.6%
		% of Total	7.8%	7.8%	3.5%	3.5%	22.6%
	SOMETIMES	Count	17	2	0	3	22
		% within Q.2M	77.3%	9.1%	.0%	13.6%	100.0%
		% within District	21.3%	3.3%	.0%	5.0%	9.6%
		% of Total	7.4%	.9%	.0%	1.3%	9.6%
Total		Count	80	60	30	60	230
		% within Q.2M	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.3.17, for district wise participation in decision making of selling of milk/poultry items by female farmers, in all districts maximum percentage of female farmers are spotted sometimes (except for East where it has shown maximum in always), participating in decision making for this activity. Within the districts, South is the district, which has not found even a single female who never participated in decision making of this activity. Within the districts, East is found to have maximum number of females who always participated in this activity. Within the districts, East district is found to have maximum number of females who never participated in this activity.

Table-4.2.3.17 -Q.2N * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.2N	NEVER	Count	12	3	2	0	17
		% within Q.2N	70.6%	17.6%	11.8%	.0%	100.0%
		% within District	15.0%	5.0%	6.7%	.0%	7.4%
		% of Total	5.2%	1.3%	.9%	.0%	7.4%
	RARELY	Count	16	7	4	6	33
		% within Q.2N	48.5%	21.2%	12.1%	18.2%	100.0%
		% within District	20.0%	11.7%	13.3%	10.0%	14.3%
		% of Total	7.0%	3.0%	1.7%	2.6%	14.3%
	SOMETIMES	Count	18	29	10	29	86
		% within Q.2N	20.9%	33.7%	11.6%	33.7%	100.0%
		% within District	22.5%	48.3%	33.3%	48.3%	37.4%
		% of Total	7.8%	12.6%	4.3%	12.6%	37.4%
	FREQUENTLY	Count	11	10	3	9	33
		% within Q.2N	33.3%	30.3%	9.1%	27.3%	100.0%
		% within District	13.8%	16.7%	10.0%	15.0%	14.3%

		% of Total	4.8%	4.3%	1.3%	3.9%	14.3%
	ALWAYS	Count	23	11	11	16	61
		% within Q.2N	37.7%	18.0%	18.0%	26.2%	100.0%
		% within District	28.8%	18.3%	36.7%	26.7%	26.5%
		% of Total	10.0%	4.8%	4.8%	7.0%	26.5%
Total		Count	80	60	30	60	230
		% within Q.2N	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.4 Female Farmer's Participation in Farms*:

4.2.4.1 Gender Wise Participation:

- **Descriptive Details and Analysis of Gender Wise Participation:**

The different management practices carried out in nineteen different crop production and animal husbandry and related activities identified as (A), (B), (C), (D), (E), (F), (G), (H), (I), (J), (K), (L), (M), (N), (O), (P), (Q), (R), (S) in the (table-4.2.4.1) below, represents - ploughing of fields (A), sowing of seeds (B), weeding (C), harvesting (D), threshing (E), winnowing (F), storage of grain (G), collection of fuel from fields / forest / community land (H), procurement of feed and fodder from the market (I), cleaning of the animals and their shed (J), feeding of animals (K), watering (L), getting green fodder from fields / forest / community land (M), milking (N), milk disposal (O), health care to animals (P), vaccination and visits to animal hospitals (Q), breeding of animals (R), care of fields and crops (S).

Statistics for gender wise participation in (A), (B), (C), (D), (E), (F), (G), (H), (I), (J), (K), (L), (M), (N), (O), (P), (Q), (R) and (S) has been given in table-4.2.4.1 From the table we find that there are 230 valid scores and values of mean for them are 1.28, 2.37, 2.18, 2.25, 2.01, 2.03, 1.88, 1.89, 1.79, 1.80, 2.14, 2.18, 2.00, 2.11, 2.24, 1.71, 1.29, 1.32, and 1.91 respectively. Standard deviation is .449, .528, .614, .526, .620, .705, .640, .624, .663, .548, .484, .567, .677, .648, .628, .652, .453, .477, .525 and standard error of mean is .030, .035, .040, .035, .041, .046, .042, .041, .044, .036, .032, .037, .045, .043, .041, .043, .030, .031, .035.

Table-4.2.4.1-One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q.3A	230	1.28	.449	.030
Q.3B	230	2.37	.528	.035
Q.3C	230	2.18	.614	.040
Q.3D	230	2.25	.526	.035
Q.3E	230	2.01	.620	.041
Q.3F	230	2.03	.705	.046

*"Gender Participation in Crop Production and Animal Husbandry & Related Activities in the Rural Area of North-Eastern India", Nidhi Dwivedy, "Asian Journal of Management" 3(3): July-Sept. 2012, Pp 139-148, ISSN- 0976- 495X.

Q.3G	230	1.88	.640	.042
Q.3H	230	1.89	.624	.041
Q.3I	230	1.79	.663	.044
Q.3J	230	1.80	.548	.036
Q.3K	230	2.14	.484	.032
Q.3L	230	2.18	.567	.037
Q.3M	230	2.00	.677	.045
Q.3N	230	2.11	.648	.043
Q.3O	230	2.24	.628	.041
Q.3P	230	1.71	.652	.043
Q.3Q	230	1.29	.453	.030
Q.3R	230	1.32	.477	.031
Q.3S	230	1.91	.525	.035

- **Gender Wise Percentage Participation in Farm and Related Activities of Sample Farmers at Selected Sites of Sikkim State**

It has been observed in Table-4.2.4.2 that though both the genders are responsible for most of these activities, but, division of labour in the performance of some activities has been spotted. The ploughing of fields (72%) is the mainstay of men. However, 28% farmers preferred to involve women also, mainly for cleaning of the field. Activities like sowing of seed (40%), Weeding (30%), harvesting (30%), threshing (equal 19%), getting green fodder from fields / forest / community land (equal 23%) and Winnowing (27%) relatively more independent involvement of women has been noticed. Whereas, for storage of grain, independent involvement of men (27%) has been noted. Even so, the data has shown more percentage of respondents jointly participating (both men and women) in activities like Sowing of seeds (58%), Weeding (59%), Harvesting (66%), Threshing (62%), Winnowing (50%), Storage of grains (58%) and Collection of fuel from fields /forest /community land (60%).

Involvement of women in livestock management practices varies depending upon the type of management practices. Data presented in Table shows more percentage of women contributing independently in activities like feeding of animals (20%), watering of animals (26%), milking (27%) and milk disposal (35%). While activities like vaccination and visits to animal hospitals (78%), breeding of animals (71%), traditional health care of animals (40%), procurement of feed and fodder from the market (35%) and cleaning of the animals and their shed (35%) relatively more percentage of men has been found than women. Nevertheless, the data shows joint participation (both men and women) for (more than 50%) of the respondents in activities like Procurement of feed and fodder from the market(52%), Cleaning of the animals/shed(66%), Feeding of animals(75%), Watering(65%), getting green fodder from fields / forest / community land(54%), Milking(57%), Milk disposal(55%) and care to animals (49%).

Table-4.2.4.2- Frequency of gender wise participation in Farm and related activities of sample farmers at selected sites of Sikkim state

Activities → / Relative participation ↓	Ploughing of Fields	Sowing of seeds	Weeding	Harvesting	Threshing	Winnowing	Storage of grains	Collection of fuel from fields /forest	Procurement of feed and fodder from the	Cleaning of the animals/shed	Feeding of animals	Watering	getting green fodder from fields / forest /	Milking	Milk disposal	Traditional health care to animals	Vaccination/visits to animal hospitals	Breeding of animals	care of fields and crops
Male	166 (72)	05 (02)	26 (11)	10 (04)	43 (19)	53 (23)	62 (27)	59 (26)	80 (35)	62 (27)	13 (05)	20 (09)	53 (23)	37 (16)	24 (10)	92 (40)	164 (71)	157 (68)	43 (18)
Female	00 (00)	91 (40)	68 (30)	68 (30)	45 (19)	61 (27)	35 (15)	33 (14)	31 (13)	16 (07)	45 (20)	61 (26)	52 (23)	62 (27)	80 (35)	25 (11)	00 (00)	01 (01)	22 (10)
Both	64 (28)	134 (58)	136 (59)	152 (66)	142 (62)	116 (50)	138 (60)	119 (52)	119 (52)	152 (66)	172 (75)	149 (65)	125 (54)	131 (57)	126 (55)	113 (49)	66 (29)	72 (31)	165 (72)

Source: Field Survey (Figures in the parentheses indicate the % participation)

- **Inferential Analysis**

One sample't'-test is conducted to test our hypothesis

Hypothesis Statement – Participation in farm, animal and related activities by women is more than that of men.

Ho – Participation in farm, animal and related activities by women is not more than that of men.
Ha - Participation in farm, animal and related activities by women is more than that of men.

The Mean Difference is obtained by subtracting the test value (which is 2 here in this table), from each sample mean. Test statistic 2 represents Participation of both (male and female). More than 2 mean female Participation and less than 2 means male Participation.

From the table 4.2.4.3 we find that value of 't' for Participation by female farmers in sowing of seeds (B), weeding (C), harvesting (D), feeding of animals (K), watering (L), milking (N), milk disposal (O) is 10.740, 4.510, 7.270, 4.363, 4.766, 2.542 and 5.878 respectively which is positive, mean difference column for them also shows positive values. This is further confirmed by significance levels which are 0.00. Confidence intervals lie entirely above 0.0 and also it is positive. Thus there are valid reasons for null hypothesis for all these to be rejected and thus alternate hypothesis for these activities is accepted. Thus, we can safely say that Participation by women in these activities is more than that of men.

From the table 4.2.4.3, we also find that value of 't' for Participation by female farmers in

ploughing of fields (A), storage of grain (G), collection of fuel from fields / forest / community land (H), procurement of feed and fodder from the market (I), cleaning of the animals and their shed (J), health care to animals (P), vaccination and visits to animal hospitals (Q), breeding of animals (R), care of fields and crops (S) is -24.371, -2.781, -2.749, -4.876, -5.534, -6.771, -23.854, -21.547, -2.638 respectively which is negative. This is further confirmed by confidence intervals, both limits of which lie entirely below 0.0 for all these activities. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted for these activities, which says that Participation by female farmers is significantly not more than 2 on the average in these farm/animal and related activities. Thus, there are valid reasons for us to say that Participation by women in these activities is not more than that of men.

From the table 4.2.4.3, we find that confidence intervals do not lie entirely either above or below 0.0. Its value is positive for one limit and negative for the other limit. These activities are identified as threshing (E), winnowing (F), getting green fodder from fields / forest / community land (M). For the activities (E) and (F), value of‘t’ is 0.213 and 0.749, which is lower than 1.96 and significance level is 0.832 and 0.455 respectively (i.e. non 0). But, if we look at the mean difference, we find that for (E) and (F), it is positive i.e. 0.009, 0.035 and also the upper limit of the confidence interval lies entirely above 0. Besides, magnitude of the upper limit (positive value) is more than the magnitude of lower limit (negative value). We can safely say that null hypothesis for these activities is rejected and thus alternate hypothesis for these activities is accepted. For getting green fodder from fields / forest (M), value of‘t’ and the mean difference are both negative i.e. -0.097 and -.004 respectively. Significance level is 0.923 (i.e. non 0). The upper limit of the confidence interval though lies entirely above 0 but magnitude of the upper limit (positive value) is less than the magnitude of lower limit (negative value). Consequently, we can safely say that null hypothesis for this activity is accepted and thus alternate hypothesis is rejected.

Table-4.2.4.3-One-Sample Test

	Test Value = 2					
					95% Confidence Interval	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q.3A	-24.371	229	.000	-.722	-.78	-.66
Q.3B	10.740	229	.000	.374	.31	.44
Q.3C	4.510	229	.000	.183	.10	.26
Q.3D	7.270	229	.000	.252	.18	.32
Q.3E	.213	229	.832	.009	-.07	.09
Q.3F	.749	229	.455	.035	-.06	.13
Q.3G	-2.781	229	.006	-.117	-.20	-.03
Q.3H	-2.749	229	.006	-.113	-.19	-.03

Q.3I	-4.876	229	.000	-.213	-.30	-.13
Q.3J	-5.534	229	.000	-.200	-.27	-.13
Q.3K	4.363	229	.000	.139	.08	.20
Q.3L	4.766	229	.000	.178	.10	.25
Q.3M	-.097	229	.923	-.004	-.09	.08
Q.3N	2.542	229	.012	.109	.02	.19
Q.3O	5.878	229	.000	.243	.16	.33
Q.3P	-6.771	229	.000	-.291	-.38	-.21
Q.3Q	-23.854	229	.000	-.713	-.77	-.65
Q.3R	-21.547	229	.000	-.678	-.74	-.62
Q.3S	-2.638	229	.009	-.091	-.16	-.02

- **District Wise Gender Participation:**

In table-4.2.4.4, for district wise gender participation in ploughing of fields (A) activity, of sample female farmers, it is observed that though in all the districts only male are found performing this activity except North where joint participation is noted the most for this activity. But, within the districts, in East district male dominance is spotted the most and in North the least, for this activity. Independent female participation is absent for this activity. Joint participation for this activity is noted the most in North district.

Table-4.2.4.4-Q.3A * District Cross tabulation

			District				Total
			East	West	North	South	
Q.3A	MALE	Count	63	45	7	51	166
		% within Q.3A	38.0%	27.1%	4.2%	30.7%	100.0%
		% within District	78.8%	75.0%	23.3%	85.0%	72.2%
		% of Total	27.4%	19.6%	3.0%	22.2%	72.2%
	BOTH	Count	17	15	23	9	64
		% within Q.3A	26.6%	23.4%	35.9%	14.1%	100.0%
		% within District	21.3%	25.0%	76.7%	15.0%	27.8%
		% of Total	7.4%	6.5%	10.0%	3.9%	27.8%
Total		Count	80	60	30	60	230
		% within Q.3A	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.5, for district wise gender participation in sowing of seeds (B) activity, of sample female farmers, it is observed that though in all the districts maximum percentage is found in jointly performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in North the least, for this activity. Surprisingly, not even a single male is found performing this activity independently in East, West, North districts and in South it is almost negligible i.e. only 2% of it. Independent female participation for this activity is noted the most in East and West districts and the least in North district.

Table-4.2.4.5-Q.3B * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.3B	MALE	Count	0	0	0	5	5
		% within Q.3B	.0%	.0%	.0%	100.0%	100.0%
		% within District	.0%	.0%	.0%	8.3%	2.2%
		% of Total	.0%	.0%	.0%	2.2%	2.2%
	BOTH	Count	50	30	21	32	133
		% within Q.3B	37.6%	22.6%	15.8%	24.1%	100.0%
		% within District	62.5%	50.0%	70.0%	53.3%	57.8%
		% of Total	21.7%	13.0%	9.1%	13.9%	57.8%
	FEMALE	Count	30	30	9	23	92
		% within Q.3B	32.6%	32.6%	9.8%	25.0%	100.0%
		% within District	37.5%	50.0%	30.0%	38.3%	40.0%
		% of Total	13.0%	13.0%	3.9%	10.0%	40.0%
Total		Count	80	60	30	60	230
		% within Q.3B	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.6, for district wise gender participation in weeding (C) activity, of sample female farmers, it is observed that though in all the districts maximum percentage is found in jointly performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in North the least, for this activity. Surprisingly, not even a single male is found performing this activity independently in North districts and in West and South it is almost negligible. Independent female participation for this activity is noted the most in South followed by West districts and the least in North district.

Table-4.2.4.6-Q.3C * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.3C	MALE	Count	21	1	0	3	25
		% within Q.3C	84.0%	4.0%	.0%	12.0%	100.0%
		% within District	26.3%	1.7%	.0%	5.0%	10.9%
		% of Total	9.1%	.4%	.0%	1.3%	10.9%
	BOTH	Count	44	35	27	30	136
		% within Q.3C	32.4%	25.7%	19.9%	22.1%	100.0%
		% within District	55.0%	58.3%	90.0%	50.0%	59.1%
		% of Total	19.1%	15.2%	11.7%	13.0%	59.1%
	FEMALE	Count	15	24	3	27	69
		% within Q.3C	21.7%	34.8%	4.3%	39.1%	100.0%
		% within District	18.8%	40.0%	10.0%	45.0%	30.0%
		% of Total	6.5%	10.4%	1.3%	11.7%	30.0%
Total		Count	80	60	30	60	230
		% within Q.3C	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.7, for district wise gender participation in harvesting (D), activity, of sample female farmers, it is observed that though in all the districts maximum percentage is found in jointly performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in North the least, for this activity. Surprisingly, not even a single male is found performing this activity independently in North districts and in East, West and South it is almost negligible. Independent female participation for this activity is noted the most in East followed by West, South districts and the least in North district.

Table-4.2.4.7-Q.3D * District Cross tabulation

			District				Total
			East	West	North	South	
Q.3D	MALE	Count	3	4	0	3	10
		% within Q.3D	30.0%	40.0%	.0%	30.0%	100.0%
		% within District	3.8%	6.7%	.0%	5.0%	4.3%
		% of Total	1.3%	1.7%	.0%	1.3%	4.3%
	BOTH	Count	51	33	27	40	151
		% within Q.3D	33.8%	21.9%	17.9%	26.5%	100.0%
		% within District	63.8%	55.0%	90.0%	66.7%	65.7%
		% of Total	22.2%	14.3%	11.7%	17.4%	65.7%
	FEMALE	Count	26	23	3	17	69
		% within Q.3D	37.7%	33.3%	4.3%	24.6%	100.0%
		% within District	32.5%	38.3%	10.0%	28.3%	30.0%
		% of Total	11.3%	10.0%	1.3%	7.4%	30.0%
Total		Count	80	60	30	60	230
		% within Q.3D	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.8, for district wise gender participation in threshing (E), activity, of sample female farmers, it is observed that though in all the districts maximum percentage is found in jointly performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in North the least, for this activity. Surprisingly, not even a single female is found performing this activity independently in North districts. West is ahead in recording Independent female participation for this activity followed by South and East districts.

Table-4.2.4.8-Q.3E * District Cross tabulation

			District				Total
			East	West	North	South	
Q.3E	MALE	Count	25	9	3	6	43
		% within Q.3E	58.1%	20.9%	7.0%	14.0%	100.0%
		% within District	31.3%	15.0%	10.0%	10.0%	18.7%
		% of Total	10.9%	3.9%	1.3%	2.6%	18.7%
	BOTH	Count	43	31	27	41	142
		% within Q.3E	30.3%	21.8%	19.0%	28.9%	100.0%

		% within District	53.8%	51.7%	90.0%	68.3%	61.7%
		% of Total	18.7%	13.5%	11.7%	17.8%	61.7%
	FEMALE	Count	12	20	0	13	45
		% within Q.3E	26.7%	44.4%	.0%	28.9%	100.0%
		% within District	15.0%	33.3%	.0%	21.7%	19.6%
		% of Total	5.2%	8.7%	.0%	5.7%	19.6%
Total		Count	80	60	30	60	230
		% within Q.3E	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.9, for district wise gender participation in winnowing (F) activity, of sample female farmers, it is observed that though in North and South districts maximum percentage is found in jointly performing this activity. But, in East maximum male and in West maximum female percentage is found independently performing this activity. While independent male participation is almost negligible in North district. Within the districts, in South district joint participation percentage is spotted the most and in West the least, for this activity. West is ahead in recording Independent female participation for this activity followed by South, East districts and North.

Table-4.2.4.9-Q.3F * District Cross tabulation

			District				Total
			East	West	North	South	
Q.3F	MALE	Count	34	10	2	7	53
		% within Q.3F	64.2%	18.9%	3.8%	13.2%	100.0%
		% within District	42.5%	16.7%	6.7%	11.7%	23.0%
		% of Total	14.8%	4.3%	.9%	3.0%	23.0%
	BOTH	Count	31	23	26	36	116
		% within Q.3F	26.7%	19.8%	22.4%	31.0%	100.0%
		% within District	38.8%	38.3%	86.7%	60.0%	50.4%
		% of Total	13.5%	10.0%	11.3%	15.7%	50.4%
	FEMALE	Count	15	27	2	17	61
		% within Q.3F	24.6%	44.3%	3.3%	27.9%	100.0%
		% within District	18.8%	45.0%	6.7%	28.3%	26.5%
		% of Total	6.5%	11.7%	.9%	7.4%	26.5%
Total		Count	80	60	30	60	230
		% within Q.3F	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.10, for district wise gender participation in storage of grain (G) activity, of sample female farmers, it is observed that though in all districts maximum percentage is found in jointly performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in North the least, for this activity. In all districts except North maximum male percentage is found independently performing this activity. Surprisingly, not even a single male is found performing this activity independently in North districts. East is ahead of all the

districts in recording Independent female participation for this activity followed by South, West and North districts.

Table-4.2.4.10-Q.3G * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.3G	MALE	Count	25	20	0	16	61
		% within Q.3G	41.0%	32.8%	.0%	26.2%	100.0%
		% within District	31.3%	33.3%	.0%	26.7%	26.5%
		% of Total	10.9%	8.7%	.0%	7.0%	26.5%
	BOTH	Count	39	34	25	36	134
		% within Q.3G	29.1%	25.4%	18.7%	26.9%	100.0%
		% within District	48.8%	56.7%	83.3%	60.0%	58.3%
		% of Total	17.0%	14.8%	10.9%	15.7%	58.3%
	FEMALE	Count	16	6	5	8	35
		% within Q.3G	45.7%	17.1%	14.3%	22.9%	100.0%
		% within District	20.0%	10.0%	16.7%	13.3%	15.2%
		% of Total	7.0%	2.6%	2.2%	3.5%	15.2%
Total		Count	80	60	30	60	230
		% within Q.3G	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.11, for district wise gender participation in collection of fuel from fields / forest / community land (H) activity, of sample female farmers, it is observed that though in all districts maximum percentage is found in jointly performing this activity. But, within the districts, in West district joint participation percentage is spotted the most and in East the least, for this activity. In all districts except North maximum male percentage is found independently performing this activity. In North district maximum female percentage is found independently performing this activity. East is ahead of all the districts in recording Independent female participation for this activity followed by South, North and West districts.

Table-4.2.4.11-Q.3H * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.3H	MALE	Count	23	11	4	20	58
		% within Q.3H	39.7%	19.0%	6.9%	34.5%	100.0%
		% within District	28.8%	18.3%	13.3%	33.3%	25.2%
		% of Total	10.0%	4.8%	1.7%	8.7%	25.2%
	BOTH	Count	41	45	21	32	139
		% within Q.3H	29.5%	32.4%	15.1%	23.0%	100.0%
		% within District	51.3%	75.0%	70.0%	53.3%	60.4%
		% of Total	17.8%	19.6%	9.1%	13.9%	60.4%
	FEMALE	Count	16	4	5	8	33
		% within Q.3H	48.5%	12.1%	15.2%	24.2%	100.0%
		% within District	20.0%	6.7%	16.7%	13.3%	14.3%

		% of Total	7.0%	1.7%	2.2%	3.5%	14.3%
Total		Count	80	60	30	60	230
		% within Q.3H	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.12, for district wise gender participation in procurement of feed and fodder from the market (I), activity, of sample female farmers, it is observed that though in all districts except West maximum percentage is found in jointly performing this activity. In West male maximum percentage is found in performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in West the least, for this activity. In all districts maximum male percentage is found independently performing this activity. West is ahead of all the districts in recording Independent female participation for this activity followed by South, North and East districts.

Table-4.2.4.12-Q.3I * District Cross tabulation

			District				Total
			East	West	North	South	
Q.3I	MALE	Count	24	25	7	24	80
		% within Q.3I	30.0%	31.3%	8.8%	30.0%	100.0%
		% within District	30.0%	41.7%	23.3%	40.0%	34.8%
		% of Total	10.4%	10.9%	3.0%	10.4%	34.8%
	BOTH	Count	51	18	21	29	119
		% within Q.3I	42.9%	15.1%	17.6%	24.4%	100.0%
		% within District	63.8%	30.0%	70.0%	48.3%	51.7%
		% of Total	22.2%	7.8%	9.1%	12.6%	51.7%
	FEMALE	Count	5	17	2	7	31
		% within Q.3I	16.1%	54.8%	6.5%	22.6%	100.0%
		% within District	6.3%	28.3%	6.7%	11.7%	13.5%
		% of Total	2.2%	7.4%	.9%	3.0%	13.5%
Total		Count	80	60	30	60	230
		% within Q.3I	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.13, for district wise gender participation in cleaning of the animals and their shed (J) activity, of sample female farmers, it is observed that though in all districts maximum percentage is found in jointly performing this activity. But, within the districts, in West district joint participation percentage is spotted the most and in North the least, for this activity. In all districts maximum male percentage is found independently performing this activity. East is ahead of all the districts in recording Independent female participation for this activity followed by West and equally in North and South districts.

Table-4.2.4.13-Q.3J * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.3J	MALE	Count	28	6	10	17	61
		% within Q.3J	45.9%	9.8%	16.4%	27.9%	100.0%
		% within District	35.0%	10.0%	33.3%	28.3%	26.5%
		% of Total	12.2%	2.6%	4.3%	7.4%	26.5%
	BOTH	Count	46	50	17	40	153
		% within Q.3J	30.1%	32.7%	11.1%	26.1%	100.0%
		% within District	57.5%	83.3%	56.7%	66.7%	66.5%
		% of Total	20.0%	21.7%	7.4%	17.4%	66.5%
	FEMALE	Count	6	4	3	3	16
		% within Q.3J	37.5%	25.0%	18.8%	18.8%	100.0%
		% within District	7.5%	6.7%	10.0%	5.0%	7.0%
		% of Total	2.6%	1.7%	1.3%	1.3%	7.0%
Total		Count	80	60	30	60	230
		% within Q.3J	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.14, for district wise gender participation in feeding of animals (K) activity, of sample female farmers, it is observed that though in all districts maximum percentage is found in jointly performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in North the least, for this activity. In all districts maximum female percentage is found independently performing this activity. West is ahead of all the districts in recording Independent female participation for this activity followed by East, South and North districts. A very low independent male percentage performing this activity is found. Surprisingly, not even a single male is found performing this activity independently in North districts.

Table-4.2.4.14-Q.3K * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.3K	MALE	Count	7	2	0	4	13
		% within Q.3K	53.8%	15.4%	.0%	30.8%	100.0%
		% within District	8.8%	3.3%	.0%	6.7%	5.7%
		% of Total	3.0%	.9%	.0%	1.7%	5.7%
	BOTH	Count	62	38	24	47	171
		% within Q.3K	36.3%	22.2%	14.0%	27.5%	100.0%
		% within District	77.5%	63.3%	80.0%	78.3%	74.3%
		% of Total	27.0%	16.5%	10.4%	20.4%	74.3%
	FEMALE	Count	11	20	6	9	46
		% within Q.3K	23.9%	43.5%	13.0%	19.6%	100.0%
		% within District	13.8%	33.3%	20.0%	15.0%	20.0%
		% of Total	4.8%	8.7%	2.6%	3.9%	20.0%
Total		Count	80	60	30	60	230
		% within Q.3K	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.15, for district wise gender participation in watering (L) activity, of sample female farmers, it is observed that though in all districts maximum percentage is found in jointly performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in North the least, for this activity. In all districts maximum female percentage is found independently performing this activity. West is ahead of all the districts in recording Independent female participation for this activity followed by East, South and North districts. A very low independent male percentage performing this activity is found. Surprisingly, not even a single male is found performing this activity independently in North districts.

Table-4.2.4.15-Q.3L * District Cross tabulation

			District				Total
			East	West	North	South	
Q.3L	MALE	Count	8	2	0	10	20
		% within Q.3L	40.0%	10.0%	.0%	50.0%	100.0%
		% within District	10.0%	3.3%	.0%	16.7%	8.7%
		% of Total	3.5%	.9%	.0%	4.3%	8.7%
	BOTH	Count	56	34	24	35	149
		% within Q.3L	37.6%	22.8%	16.1%	23.5%	100.0%
		% within District	70.0%	56.7%	80.0%	58.3%	64.8%
		% of Total	24.3%	14.8%	10.4%	15.2%	64.8%
	FEMALE	Count	16	24	6	15	61
		% within Q.3L	26.2%	39.3%	9.8%	24.6%	100.0%
		% within District	20.0%	40.0%	20.0%	25.0%	26.5%
		% of Total	7.0%	10.4%	2.6%	6.5%	26.5%
Total		Count	80	60	30	60	230
		% within Q.3L	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.16, for district wise gender participation in getting green fodder from fields / forest / community land (M) activity, of sample female farmers, it is observed that though in all districts maximum percentage is found in jointly performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in North the least, for this activity. In all districts maximum female percentage is found independently performing this activity. West is ahead of all the districts in recording Independent female participation for this activity followed by East, South and North districts. A very low independent male percentage performing this activity is found in North district.

Table-4.2.4.16-Q.3M * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.3N	MALE	Count	14	8	2	13	37
		% within Q.3N	37.8%	21.6%	5.4%	35.1%	100.0%
		% within District	17.5%	13.3%	6.7%	21.7%	16.1%
		% of Total	6.1%	3.5%	.9%	5.7%	16.1%
	BOTH	Count	46	29	20	35	130
		% within Q.3N	35.4%	22.3%	15.4%	26.9%	100.0%
		% within District	57.5%	48.3%	66.7%	58.3%	56.5%
		% of Total	20.0%	12.6%	8.7%	15.2%	56.5%
	FEMALE	Count	20	23	8	12	63
		% within Q.3N	31.7%	36.5%	12.7%	19.0%	100.0%
		% within District	25.0%	38.3%	26.7%	20.0%	27.4%
		% of Total	8.7%	10.0%	3.5%	5.2%	27.4%
Total		Count	80	60	30	60	230
		% within Q.3N	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.17, for district wise gender participation in milking (N) activity, of sample female farmers, it is observed that though in all districts maximum percentage is found in jointly performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in North the least, for this activity. In all districts maximum female percentage is found independently performing this activity. West is ahead of all the districts in recording Independent female participation for this activity followed by East, South and North districts. A very low independent male percentage performing this activity is found in North district.

Table-4.2.4.17-Q.3N * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.3N	MALE	Count	14	8	2	13	37
		% within Q.3N	37.8%	21.6%	5.4%	35.1%	100.0%
		% within District	17.5%	13.3%	6.7%	21.7%	16.1%
		% of Total	6.1%	3.5%	.9%	5.7%	16.1%
	BOTH	Count	46	29	20	35	130
		% within Q.3N	35.4%	22.3%	15.4%	26.9%	100.0%
		% within District	57.5%	48.3%	66.7%	58.3%	56.5%
		% of Total	20.0%	12.6%	8.7%	15.2%	56.5%
	FEMALE	Count	20	23	8	12	63
		% within Q.3N	31.7%	36.5%	12.7%	19.0%	100.0%
		% within District	25.0%	38.3%	26.7%	20.0%	27.4%
		% of Total	8.7%	10.0%	3.5%	5.2%	27.4%
Total		Count	80	60	30	60	230
		% within Q.3N	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.18, for district wise gender participation in milk disposal (O) activity, of sample female farmers, it is observed that though in all districts maximum percentage is found in jointly performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in North the least, for this activity. In all districts maximum female percentage is found independently performing this activity. West is ahead of all the districts in recording Independent female participation for this activity followed by East, South and North districts. A very low independent male percentage performing this activity is found in North district. Not even a single male is found performing this activity independently in North districts.

Table-4.2.4.18-Q.3O * District Cross tabulation

			District				Total
			East	West	North	South	
Q.3O	MALE	Count	13	6	0	5	24
		% within Q.3O	54.2%	25.0%	.0%	20.8%	100.0%
		% within District	16.3%	10.0%	.0%	8.3%	10.4%
		% of Total	5.7%	2.6%	.0%	2.2%	10.4%
	BOTH	Count	43	27	21	34	125
		% within Q.3O	34.4%	21.6%	16.8%	27.2%	100.0%
		% within District	53.8%	45.0%	70.0%	56.7%	54.3%
		% of Total	18.7%	11.7%	9.1%	14.8%	54.3%
	FEMALE	Count	24	27	9	21	81
		% within Q.3O	29.6%	33.3%	11.1%	25.9%	100.0%
		% within District	30.0%	45.0%	30.0%	35.0%	35.2%
		% of Total	10.4%	11.7%	3.9%	9.1%	35.2%
Total		Count	80	60	30	60	230
		% within Q.3O	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.19, for district wise gender participation in health care to animals (P) activity, of sample female farmers, it is observed that though in all districts except West maximum percentage is found in jointly performing this activity. In West male maximum percentage is found in performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in North the least, for this activity. In all districts maximum male percentage is found independently performing this activity. West is ahead of all the districts in recording Independent female participation for this activity followed by East, South and North districts.

Table-4.2.4.19-Q.3P * District Cross tabulation

			District				Total
			East	West	North	South	
Q.3P	MALE	Count	31	34	10	17	92
		% within Q.3P	33.7%	37.0%	10.9%	18.5%	100.0%
		% within District	38.8%	56.7%	33.3%	28.3%	40.0%
		% of Total	13.5%	14.8%	4.3%	7.4%	40.0%

	BOTH	Count	41	20	16	36	113
		% within Q.3P	36.3%	17.7%	14.2%	31.9%	100.0%
		% within District	51.3%	33.3%	53.3%	60.0%	49.1%
		% of Total	17.8%	8.7%	7.0%	15.7%	49.1%
	FEMALE	Count	8	6	4	7	25
		% within Q.3P	32.0%	24.0%	16.0%	28.0%	100.0%
		% within District	10.0%	10.0%	13.3%	11.7%	10.9%
		% of Total	3.5%	2.6%	1.7%	3.0%	10.9%
Total		Count	80	60	30	60	230
		% within Q.3P	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.20, for district wise gender participation in vaccination and visits to animal hospitals (Q) activity, of sample female farmers, it is observed that though in all districts maximum male percentage is found independently performing this activity. But, within the districts, in West district Independent male participation percentage is spotted the most and in North the least, for this activity. In all the districts Independent female participation is totally absent for this activity. Within the districts, in South district joint participation percentage is spotted the most and in North/ West the least, for this activity.

Table-4.2.4.20-Q.3Q * District Cross tabulation

			District				Total
			East	West	North	South	
Q.3Q	MALE	Count	62	48	18	36	164
		% within Q.3Q	37.8%	29.3%	11.0%	22.0%	100.0%
		% within District	77.5%	80.0%	60.0%	60.0%	71.3%
		% of Total	27.0%	20.9%	7.8%	15.7%	71.3%
	BOTH	Count	18	12	12	24	66
		% within Q.3Q	27.3%	18.2%	18.2%	36.4%	100.0%
		% within District	22.5%	20.0%	40.0%	40.0%	28.7%
		% of Total	7.8%	5.2%	5.2%	10.4%	28.7%
Total		Count	80	60	30	60	230
		% within Q.3Q	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.21, for district wise gender participation in breeding of animals (R) activity, of sample female farmers, it is observed that though in all districts maximum male percentage is found independently performing this activity. But, within the districts, in East district Independent male participation percentage is spotted the most and in North the least, for this activity. In all the districts Independent female participation is totally absent for this activity. Within the districts, in South district joint participation percentage is spotted the most and in West the least, for this activity.

Table-4.2.4.21-Q.3R * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.3R	MALE	Count	57	54	14	34	159
		% within Q.3R	35.8%	34.0%	8.8%	21.4%	100.0%
		% within District	71.3%	90.0%	46.7%	56.7%	69.1%
		% of Total	24.8%	23.5%	6.1%	14.8%	69.1%
	BOTH	Count	23	6	16	26	71
		% within Q.3R	32.4%	8.5%	22.5%	36.6%	100.0%
		% within District	28.8%	10.0%	53.3%	43.3%	30.9%
		% of Total	10.0%	2.6%	7.0%	11.3%	30.9%
Total		Count	80	60	30	60	230
		% within Q.3R	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

In table-4.2.4.22, for district wise gender participation in care of fields and crops (S) activity, of sample female farmers, it is observed that though in all districts maximum percentage is found in jointly performing this activity. But, within the districts, in East district joint participation percentage is spotted the most and in North the least, for this activity. In all districts except West maximum male percentage is found independently performing this activity. West is ahead of all the districts in recording Independent female participation for this activity followed by South, East and North districts.

Table-4.2.4.22-Q.3S * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.3S	MALE	Count	17	11	4	11	43
		% within Q.3S	39.5%	25.6%	9.3%	25.6%	100.0%
		% within District	21.3%	18.3%	13.3%	18.3%	18.7%
		% of Total	7.4%	4.8%	1.7%	4.8%	18.7%
	BOTH	Count	60	36	24	45	165
		% within Q.3S	36.4%	21.8%	14.5%	27.3%	100.0%
		% within District	75.0%	60.0%	80.0%	75.0%	71.7%
		% of Total	26.1%	15.7%	10.4%	19.6%	71.7%
	FEMALE	Count	3	13	2	4	22
		% within Q.3S	13.6%	59.1%	9.1%	18.2%	100.0%
		% within District	3.8%	21.7%	6.7%	6.7%	9.6%
		% of Total	1.3%	5.7%	.9%	1.7%	9.6%
Total		Count	80	60	30	60	230
		% within Q.3S	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.4.2 Employment Intensity of Sample Farming Females

- **Employment Intensity Details:**

Statistics for Employment Intensity shows A for Male and B for female in table-4.2.4.23. From the table we find that there are 230 valid scores and values of mean for them are 6.34 and 6.72 respectively. Standard deviation is 1.616, 1.387 and standard error of mean is0.107, 0.091.

Table-4.2.4.23-One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q.4A	230	6.34	1.616	.107
Q.4B	230	6.72	1.387	.091

Source: Field Survey

As far as employment intensity is concerned, Table-4.2.4.24 below shows that 6-7 hours/day is the time for which maximum percentage of male member of female respondents work in farm and different related activities. However, maximum percentage of female respondents was noticed for working 7-8 hours/day in the table.

Table-4.2.4.24-Gender-wise employment intensity of sample farmers of Sikkim State

Employment intensity	**Male Farmers**									
N0. Of working hours/day	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Total**
No. of respondents	01	02	08	22	32	50	53	47	15	230
Percent (%)	O1	01	03	10	14	22	23	20	06	100
	Female Farmers									
No. of respondents			01	25	14	49	61	69	11	230
Percent (%)			O1	11	06	21	26	30	05	100

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – Women work for longer duration than men in farm, animal and related activities.
Ho – Working hours of women are not more in farm, animal and related activities than that of men.
Ha - Working hours of women are more in farm, animal and related activities than that of men.

The Mean Difference is obtained by subtracting the test value (which is 5 here in this table), from each sample mean. Test statistic 5 represents working of both (male and female) for 5 hours/day on an average in the farm. More than 5 mean they work for more than this time and less than 5 means they work for less than this time.

Table-4.2.4.25-One-Sample Test						
	Test Value = 5					
					95% Confidence Interval of the Difference	
	T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q.4A	12.610	229	.000	1.343	1.13	1.55
Q.4B	18.776	229	.000	1.717	1.54	1.90

From the table 4.2.4.25 above, we find that confidence intervals lie entirely above 0.0 and also it is positive. The value of‘t’ for Employment Intensity for both male and female is 12.610 and 18.776, which is higher than 1.96, mean difference column for them also shows positive values. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0. Very interestingly, the values of T, Mean Difference, Lower and Upper limits of the Confidence Interval are showing more amount for females than the male. We can safely say that null hypothesis for it is rejected and thus alternate hypothesis is accepted. Further, we conclude it by saying that though Employment Intensity for both male and female is significantly more than 5 hours/day on the average. But, the test shows that females work for longer duration than the men.

Table-4.2.4.25(i)- Paired-Samples Test									
		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
	Q4A-4B	-.378	1.402	.092	-.560	-.196	-4.092	229	.000

From the table 4.2.4.25(i) above, we find that the value of‘t’ in Paired-Samples Test for Employment Intensity for both male and female is -4.092, which is more than -1.96. The Sig. (2-tailed) column displays the probability of obtaining a t statistic whose absolute value is equal to or greater than the obtained t statistic. Since the significance value for it is less than 0.05, we can conclude that the difference in employment intensity of male and female is not due to chance variation. We can safely say that null hypothesis for it is rejected and thus alternate hypothesis is accepted. A One-sample t-test result gets justified by Paired-Samples Test also, thereby showing that females work for longer duration than the men.

- **District Wise Gender Employment Intensity:**

In table-4.2.4.26, for district wise gender (male) employment intensity of sample female farmers, it is observed that in East and West male percentage for employment intensity is spotted the most

for working 6 hours/day, in North for 8 hours/day and in South for 7 hours/day.

Table-4.2.4.26-Q.4A * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.4A	1	Count	0	0	1	0	1
		% within Q.4A	.0%	.0%	100.0%	.0%	100.0%
		% within District	.0%	.0%	3.3%	.0%	.4%
		% of Total	.0%	.0%	.4%	.0%	.4%
	2	Count	0	0	2	0	2
		% within Q.4A	.0%	.0%	100.0%	.0%	100.0%
		% within District	.0%	.0%	6.7%	.0%	.9%
		% of Total	.0%	.0%	.9%	.0%	.9%
	3	Count	4	0	3	1	8
		% within Q.4A	50.0%	.0%	37.5%	12.5%	100.0%
		% within District	5.0%	.0%	10.0%	1.7%	3.5%
		% of Total	1.7%	.0%	1.3%	.4%	3.5%
	4	Count	12	6	3	1	22
		% within Q.4A	54.5%	27.3%	13.6%	4.5%	100.0%
		% within District	15.0%	10.0%	10.0%	1.7%	9.6%
		% of Total	5.2%	2.6%	1.3%	.4%	9.6%
	5	Count	9	13	1	10	33
		% within Q.4A	27.3%	39.4%	3.0%	30.3%	100.0%
		% within District	11.3%	21.7%	3.3%	16.7%	14.3%
		% of Total	3.9%	5.7%	.4%	4.3%	14.3%
	6	Count	20	18	3	9	50
		% within Q.4A	40.0%	36.0%	6.0%	18.0%	100.0%
		% within District	25.0%	30.0%	10.0%	15.0%	21.7%
		% of Total	8.7%	7.8%	1.3%	3.9%	21.7%
	7	Count	9	15	3	25	52
		% within Q.4A	17.3%	28.8%	5.8%	48.1%	100.0%
		% within District	11.3%	25.0%	10.0%	41.7%	22.6%
		% of Total	3.9%	6.5%	1.3%	10.9%	22.6%
	8	Count	17	8	8	14	47
		% within Q.4A	36.2%	17.0%	17.0%	29.8%	100.0%
		% within District	21.3%	13.3%	26.7%	23.3%	20.4%
		% of Total	7.4%	3.5%	3.5%	6.1%	20.4%
	9	Count	9	0	6	0	15
		% within Q.4A	60.0%	.0%	40.0%	.0%	100.0%
		% within District	11.3%	.0%	20.0%	.0%	6.5%
		% of Total	3.9%	.0%	2.6%	.0%	6.5%
Total		Count	80	60	30	60	230
		% within Q.4A	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

In table-4.2.4.27, for district wise gender (female) employment intensity of sample female farmers, it is observed that in East female percentage for employment intensity is spotted the most for working 8hours/day, in West , North and South for 7 hours/day.

Table-4.2.4.27-Q.4B * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.4B	3	Count	0	0	1	0	1
		% within Q.4B	.0%	.0%	100.0%	.0%	100.0%
		% within District	.0%	.0%	3.3%	.0%	.4%
		% of Total	.0%	.0%	.4%	.0%	.4%
	4	Count	12	7	3	3	25
		% within Q.4B	48.0%	28.0%	12.0%	12.0%	100.0%
		% within District	15.0%	11.7%	10.0%	5.0%	10.9%
		% of Total	5.2%	3.0%	1.3%	1.3%	10.9%
	5	Count	1	8	2	4	15
		% within Q.4B	6.7%	53.3%	13.3%	26.7%	100.0%
		% within District	1.3%	13.3%	6.7%	6.7%	6.5%
		% of Total	.4%	3.5%	.9%	1.7%	6.5%
	6	Count	18	16	3	11	48
		% within Q.4B	37.5%	33.3%	6.3%	22.9%	100.0%
		% within District	22.5%	26.7%	10.0%	18.3%	20.9%
		% of Total	7.8%	7.0%	1.3%	4.8%	20.9%
	7	Count	6	21	10	24	61
		% within Q.4B	9.8%	34.4%	16.4%	39.3%	100.0%
		% within District	7.5%	35.0%	33.3%	40.0%	26.5%
		% of Total	2.6%	9.1%	4.3%	10.4%	26.5%
	8	Count	38	8	5	18	69
		% within Q.4B	55.1%	11.6%	7.2%	26.1%	100.0%
		% within District	47.5%	13.3%	16.7%	30.0%	30.0%
		% of Total	16.5%	3.5%	2.2%	7.8%	30.0%
	9	Count	5	0	6	0	11
		% within Q.4B	45.5%	.0%	54.5%	.0%	100.0%
		% within District	6.3%	.0%	20.0%	.0%	4.8%
		% of Total	2.2%	.0%	2.6%	.0%	4.8%
Total		Count	80	60	30	60	230
		% within Q.4B	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.5 Accessibility*

4.2.5.1 Accessibility Sample Farming Females to Production Resources

- **Accessibility to Production Resources Details**:

A, B C, D, E, F and G in the tables-4.2.5.1(i) and 4.2.5.1(ii) below represent accessibility of sample farming females of rural area to seven production resources namely - production inputs (A), credit (B), extension service and training (C), technology and government policies (D), education (E), rural institution (F), livestock rearing (G).

Statistics for accessibility of farming females of rural area to seven production resources has been

*"Access of Farming Females to Productive Resources in Sikkim: A Pillar for Promoting their Empowerment", Nidhi Dwivedy, "International Journal of Social Science Tomorrow" Vol. 1, No. 3, May 2012,

given in table-4.2.5.1(i). From the table we find that there are 230 valid scores and values of mean for them are 2.86 (A), 1.97 (B), 2.44 (C), 2.55 (D), 2.35 (E), 1.82 (F) and 3.39 (G) respectively. Standard deviation is 1.054 (A), 1.313 (B), 1.021 (C), 0 .817 (D), 1.011 (E), 0.916 (F), 0.773 (G) and standard error of mean is 0.069 (A), 0 .087 (B), 0.067 (C), 0.054 (D), 0.067 (E), 0.060 (F) and 0.051 (G).

Table-4.2.5.1(i)-One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q.5A	230	2.86	1.054	.069
Q.5B	230	1.97	1.313	.087
Q.5C	230	2.44	1.021	.067
Q.5D	230	2.55	.817	.054
Q.5E	230	2.35	1.011	.067
Q.5F	230	1.82	.916	.060
Q.5G	230	3.39	.773	.051

Source: Field Survey

- **Extent of Rural Women's Access to Resources**

Data contained in Table 4.2.5.2 shows that the respondents had good access to livestock rearing (mean: 3.39), production inputs (mean: 2.86) and Technology/Government policies (mean: 2.55). However, their access to extension services and training (mean: 2.44), education (mean: 2.35), credit (mean: 1.97) and formal /informal institutions (mean: 1.82) shows limited access. In support of the qualitative data obtained through group discussions, the extent of women's access to seven productive resources and underlying facts are described here on the basis of rank order.

Table-4.2.5.2.-Frequency table showing the extent of accessibility to production resources of sample farmers at selected sites of all districts in Sikkim State							
Resources	**Extent Of Access (%)**					**Mean* (CV)**	**Rank Order**
	1 Never	**2 Rarely**	**3 Sometimes**	**4 Frequently**	**5 Always**		
Livestock Rearing	0	06	58	25	11	**3.39 (22.8)**	**1**
Production inputs	09	27	42	13	09	**2.86 (36.8)**	**2**
Technology/Government policies	19	10	69	02	0	**2.55 (32.03)**	**3**
Extension service and training	28	10	51	11	0	**2.44 (41.8)**	**4**
Education	21	39	29	08	03	**2.35 (43.02)**	**5**
Credit	01	61	03	11	24	**1.97 (66.6)**	**6**
Rural institution	50	22	25	03	0	**1.82 (50.3)**	**7**

Source: Field Survey

* Mean values of items ranging from 1 to 5, where 1 indicates no/poor access and 5 indicates best level of access of Resources. Figures in the parentheses indicate CV = (SD / Mean) × 100.

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – There is discrimination in accessibility of farming females of rural area to production resources.

Ho - Accessibility of farming females of rural area is not more to production resources.

Ha - Accessibility of farming females of rural area is more to production resources.

The Mean Difference is obtained by subtracting the test value (which is 3 here in this table), from each sample mean. Test statistic 3 represents sometimes accessibility by women. More than 3 means frequently/always and less than 3 means never/rarely accessibility by women.

From the table 4.2.5.1(ii), we find that confidence intervals lie entirely above 0.0 and also it is positive. The value of ‘t’ for accessibility of farming females in livestock rearing is 7.679, which is higher than 1.96, mean difference column for it also shows positive values. This is further

confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says that accessibility of farming females is more in livestock rearing. Further, we conclude it by saying that significantly more number of sample female farmers on an average access livestock rearing.

From the table- 4.2.5.1(ii) we also find that value of 't' for accessibility of farming females in production inputs, credit, extension service and training, technology and Government policies, education, rural institution is -2.065, -11.902, -8.266, -8.312, -9.781, -19.570 respectively which is negative and also less than 1.96. This is further confirmed by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis for these is accepted, which says that accessibility of farming females is not more in these production resources.

Table-4.2.5.1(ii) - One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q.5A	-2.065	229	.040	-.143	-.28	.00
Q.5B	-11.902	229	.000	-1.030	-1.20	-.86
Q.5C	-8.266	229	.000	-.557	-.69	-.42
Q.5D	-8.312	229	.000	-.448	-.55	-.34
Q.5E	-9.781	229	.000	-.652	-.78	-.52
Q.5F	-19.570	229	.000	-1.183	-1.30	-1.06
Q.5G	7.679	229	.000	.391	.29	.49

- **Factor Analysis on accessibility to production resources**

Factor analysis of the data on production resources was performed to identify the resources to which women have relatively less access.

Table-4.2.5.3(i) - KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.581
Bartlett's Test of Sphericity Approx.	Chi-Square	112.114
	df	21
	Sig.	.000

Table-4.2.5.3(ii) -Communalities		
	Initial	**Extraction**
Q.5A	1.000	.551
Q.5B	1.000	.667
Q.5C	1.000	.559
Q.5D	1.000	.542
Q.5E	1.000	.481
Q.5F	1.000	.580
Q.5G	1.000	.651
Extraction Method: Principal Component Analysis.		

Kaiser-Meyer-Olkin measure of sampling adequacy in table-4.2.5.3(i) - is 0.581 which is more than 0.5 and therefore sample is considered adequate. Bartlett's test of sphericity gives chi-square of 112.114 and the corresponding significance is approximately zero which confirms multivariate normality of the data.

Table-4.2.5.3(iii) -Total Variance Explained						
Component	**Initial Eigenvalues**			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.832	26.176	26.176	1.832	26.176	26.176
2	1.144	16.345	42.521	1.144	16.345	42.521
3	1.055	15.072	57.593	1.055	15.072	57.593
4	.966	13.795	71.387			
5	.816	11.655	83.042			
6	.648	9.255	92.296			
7	.539	7.704	100.000			
Extraction Method: Principal Component Analysis.						

From the result in table-4.2.5.3(iii), we find that livestock rearing (G), production inputs (A) and technology and government policies (D) have an Eigen value more than 1 in figure 4.10 below, whereas others credit (B), extension service and training (C), rural institution (F) and education (E) have an Eigen value less than 1. Thus factors having an Eigen value less than 1 are critical.

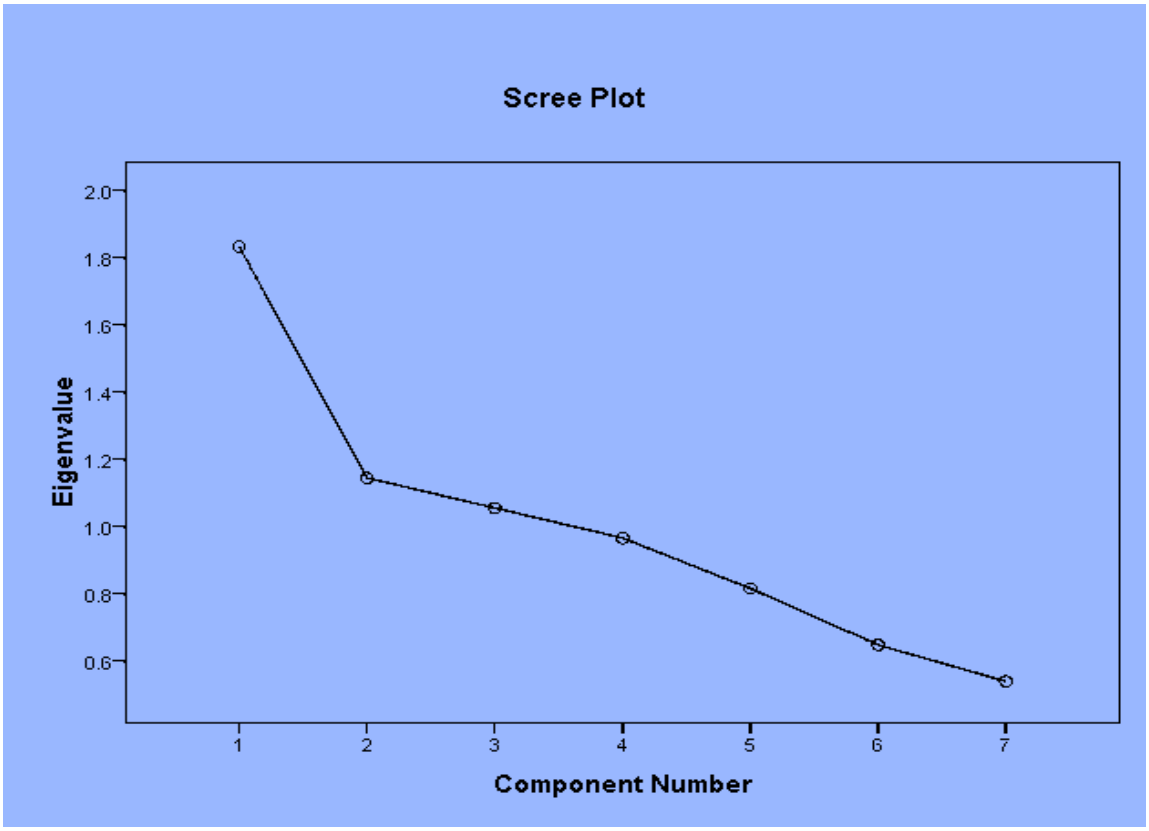


Figure-4.10, Scree Plot of accessibility to production resources

4.2.5.2 Accessibility to Production Inputs

- **Production Inputs Details:**

A, B C, D and E in the tables-4.2.5.4 and 4.2.5.6 below represent the accessibility of farming females of rural area to five production inputs namely Seeds and saplings (A), water sources (Dhara i.e. spring water) (B), medicine for Plants (C), medicine for Animals (D) and fertilizers (E).

Statistics for Production inputs for female farmers is shown in the Table-4.2.5.4 below. From the table we find that there are 230 valid scores and a value of mean them is 2.85 (A), 4.61 (B),

2.69 (C), 1.87 (D), 2.11 (E). Standard deviation is 1.065 (A), 0.489 (B), 0.960 (C), 1.055 (D), 1.074 (E) and standard error of mean 0.070 (A), 0.032 (B), 0.063 (C), 0.070 (D), 0.071 (E).

Table-4.2.5.4-One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Q.5.1A	230	2.85	1.065	.070
Q.5.1B	230	4.61	.489	.032
Q.5.1C	230	2.69	.960	.063
Q.5.1D	230	1.87	1.055	.070
Q.5.1E	230	2.11	1.074	.071

- **Extent of Rural Women's Access to Inputs:**

Production inputs here include water sources (Dhara i.e. spring water), Seeds and saplings, medicine for (Plants and animals) and fertilizers. Data contained in Table 4.2.5.5 shows that the water source i.e. Dhara (mean: 4.61) is almost fully accessible to the respondents. The respondents have good access to seeds and saplings (mean: 2.85) and medicine for plants (mean: 2.69). Unexpectedly, only 36% and 29% of respondents have a very little access to seed and saplings and medicine for plants respectively, for production purposes. However, fertilizers (mean: 2.11) and medicine for animals (mean: 1.87) shows the limited access. Though, 67% and 70% of the respondents shows negligible/limited access to fertilizers and medicine for animals respectively.

Table-4.2.5.5-Frequency table showing the extent of rural women's access to inputs

Inputs	Extent of Access (%)					Mean* (CV)	Rank Order
	1 Never	2 Rarely	3 Sometimes	4 Frequently	5 Always		
Water sources (Dhara)	0	0	0	39	61	**4.61 (10.6)**	**1**
Seeds and Saplings	10	26	42	13	09	**2.85 (37.3)**	**2**
Medicine (Plants)	17	12	57	11	03	**2.69 (35.6)**	**3**
Fertilizers	36	31	24	05	04	**2.11 (50.9)**	**4**
Medicine (Animals)	53	17	23	05	02	**1.87 (56.4)**	**5**

Source: Field Survey

* Mean values of items ranging from 1 to 5, where 1 indicates no access and 5 indicates best level of access of inputs.

Figures in the parentheses indicate CV = (SD / Mean) × 100.

- **Inferential Analysis**

One sample't'-test is conducted to test our hypothesis

Hypothesis Statement – There is discrimination in accessibility of farming females of rural area to five production inputs.

Ho - Accessibility of farming females of rural area is not more to five production inputs.
Ha - Accessibility of farming females of rural area is more to five production inputs.

The Mean Difference is obtained by subtracting the test value (which is 3 here in this table), from each sample mean. Test statistic 3 represents sometimes accessibility by women. More than 3 means frequently/always and less than 3 means never/rarely accessibility by women.

From the table-4.2.5.6 below, we find that confidence intervals lie entirely above 0.0 and also it is positive for accessibility of farming females to water sources (Dhara i.e. spring water) (B). The value of't' for it is 49.881 which is higher than 1.96, mean difference column for it also shows positive values. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that alternate hypothesis for water sources is accepted, which says that accessibility of farming females is more in it.

From the table-4.2.5.6 below, we also find that value of 't' for accessibility of farming females in production inputs, seeds and saplings; medicine (plants), medicine (animals), fertilizers is -2.167, -4.876, -16.315, and -12.583 respectively which is negative and also less than 1.96. This is further confirmed by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted, which says that accessibility of farming females is not more in these productive inputs.

Table-4.2.5.6-One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q.5.1A	-2.167	229	.031	-.152	-.29	-.01
Q.5.1B	49.881	229	.000	1.609	1.55	1.67
Q.5.1C	-4.876	229	.000	-.309	-.43	-.18
Q.5.1D	-16.315	229	.000	-1.135	-1.27	-1.00
Q.5.1E	-12.583	229	.000	-.891	-1.03	-.75

Source: Field Survey

4.2.5.3 Credit Status*

- **Parameter Representation:**

5.2, A, B and C in the table-4.2.5.7 below represents - Availing credit (5.2), Availing credit on their name (A), Availing credit from formal institution (B), Availingcredit for personal purpose (C).

Table-4.2.5.7-One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q.5.2	230	1.78	.416	.027
Q.5.2A	230	1.39	1.103	.073
Q.5.2B	230	1.57	1.179	.078
Q.5.2C	230	1.75	1.221	.081

- **Frequency Showing Credit Characteristic of sample female farmers of Sikkim:**

Table-4.2.5.8 presents frequency showing credit characteristic of sample female farmers of Sikkim. The explanation of which is given along with their respective points (points 4.2.5.3.1 to 4.2.5.3.4) below.

Table-4.2.5.8- Frequency showing credit characteristic of sample female farmers of Sikkim

Character	Group (availing, on the name, source and purpose of credit)	No. of respondents	Percent (%)
Availing credit facility	No	51	22
	Yes	179	78
	Total	**230**	**100**
Gender-wise status (on their name) of females to avail credit	**Non- credit availing females**	**51**	**22**
	Male	100	56
	Female	61	34
	Both	18	10
	Total (credit availing females)	**179**	**78 (100)**
	Total (availing + non)	**230**	**100**
Source of credit	**Non-credit availing females**	**51**	**22**
	Formal	78	43
	Informal	80	45
	Both	21	12
	Total (credit availing females)	**179**	**78 (100)**
	Total (availing + non)	**230**	**100**

*"The Credit Status of Farming Females-A Study of Rural Area of Sikkim in North-Eastern India" Nidhi Dwivedy, "Excel International Journal of Multidisciplinary Management Studies EIJMMS", Vol.3 (1), January 2013, Pp. 97-112, ISSN: 2249-8834.

Purpose of credit	**Non- credit availing females**	**51**	**22**
	Personal	54	30
	Commercial	98	55
	Both	27	15
	Total (credit availing females)	**179**	**78 (100)**
	Total (availing + non)	**230**	**100**

Source: Field Survey

- **Inferential Analysis**

To test the hypothesis for Credit Status of farming females of rural area (for points 4.2.5.3.1 to 4.2.5.3.4) below, one-sample t-test has been conducted. The Mean Difference is obtained by subtracting the test value (which is 1.5 here in this table), from each sample mean. Test statistic 1.5 represents both (male and female), (formal and informal), (personal and commercial) respectively for points 5.2A to 5.2C. More than 1.5 mean more participation of the parameter and less than 1.5 mean less participation of the parameter. For 5.2, less than this value means not availing credit and more than this means availing credit.

Table-4.2.5.9-One-Sample Test

	Test Value = 1.5					
					95% Confidence Interval of the Difference	
	T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q.5.2	10.136	229	.000	.278	.22	.33
Q.5.2A	-1.554	229	.121	-.113	-.26	.03
Q.5.2B	.839	229	.403	.065	-.09	.22
Q.5.2C	3.078	229	.002	.248	.09	.41

4.2.5.3.1 Credit Availing Status

- **Credit Availing Status Details:**

Statistics for Credit availing status (5.2), by female farmers is shown in the Table-4.2.5.7 above. From the table we find that there are 230 valid scores and value of mean for it is 1.78. Standard deviation is 0.416 and standard error of mean is 0.027.

Table-4.2.5.8 presents the frequency showing credit characteristic of farm women of Sikkim. It shows that about availing credit facility, (22%) of the sample farmers don't avail any, while (78%) of them avail the credit facility.

- **Inferential Analysis**

- It is our assumption that no more farming females of rural area avail credit.

One sample‘t’-test is conducted to test our hypothesis

Ho - No more farming females of rural area avail credit.

From the table 4.2.5.9 we find that value of‘t’ for credit availing status (5.2) is 10.136, which is positive and also higher than 1.96, mean difference column for it also shows positive values. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says that more number of sample female farmers of rural areas avail credit. Further, we conclude it by saying that significantly more number of sample female farmers on an average of rural areas avail credit.

- **District Wise Credit Availing Status of Female Farmers**

In table-4.2.5.10, for district wise credit availing status of female farmers, it is observed that though in all the districts female farmers avail credit. But, within the districts, in East district dominance is spotted the most and in North it is spotted the least. Within the districts, West is the district where maximum percentage of female farmers who do not avail credit is noted followed by East, South and North.

Table-4.2.5.10-Q.5.2 * District Cross tabulation

			District				Total
			East	West	North	South	
Q.5.2	NO	Count	20	25	2	4	51
		% within Q.5.2	39.2%	49.0%	3.9%	7.8%	100.0%
		% within District	25.0%	41.7%	6.7%	6.7%	22.2%
		% of Total	8.7%	10.9%	.9%	1.7%	22.2%
	YES	Count	60	35	28	56	179
		% within Q.5.2	33.5%	19.6%	15.6%	31.3%	100.0%
		% within District	75.0%	58.3%	93.3%	93.3%	77.8%
		% of Total	26.1%	15.2%	12.2%	24.3%	77.8%
Total		Count	80	60	30	60	230
		% within Q.5.2	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.5.3.2 Availing Credit on the Name of Female Farmers

- **Availing Credit on their Name Details:**

Statistics for availing credit on the name of female farmers (A) is shown in the Table-4.2.5.7 above. From the table we find that there are 230 valid scores and value of mean for it is 1.39. Standard deviation is 1.103 and standard error of mean is 0.073.

Table-4.2.5.8 presents t h e frequency showing credit characteristic of farm women of Sikkim. It shows that about availing credit facility, (22%) of the sample farmers don't avail any, while (78%) of them avail the credit facility. Out of the (78%) of those who avail credit, (56%) are the male and (34%) are the female withdrawer. While in (10%) of the cases, both (male as well as female) were found to avail credit. Interestingly, a high proportion of women's loans were controlled by male members of the household.

- **Inferential nalysis**

One sample't'-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area do not avail credit on their name.

Ho - Availing credit on their name is not more by farming females of rural area.

Ha - Availing credit on their name is more by farming females of rural area.

From the table 4.2.5.9 we find that value of't' for availing credit on their name (A) is -1.554, which is negative and also less than 1.96. Mean difference column for it also shows negative values. The confidence intervals do not lie entirely either above or below 0. Its value is positive for one limit and negative for the other limit but then again the magnitude of lower limit (negative value) is more than the magnitude of the upper limit (positive value). Since it is more inclined towards negative side, consequently, we can safely conclude that null hypothesis for it to be accepted, thus there are valid reasons for null hypothesis to be accepted for it, which says that those women who avail credit facility, it is not on their name.

- **District Wise**

In table-4.2.5.11, for district wise availing credit on the name (A) of female farmers, it is observed that though in all the districts male dominate the credit availing. But, within the districts, in South district male dominance is spotted the most, for availing credit followed by North, West

and East. Female dominance within the districts for availing credit is noticed the most in North district followed by East, West and South.

Table-4.2.5.11-Q.5.2A * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.5.2A	0	Count	20	25	2	4	51
		% within Q.5.2A	39.2%	49.0%	3.9%	7.8%	100.0%
		% within District	25.0%	41.7%	6.7%	6.7%	22.2%
		% of Total	8.7%	10.9%	.9%	1.7%	22.2%
	MALE	Count	25	21	15	39	100
		% within Q.5.2A	25.0%	21.0%	15.0%	39.0%	100.0%
		% within District	31.3%	35.0%	50.0%	65.0%	43.5%
		% of Total	10.9%	9.1%	6.5%	17.0%	43.5%
	BOTH	Count	12	0	0	6	18
		% within Q.5.2A	66.7%	.0%	.0%	33.3%	100.0%
		% within District	15.0%	.0%	.0%	10.0%	7.8%
		% of Total	5.2%	.0%	.0%	2.6%	7.8%
	FEMALE	Count	23	14	13	11	61
		% within Q.5.2A	37.7%	23.0%	21.3%	18.0%	100.0%
		% within District	28.8%	23.3%	43.3%	18.3%	26.5%
		% of Total	10.0%	6.1%	5.7%	4.8%	26.5%
Total		Count	80	60	30	60	230
		% within Q.5.2A	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.5.3.3 Female Farmer's Credit Availing Institutions

- **Credit Availing Institution Details:**

Statistics for availing credit from formal institution (B), by female farmers is shown in the Table 4.2.5.7 above. From the table we find that there are 230 valid scores and value of mean for it is 1.57. Standard deviation is 1.179 and standard error of mean is 0.078.

Table-4.2.5.8 presents frequency showing credit characteristic of farm women of Sikkim. It shows that about availing credit facility, (22%) of the sample farmers don't avail any, while (78%) of them avail the credit facility. Out of the (78%) persons who avail credit facility, (43%) use formal source to availing credit, (45%) Informal and (12%) of them use both the sources of credit. The respondents reported that their access to institutional loans was further restricted by their lack of education, confinement to household activities, lack of familiarity with loan providers and re-strictions on their mobility.

- **Inferential Analysis**

One sample't'-test is conducted to test our hypothesis

Hypothesis Statement –More farming females of rural area avail credit from informal institution.

Ho - availing credit from informal institution is not more by farming females of rural area.
Ha - availing credit from informal institution is more by farming females of rural area.

From the table 4.2.5.9 we find that value of't' for availing credit from institution (B) is 0.839, which is positive, mean difference column for it also shows positive values. The confidence intervals do not lie entirely either above or below 0. Its value is positive for one limit and negative for the other limit but then again the magnitude of upper limit (positive value) is more than the magnitude of the lower limit (negative value). Since it is more inclined towards positive side, we can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says that availing credit from informal institution is more by farming females of rural area. Further, we conclude it by saying that significantly more number of sample female farmers on an average use informal source of credit.

- **District Wise**

In table-4.2.5.12, for district wise availing credit from formal institution (B) of female farmers, it is observed that only in East district formal institution dominates for availing credit. But, informal source dominance for availing credit is observed in West, North and South districts. Within the districts, in East district availing credit from formal institution is spotted the most, followed by South, West and North. Informal source of availing credit dominance within the districts is noticed the most in East and South districts equally followed by West and North.

Table-4.2.5.12-Q.5.2B * District Cross tabulation

			District				Total
			East	West	North	South	
Q.5.2B	0	Count	20	25	2	4	51
		% within Q.5.2B	39.2%	49.0%	3.9%	7.8%	100.0%
		% within District	25.0%	41.7%	6.7%	6.7%	22.2%
		% of Total	8.7%	10.9%	.9%	1.7%	22.2%
	FORMAL	Count	27	17	11	23	78
		% within Q.5.2B	34.6%	21.8%	14.1%	29.5%	100.0%
		% within District	33.8%	28.3%	36.7%	38.3%	33.9%
		% of Total	11.7%	7.4%	4.8%	10.0%	33.9%
	BOTH	Count	9	0	3	9	21
		% within Q.5.2B	42.9%	.0%	14.3%	42.9%	100.0%
		% within District	11.3%	.0%	10.0%	15.0%	9.1%

		% of Total	3.9%	.0%	1.3%	3.9%	9.1%
	INFORMAL	Count	24	18	14	24	80
		% within Q.5.2B	30.0%	22.5%	17.5%	30.0%	100.0%
		% within District	30.0%	30.0%	46.7%	40.0%	34.8%
		% of Total	10.4%	7.8%	6.1%	10.4%	34.8%
Total		Count	80	60	30	60	230
		% within Q.5.2B	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.5.3.4 Purpose of Availing Credit

- **Purpose of Availing Credit Details:**

Statistics for Purpose of availing credit (C), by female farmers is shown in the table-4.2.5.7 above. From the table we find that there are 230 valid scores and value of mean for it is 1.75. Standard deviation is 1.221 and standard error of mean is 0.081. Table-4.2.5.8 presents frequency showing credit characteristic of farm women of Sikkim. It shows that about availing credit facility, (22%) of the sample farmers don't avail any, while (78%) of them avail the credit facility. Sample females were also asked to disclose about the Purpose of availing credit. (30%) reported of availing credit for personal purpose, (55%) for commercial and (15%) for both the purposes.

- **Inferential Analysis**

One sample't'-test is conducted to test our hypothesis

Hypothesis Statement –Farming females of rural area do not avail credit for commercial purpose.
Ho - availing credit for commercial purpose is not more by farming females of rural area.
Ha - availing credit for commercial purpose is more by farming females of rural area.

From the table 4.2.5.9 we find that value of't' for Purpose of availing credit (C) is 3.078, which is positive and also higher than 1.96, mean difference column for it also shows positive values. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for it is rejected and thus alternate hypothesis for it is accepted, which says that availing credit for commercial purpose is more by farming females of rural area. Further, we conclude it by saying that significantly more number of sample female farmers on an average use informal source of credit for commercial purpose.

- **District Wise**

In table-4.2.5.13, for district wise purpose of availing credit by female farmers, it is observed that in all the districts commercial purpose dominates for availing credit. Within the districts, in South district availing credit for commercial purpose is spotted the most, followed by East, North and West. Personal purpose of availing credit dominance within the districts is noticed the most in East district followed by South, West and North.

Table-4.2.5.13-Q.5.2C * District Cross tabulation

			District				Total
			East	West	North	South	
Q.5.2C	0	Count	20	25	2	4	51
		% within Q.5.2C	39.2%	49.0%	3.9%	7.8%	100.0%
		% within District	25.0%	41.7%	6.7%	6.7%	22.2%
		% of Total	8.7%	10.9%	.9%	1.7%	22.2%
	PERSONAL	Count	20	13	2	19	54
		% within Q.5.2C	37.0%	24.1%	3.7%	35.2%	100.0%
		% within District	25.0%	21.7%	6.7%	31.7%	23.5%
		% of Total	8.7%	5.7%	.9%	8.3%	23.5%
	BOTH	Count	13	2	3	9	27
		% within Q.5.2C	48.1%	7.4%	11.1%	33.3%	100.0%
		% within District	16.3%	3.3%	10.0%	15.0%	11.7%
		% of Total	5.7%	.9%	1.3%	3.9%	11.7%
	COMMERCIAL	Count	27	20	23	28	98
		% within Q.5.2C	27.6%	20.4%	23.5%	28.6%	100.0%
		% within District	33.8%	33.3%	76.7%	46.7%	42.6%
		% of Total	11.7%	8.7%	10.0%	12.2%	42.6%
Total		Count	80	60	30	60	230
		% within Q.5.2C	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.5.4 Opportunity to Have Services from Extension Agencies

- **Opportunity to Have Services from Extension Agencies Details:**

Statistics for opportunity to have services from extension agencies for female farmers is shown in the Table-4.2.5.14 below. From the table we find that there are 230 valid scores and a value of mean them is 1.71. Standard deviation is 0.453 and standard error of mean 0.030.

Table-4.2.5.14-One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q.5.3A	230	1.71	.453	.030

Source: Field Survey

- **Extent of Access to Extension Services and Training:**

Regarding any opportunity they get to have services from extension agencies like Department of Agriculture Extension (DAE)/Department of Livestock Services (DLF) to develop technical skill, (28%) replied in negative, while (72%) were affirmative about it. Those who get an opportunity, to have services, their accessibility extent showed that (10%) of them rarely, (51%) sometimes and (11%) of them get it frequently. As is revealed from the data in the table-4.2.5.2, almost half of the sample female farmers do not/rarely get an opportunity to have such services. The reason, they reported for this is-being residing in the interior and remote area, they do not get the timely information for the same and also they reported that most of the time male member of the family goes for it. As a result, they lack modern avenues of knowledge and information, new technologies and opportunities for training to increase their farm productivity and income. Though, they were of the view that they are aware about some of the technologies but do not have access to it.

- **Inferential Analysis**

One sample't'-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area do not get an opportunity to have services from extension agencies.
Ho - opportunity to have services from extension agencies is not more of rural farming females.
Ha - opportunity to have services from extension agencies is more of rural farming females.

The Mean Difference is obtained by subtracting the test value (which is 1.5 here in this table), from each sample mean. 1 represents no opportunity to have services from extension agencies and 2 represents yes for that. So, less than 1.5 means no and more than 1.5 mean means yes for opportunity to have services from extension agencies.

From the table 4.2.5.15 below, we find that value of 't' for opportunity to have services from extension agencies for female farmers is 7.127, which is positive and also higher than 1.96, mean difference column for it also, shows positive values. This is further confirmed by significance level which is 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says that opportunity to have services from extension agencies is more of rural farming females. Further, we conclude it by saying that significantly more number of sample female farmers on an average get an opportunity to have services from extension agencies.

Table-4.2.5.15-One-Sample Test						
	Test Value =1.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Q.5.3A	7.127	229	.000	.213	.15	.27

- **District Wise**

In table-4.2.5.16, for district wise opportunity to have services from extension agencies by female farmers, it is observed that though in all the districts female farmers get the opportunity to have services from extension agencies. But, within the districts, in West district dominance is spotted the most and in North it is spotted the least, for getting this opportunity. Within the districts, East is the district where maximum percentage of female farmers who do not get this opportunity is noted followed by East, (South and North equally) and West.

Table-4.2.5.16-Q.5.3A * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.5.3A	NO	Count	37	9	10	10	66
		% within Q.5.3A	56.1%	13.6%	15.2%	15.2%	100.0%
		% within District	46.3%	15.0%	33.3%	16.7%	28.7%
		% of Total	16.1%	3.9%	4.3%	4.3%	28.7%
	YES	Count	43	51	20	50	164
		% within Q.5.3A	26.2%	31.1%	12.2%	30.5%	100.0%
		% within District	53.8%	85.0%	66.7%	83.3%	71.3%
		% of Total	18.7%	22.2%	8.7%	21.7%	71.3%
Total		Count	80	60	30	60	230
		% within Q.5.3A	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.5.5 Awareness Regarding Technology and Government Policies

- **Awareness Regarding Technology and Government Policies Details:**

Statistics for Awareness regarding Technology (A) and Government policies (B) of female farmers is shown in the Table-4.2.5.17 below. From the table we find that there are 230 valid scores and values of mean them are 1.75 and 1.83 respectively. Standard deviation is 0.433 and 0.380 and standard error of mean 0.029 and 0.025 respectively.

Table-4.2.5.17-One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Q.5.4A	230	1.75	.433	.029
Q.5.4B	230	1.83	.380	.025

Source: Field Survey

- **Extent of Access to Technologies:**

Awareness data of the sample farmers regarding Technology and Government policies in the table shows that (24%) of them were not, while (76%) were aware about Technology and (17%) of them were not, while (83%) were aware about Government policies. However, this data does not show the level of implementation of these technologies in their farms, but only the awareness level. The extent of accessibility in table-4.2.5.2 shows that (19%) of them never, (10%) rarely and (69%) of them accessed it sometimes. Still they used traditional tools and practices for production and household purposes. Due to lack of capital, it was difficult for women to hire or buy or adopt technologies.

- **Inferential Analysis**

- It is our assumption that female's awareness level regarding technology and govt. policies is less.

One sample't'-test is conducted to test our hypothesis

Ho – Awareness regarding Technology and Government policies is not more of rural farming females.

The Mean Difference is obtained by subtracting the test value (which is 1.5 here in this table), from each sample mean. 1 represents no awareness regarding Technology and Government policies and 2 represents yes for that. So, less than 1.5 means no and more than 1.5 mean means yes for Awareness regarding Technology and Government policies.

Table-4.2.5.18-One-Sample Test						
	Test Value = 1.5					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q.5.4A	8.839	229	.000	.252	.20	.31
Q.5.4B	13.019	229	.000	.326	.28	.38

From the table 4.2.5.18 above, we find that value of 't' for Awareness regarding Technology (A) and Government policies (B) of female farmers is 8.839 and 13.019, which is positive and also higher than 1.96, mean difference column for it also, shows positive values. This is further confirmed by significance level which is 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says that Awareness regarding Technology and Government policies is more of rural farming females. Further, we conclude it by saying that significantly more number of sample female farmers on an average are aware regarding Technology and Government policies.

- **District Wise**

In table-4.2.5.19, for district wise Awareness regarding Technology (A) of female farmers, it is observed that though in all the districts female farmers are aware regarding technology. But, within the districts, in West district dominance is spotted the most and in North it is spotted the least, for awareness regarding technology. It is also observed that except North, wide variation in awareness level with in the districts is not found much. Within the districts, East is the district where maximum percentage of female farmers who are not aware regarding technology is noted followed by North, South and West.

Table-4.2.5.19-Q.5.4A * District Cross tabulation

			District				Total
			East	West	North	South	
Q.5.4A	NO	Count	28	6	14	9	57
		% within Q.5.4A	49.1%	10.5%	24.6%	15.8%	100.0%
		% within District	35.0%	10.0%	46.7%	15.0%	24.8%
		% of Total	12.2%	2.6%	6.1%	3.9%	24.8%
	YES	Count	52	54	16	51	173
		% within Q.5.4A	30.1%	31.2%	9.2%	29.5%	100.0%
		% within District	65.0%	90.0%	53.3%	85.0%	75.2%
		% of Total	22.6%	23.5%	7.0%	22.2%	75.2%
Total		Count	80	60	30	60	230
		% within Q.5.4A	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

- **District Wise**

In table-4.2.5.20, for district wise awareness regarding Government policies (B) of female farmers, it is observed that though in all the districts female farmers are aware regarding Government policies. But, within the districts, in East district dominance is spotted the most and in North it is spotted the least, for awareness regarding Government policies. Within the districts, North is the district where maximum percentage of female farmers who are not aware regarding Government policies is noted followed by South, East and West.

Table-4.2.5.20-Q.5.4B * District Cross tabulation

			District				Total
			East	West	North	South	
Q.5.4B	NO	Count	10	3	15	12	40
		% within Q.5.4B	25.0%	7.5%	37.5%	30.0%	100.0%
		% within District	12.5%	5.0%	50.0%	20.0%	17.4%
		% of Total	4.3%	1.3%	6.5%	5.2%	17.4%
	YES	Count	70	57	15	48	190
		% within Q.5.4B	36.8%	30.0%	7.9%	25.3%	100.0%
		% within District	87.5%	95.0%	50.0%	80.0%	82.6%
		% of Total	30.4%	24.8%	6.5%	20.9%	82.6%
Total		Count	80	60	30	60	230
		% within Q.5.4B	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.5.6 Education Level*

- **Education Level Details:**

Statistics for Education level of sample female farmers is shown in the Table-4.2.5.21 below. From the table we find that there are 230 valid scores and a value of mean them is 2.35. Standard deviation is 1.011 and standard error of mean 0.067.

Table-4.2.5.21-One-Sample statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q.5.5	230	2.35	1.011	.067

- **Extent of Access to Education:**

The extent of education accessibility in table-4.2.5.2 shows that (21%) never, (39%) rarely, (29%) Sometimes, (08%) frequently and (03%) had always access to it. Here, never stands for Illiterate, rarely – primary, sometimes – middle, frequently – matric and always – secondary.

*"Education Status of Farming Females – A Study of Rural Area of Sikkim in North- Eastern India" Nidhi Dwivedy, "International Journal of Social Sciences and Interdisciplinary Research" Vol.2 (2), February -2013, Pp. 36-48, ISSN: 2277-3630

- **Inferential Analysis**

One sample't'-test is conducted to test our hypothesis

Hypothesis Statement –Education level is not more of rural farming females.
Ho – education level is not more of rural farming females.
Ha - education level is more of rural farming females.

The Mean Difference is obtained by subtracting the test value (which is 3 here in this table), from each sample mean. Test statistic 3 represents middle standard here. Less than 3 mean illiterate/primary standard and more than 3 mean matric/secondary standard.

Table-4.2.5.22-One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Q.5.5	-9.781	229	.000	-.652	-.78	-.52

From the table 4.2.5.22 above, we find that value of't' for education level of female farmers -9.781, which is negative and also less than 1.96. This is further confirmed by significance level which are 0.00 and also by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted for it, which says that education level is not more of rural farming females. Here, we can safely say that there is significant number of female farmers who are either illiterate or are educated till primary level.

- **District Wise**

In table-4.2.5.23, for district wise education level of female farmers, it is observed that though in all the districts majority of female farmers are educated till primary level. But, within the districts, in South district dominance for this education level is spotted the most and in North it is spotted the least, for education level. Within the districts, East is the district where maximum percentage of female farmers who are not educated i.e. illiterate is noted followed by (South and West equally) and North. North did not record even a single female whose education level is matric and above. For Middle and Matric level education within the districts, maximum percentage of female farmers are recorded in East district, but, for secondary level West district has recorded the maximum percentage of female farmers.

Table-4.2.5.23-Q.5.5 * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.5.5	ILLITERATE	Count	18	12	7	12	49
		% within Q.5.5	36.7%	24.5%	14.3%	24.5%	100.0%
		% within District	22.5%	20.0%	23.3%	20.0%	21.3%
		% of Total	7.8%	5.2%	3.0%	5.2%	21.3%
	PRIMARY	Count	26	22	13	27	88
		% within Q.5.5	29.5%	25.0%	14.8%	30.7%	100.0%
		% within District	32.5%	36.7%	43.3%	45.0%	38.3%
		% of Total	11.3%	9.6%	5.7%	11.7%	38.3%
	MIDDLE	Count	23	18	10	15	66
		% within Q.5.5	34.8%	27.3%	15.2%	22.7%	100.0%
		% within District	28.8%	30.0%	33.3%	25.0%	28.7%
		% of Total	10.0%	7.8%	4.3%	6.5%	28.7%
	MATRIC	Count	10	4	0	5	19
		% within Q.5.5	52.6%	21.1%	.0%	26.3%	100.0%
		% within District	12.5%	6.7%	.0%	8.3%	8.3%
		% of Total	4.3%	1.7%	.0%	2.2%	8.3%
	SECONDARY	Count	3	4	0	1	8
		% within Q.5.5	37.5%	50.0%	.0%	12.5%	100.0%
		% within District	3.8%	6.7%	.0%	1.7%	3.5%
		% of Total	1.3%	1.7%	.0%	.4%	3.5%
Total		Count	80	60	30	60	230
		% within Q.5.5	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.5.7 Membership Status of any Rural Institution*

- **Membership Status of Any Rural Institution Details:**

Statistics for Membership status of any rural institution of female farmers is shown in the Table-4.2.5.24 below. From the table we find that there are 230 valid scores and a value of mean them is 1.50. Standard deviation is 0.501 and standard error of mean 0.033.

Table-4.2.5.24-One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Q.5.6	230	1.50	.501	.033

Source: Field Survey

- **Extent of Access to Rural Institutions:**

(50%) of the sample farmers were the members of either any cooperative or formal or informal association/institution/group like- Joint Liability And Activity Group (JLG), self-help group, Activity- based Group or Farmers' Club, which created opportunities for saving, taking loans, discussions and participation of women in any social events like agricultural fairs. While (50%) of

*"The Membership Status of Farming Females – A Study of Rural Area of Sikkim in North Eastern India" Nidhi Dwivedy, "Research Journal of Economics & Business Studies" Volume:02, Number: 01, November -2012, Pp. 150-168, ISSN : 2251-1555.

the sample farmers were not the members. Those who admitted positively for the membership status, in the table-4.2.5.2 their extent showed that (22%) of them rarely, (25%) sometimes and only (3%) had the frequent access to such institutions.

- **Inferential Analysis**

One sample't'-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area are not the members of either any cooperative or formal/informal association/institution/group.

Ho – no more sample female farmers are the members of either any cooperative or formal/informal association/institution/group.

Ha - more sample female farmers are the members of either any cooperative or formal/informal association/institution/group.

The Mean Difference is obtained by subtracting the test value (which is 1.5 here in this table), from each sample mean. 1 represents no for such opportunity and 2 represents yes for such opportunity. So, less than 1.5 means no for such opportunity and more than 1.5 mean means yes for such opportunity.

Table-4.2.5.25-One-Sample Test

	Test Value =1.5					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Q.5.6	.000	229	1.000	.000	-.07	.07

From the table 4.2.5.25 above, we find that value of't' for Membership status of any rural institution for female farmers is .000 i.e. neither positive nor negative, which shows equal number for member/non-member status of sample female farmers.

- **District Wise**

In table-4.2.5.26, for district wise membership status of any rural institution of female farmers, it is observed that though in all the districts female farmers are noticed members of some or the other rural institution. But, within the districts, in South district dominance is spotted the most and in North it is spotted the least, for membership status of any rural institution. Within the districts, East is the district where maximum percentage of female farmers who are not the members is noted followed by West, South and North.

Table-4.2.5.26-Q.5.6 * District Cross tabulation							
			District				Total
			East	West	North	South	
Q.5.6	NO	Count	50	26	15	24	115
		% within Q.5.6	43.5%	22.6%	13.0%	20.9%	100.0%
		% within District	62.5%	43.3%	50.0%	40.0%	50.0%
		% of Total	21.7%	11.3%	6.5%	10.4%	50.0%
	YES	Count	30	34	15	36	115
		% within Q.5.6	26.1%	29.6%	13.0%	31.3%	100.0%
		% within District	37.5%	56.7%	50.0%	60.0%	50.0%
		% of Total	13.0%	14.8%	6.5%	15.7%	50.0%
Total		Count	80	60	30	60	230
		% within Q.5.6	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

4.2.5.8 Age Wise Frequency of Female Farmers:

Age wise frequency of female farmers in the Table-4.2.5.27 shows that out of the total women surveyed, 55%, 41% and 04% fall in the 20-39 years, 40- 59 years and > 60yrs categories of age respectively.

Table-4.2.5.27-Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-39	126	54.8	54.8	54.8
	40-59	95	41.3	41.3	96.1
	60 and above	9	3.9	3.9	100.0
	Total	230	100.0	100.0	

Source: Field Survey

4.2.6 Assessment of Sample Female Farmer's Views on Farming/ Family Roles, Integrated Farming, Value Addition and Technology

- **Assessment of Female Farmers Views Details**:

A, B, C, D, E, F, F2, G, H, I, J, K, L, M and N in the table-4.2.6.1 represents - Doing anything except agriculture (A), Inclination to leave farming (B), Inclination for their contribution in farming (C), Views for moving towards urban area (D), Views regarding accompanying their husbands in case they move towards urban area (E), Inclination about absorbing their sons in agriculture (F), Inclination about absorbing their daughters in agriculture (F2), Inclination about looking after the responsibility at home as well as in agriculture (G), Views to opt for any entrepreneurial activity (H), Knowledge about plant disease and their prevention (I), Knowledge about animal disease and their prevention (J), Knowledge about feeding/nursing of domestic animals (K), Inclination about owning animal/property (L), Inclination about handing over the property to their daughter-in- law (M), Feeling about the income they get from their farm (N).

Table-4.2.6.1-One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Q.6A	230	7.57	2.451	.162
Q.6B	230	5.63	2.982	.197
Q.6C	230	7.16	2.465	.163
Q.6D	230	4.07	2.137	.141
Q.6E	230	4.91	3.121	.206
Q.6F	230	3.75	2.848	.188
Q.6F2	230	3.45	2.716	.179
Q.6G	230	7.18	2.403	.158
Q.6H	230	8.12	2.064	.136
Q.6I	230	1.77	1.132	.075
Q.6J	230	1.74	1.073	.071
Q.6K	230	1.89	1.210	.080
Q.6L	230	7.37	2.760	.182
Q.6M	230	3.75	2.804	.185
Q.6N	230	4.47	1.725	.114

Table-4.2.6.2-One-Sample Test						
	Test Value = 5					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q.6A	15.923	229	.000	2.574	2.26	2.89
Q.6B	3.185	229	.002	.626	.24	1.01
Q.6C	13.297	229	.000	2.161	1.84	2.48
Q.6D	-6.633	229	.000	-.935	-1.21	-.66
Q.6E	-.444	229	.658	-.091	-.50	.31
Q.6F	-6.646	229	.000	-1.248	-1.62	-.88
Q.6F2	-8.644	229	.000	-1.548	-1.90	-1.19
Q.6G	13.775	229	.000	2.183	1.87	2.49
Q.6H	22.903	229	.000	3.117	2.85	3.39
Q.6I	-43.347	229	.000	-3.235	-3.38	-3.09
Q.6J	-46.009	229	.000	-3.257	-3.40	-3.12
Q.6K	-39.031	229	.000	-3.113	-3.27	-2.96
Q.6L	13.046	229	.000	2.374	2.02	2.73
Q.6M	-6.748	229	.000	-1.248	-1.61	-.88
Q.6N	-4.702	229	.000	-.535	-.76	-.31

To test the hypothesis for views of female farmers on farming/ family roles, integrated farming, Value addition and technology (for points 4.2.6.1 to 4.2.6.15) below, one-sample t-test is conducted.

The Mean Difference in table-4.2.6.2 is obtained by subtracting the test value (which is 5 here in this table), from each sample mean. Test statistic 5 represents balanced views of both (positive and negative). More than 5 mean, their views are more inclined towards positive side and less than 5 means, their views are more inclined towards negative side.

4.2.6.1 Doing Anything except Agriculture

- **Doing Anything except Agriculture Details:**

Statistics for doing anything except agriculture (A) of female farmers is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and a value of mean it is 7.57. Standard deviation is 2.451 and standard error of mean 0.162.

- **Extent of Feeling for Doing Anything except Agriculture**

Degree of answers for A, B, C, D, E, F, F2, G, H, I, J, K, L, M and N in tables - 4.2.6.3, 4.2.6.4, 4.2.6.5, 4.2.6.6, 4.2.6.7(ii), 4.2.6.8(ii), 4.2.6.9(ii), 4.2.6.10, 4.2.6.12, 4.2.6.13, 4.2.6.14, 4.2.6.15, 4.2.6.17, 4.2.6.19 and 4.2.6.20 ranges from 1 to 10. 1 indicates strongly negative and 10 indicate strongly positive feeling. Whereas, degree level 5 indicates moderate feeling for the question. More than 5 means their views are more inclined towards positive side and less than 5 means, their views are more inclined towards negative side.

In table- 4.2.6.3, 02% of the respondents strongly feel negative for doing anything except agriculture. About 12% of them rated 5 for their view and 06% rated it 4. 10% rated their view for this question as 6. 30% of them strongly feel positive for doing anything except agriculture. Since 75% of the respondents rated their view for this question above 5. This shows the inclination of the view towards positive side. So, we can say that most of the female farmers are interested for doing anything except agriculture.

Table -4.2.6.3-Degree of answer for doing anything except agriculture-Q.6A

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	5	2.2	2.2	2.2
	2	6	2.6	2.6	4.8
	3	3	1.3	1.3	6.1
	4	13	5.7	5.7	11.7
	5	28	12.2	12.2	23.9
	6	23	10.0	10.0	33.9
	7	12	5.2	5.2	39.1
	8	26	11.3	11.3	50.4
	9	46	20.0	20.0	70.4
	Strong positive 10	68	29.6	29.6	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area would like to do anything except agriculture.
Ho – no more number of sample female farmers would like to do anything except agriculture.
Ha – more number of sample female farmers would like to do anything except agriculture.

From the table 4.2.6.2 we find that confidence intervals lie entirely above 0.0 and also it is positive. The value of ‘t’ for the female farmers view about given a chance, whether they would like to do anything except agriculture is 15.923 which is higher than 1.96, mean difference column for it also shows positive values. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says that more number of sample female farmers would like to do anything except agriculture. Further, we conclude it by saying that significantly more number of sample female farmers on an average are interested in and hold the view of doing anything except agriculture.

4.2.6.2 Inclination to Leave Farming*

- **Parameter Details**:

Statistics for Inclination to leave farming (B), of female farmers is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and a value of mean for it is 5.63. Standard deviation is 2.982 and standard error of mean is 0.197.

- **Extent of Inclination to leave Farming**

In table- 4.2.6.4, 13% of the respondents are strongly inclined towards the negative side for the view to leave farming.About 14% of them rated 5 for their view and 09% rated it 4. 06% rated their view for this question as 6. 13% of them strongly inclined towards the positive side for the view to leave farming. Since 50% of the respondents rated their view for this question up to 5. This shows equal inclination of the view towards positive as well as negative side. So, we can say that for feeling of the femal farmers for leaving farming is equally divided towards positive as well as negative side.

*“Female farmer’s views to leave farming-A study of Rural Area of Sikkim in North-Eastern India”, Nidhi Dwivedy, Niranjan Upadhyay, Ajeya Jha, “Research Journal of Commerce & Behavioral Science”, Volume: 01, Number: 10, August-2012, Pp-28-35, ISSN: 2251-1547.

Table -4.2.6.4-Degree of answer for leaving farming-Q.6B					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	30	13.0	13.0	13.0
	2	19	8.3	8.3	21.3
	3	14	6.1	6.1	27.4
	4	20	8.7	8.7	36.1
	5	33	14.3	14.3	50.4
	6	14	6.1	6.1	56.5
	7	20	8.7	8.7	65.2
	8	35	15.2	15.2	80.4
	9	15	6.5	6.5	87.0
	Strong positive 10	30	13.0	13.0	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area are inclined towards the the view to leave farming.
Ho – no more number of female farmers are inclined towards the the view to leave farming.
Ha – more number of sample female farmers are inclined towards the the view to leave farming.

From the table 4.2.6.2 we find that confidence intervals lie entirely above 0.0 and also it is positive. The value of ‘t’ for the female farmers view about thinking of leaving farming is 3.185 which is higher than 1.96, mean difference column for it also shows positive values. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says that more number of sample female farmers would feel happy leaving farming. Further, we conclude it by saying that significantly more number of sample female farmers on an average are interested in and hold the view of leaving farming.

4.2.6.3 Inclination for Their Contribution in Farming

- **Parameter Details**:

Statistics for Inclination for their contribution in farming (C), of female farmers is shown in the Table- 4.2.6.1 above. From the table we find that there are 230 valid scores and value of mean for it is 7.16. Standard deviation is 2.465 and standard error of mean is 0.163.

- **Extent of Inclination for their Contribution in Farming**

In table- 4.2.6.5, 03% of the respondents are strongly inclined towards the negative side for the view of their contribution in farming. About 13% of them rated 5 for their view and 06% rated it 4. 09% rated their view for this question as 6. 22% of them are strongly inclined towards the positive side for the view of their contribution in farming. Since only 28% of the respondents rated their view for this question up to 5. This shows the inclination of the view towards positive side. So, we can say that most of the female farmers feel proud for their contribution in farming.

Table -4.2.6.5-Degree of answer for their feeling about contributing in farming-Q.6C

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	7	3.0	3.0	3.0
	2	6	2.6	2.6	5.7
	3	6	2.6	2.6	8.3
	4	14	6.1	6.1	14.3
	5	31	13.5	13.5	27.8
	6	21	9.1	9.1	37.0
	7	21	9.1	9.1	46.1
	8	41	17.8	17.8	63.9
	9	32	13.9	13.9	77.8
	Strong positive 10	51	22.2	22.2	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area feel proud of their contribution in farming.

Ho – no more number of sample female farmers feel proud of their contribution in farming.

Ha –more number of sample female farmers feel proud of their contribution in farming.

From the table 4.2.6.2 we find that confidence intervals lie entirely above 0.0 and also it is positive. The value of ‘t’ for the female farmers view for their contribution in farming (C) is 13.297 which is higher than 1.96, mean difference column for it also shows positive values. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says that more number of sample female farmers feel proud of their contribution in farming. Further, we conclude it by saying that significantly more number of sample female farmers on an average feels proud of their contribution in farming.

4.2.6.4 Views for Moving Towards Urban Area

- **Parameter Details**:

Statistics for Views for moving towards urban area (D), of female farmers is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and value of mean for it is 4.07. Standard deviation is 2.137 and standard error of mean is 0.141.

- **Extent of Views for Moving Towards Urban Area (D)**

In table- 4.2.6.6, 20% of the respondents strongly feel negative for moving towards urban area. About 20% of them rated 5 for their view and 22% rated it 4. 09% rated their view for this question as 6. 2% of them strongly feel positive for moving towards urban area. Since 77% of the respondents rated their view for this question up to 5. This shows the inclination of the view towards negative side. So, we can say that most of the female farmers do not feel for moving towards urban area.

Table -4.2.6.6-Degree of answer for Views for moving towards urban area-Q.6D

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	46	20.0	20.0	20.0
	2	17	7.4	7.4	27.4
	3	16	7.0	7.0	34.3
	4	51	22.2	22.2	56.5
	5	47	20.4	20.4	77.0
	6	20	8.7	8.7	85.7
	7	19	8.3	8.3	93.9
	8	11	4.8	4.8	98.7
	9	3	1.3	1.3	100.0
	Total	**230**	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area would like to move towards urban area.
Ho – no more number of sample female farmers would like to move towards urban area.
Ha – more number of sample female farmers would like to move towards urban area.

From the table 4.2.6.2 we find that value of‘t’ for Views about moving towards urban area is - 6.633, which is negative and also less than 1.96. This is further confirmed by confidence

intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted for it, which says that no more number of sample female farmers would like to move towards urban area. Further, we conclude it by saying that no more number of sample female farmers on an average would like to move towards urban area.

4.2.6.5 Views Regarding Accompanying their Husbands in Case they Move Towards Urban Area

- **Parameter Details**:

Statistics for Views regarding accompanying the husbands in case they move towards urban area (E), of female farmers is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and value of mean for it is 4.91. Standard deviation is 3.121 and standard error of mean is 0.206.

Table -4.2.6.7(i) shows the frequency for views of female farmers regarding accompanying the husbands in case they move towards urban area. 67% of them reported that they will not accompany and 33% reported for accompanying the husbands in case they move towards urban area.

Table -4.2.6.7(i)-Q.7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT ACCOMPANY	154	67.0	67.0	67.0
	ACCOMPANY	76	33.0	33.0	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Extent of Their Views Regarding Accompanying the Husbands in Case they Move Towards Urban Area**

In table- 4.2.6.7(ii), 20% of the respondents strongly feel negative for accompanying the husbands in case they move towards urban area. About 12% of them rated 5 for their view and 10% rated it 4. 10% rated their view for this question as 6. 14% of them strongly feel positive for accompanying the husbands in case they move towards urban area. Since 61% of the respondents rated their view for this question up to 5. This shows the inclination of the view towards negative side. So, we can say that most of the female farmers do not feel for accompanying the husbands in case they move towards urban area.

Table -4.2.6.7(ii)-Degree of Views for accompanying the husbands in case they move towards urban area-Q.6E					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	45	19.6	19.6	19.6
	2	22	9.6	9.6	29.1
	3	24	10.4	10.4	39.6
	4	22	9.6	9.6	49.1
	5	27	11.7	11.7	60.9
	6	22	9.6	9.6	70.4
	7	7	3.0	3.0	73.5
	8	18	7.8	7.8	81.3
	9	10	4.3	4.3	85.7
	Strong positive 10	33	14.3	14.3	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

- It is our assumption that more farming females of rural area would like to accompany their husbands in case they move towards urban area.

One sample‘t’-test is conducted to test our hypothesis

Ho – no more number of sample female farmers would like to accompany their husbands in case they move towards urban area.

From the table 4.2.6.2 we find that confidence intervals do not lie entirely either above or below 0.0. Its value is positive for one limit and negative for the other limit. For this view, value of‘t’ is -0.444, which is lower than 1.96 but significance level is 0.658. But then again if we look at the mean difference, it is negative. The upper limit of the confidence interval lies entirely above 0 but then again the magnitude of lower limit (negative value) is more than the magnitude of the upper limit (positive value). Since their views are more inclined towards negative side, consequently, we can safely conclude that null hypothesis for it to be accepted, which says that no more number of sample female farmers would like to accompany their husbands in case they move towards urban area.

Table-4.2.6.2(i)-One-Sample Test						
	Test Value = 1.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Q.7	-5.455	229	.000	-.170	-.23	-.11

The above mentioned result of inferential statistics for views regarding accompanying the husbands in case they move towards urban area (E), of female farmers further gets fortified by the findings of the table-4.2.6.2(i). For this question 1 represents not accompany. The test value is 1.5, which represents neutral view for accompany.

From the table 4.2.6.2(i) we find that value of't' for it is -5.455, which is negative and also less than 1.96. This is further confirmed by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. This shows that most of them are not interested in accompanying the husband. This proves to be the valid support for this view to show more inclination towards negative side above.

4.2.6.6 Inclination of the View for Absorbing their Sons in Agriculture*

- **Parameter Details**:

Statistics for inclination of the view to absorb their sons in agriculture (F) is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and value of mean for it is 3.75. Standard deviation is 2.848 and standard error of mean is 0.188. Table -4.2.6.8(i) shows the frequency for inclination of female farmer's view about absorbing their sons in agriculture. 76% of them are not in favour of absorbing them in agriculture and only 24% are in favour of absorbing them in agriculture.

Table -4.2.6.8(i)-Q.8A

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT ABSORBED	174	75.7	75.7	75.7
	ABSORBED	56	24.3	24.3	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Extent of Their Inclination about Absorbing their Sons in Agriculture**

In table- 4.2.6.8(ii), 31% of the respondents are strongly inclined towards the negative side for the view of absorbing their sons in agriculture. 10% of them rated 5 for their view and 09% rated it 4. 06% rated their view for this question as 6. 07% of them are strongly inclined towards positive side for this view. Since 75% of the respondents rated their view for this question up to 5. This shows the inclination of the view towards negative side. So, we can say that most of the female farmers do not feel for absorbing their sons in agriculture.

Table -4.2.6.8(ii)-Degree of answer for their Feeling about absorbing their sons in agriculture -Q.6F					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	71	30.9	30.9	30.9
	2	36	15.7	15.7	46.5
	3	23	10.0	10.0	56.5
	4	20	8.7	8.7	65.2
	5	23	10.0	10.0	75.2
	6	14	6.1	6.1	81.3
	7	7	3.0	3.0	84.3
	8	17	7.4	7.4	91.7
	9	3	1.3	1.3	93.0
	Strong positive 10	16	7.0	7.0	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area would like to absorb their sons in agriculture.

Ho- no more number of sample female farmers would like to absorb their sons in agriculture.

Ha - more sample female farmers would like to absorb their sons in agriculture.

From the table 4.2.6.2 we find that value of‘t’ for Feeling about absorbing their sons in agriculture (F) is -6.646, which is negative. This is further confirmed by significance level which are 0.00 and also by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted for this feeling, which says that no more number of sample female farmers would like to absorb their sons in agriculture.

Table-4.2.6. 2(ii)-One-Sample Test						
	Test Value = 1.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Q.8A	-9.045	229	.000	-.257	-.31	-.20

The above mentioned findings further get strengthened by the findings of the above Table- 4.2.6.2(ii). In this table, we find that value of‘t’ for it is -9.045, which is negative and also less than 1.96. This is further confirmed by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. This shows that most of them are not interested in absorbing their sons in agriculture.

4.2.6.7 Inclination of the View for Absorbing their Daughters in Agriculture

- **Parameter Details**:

Statistics for inclination of the view to absorb their daughters in agriculture (F2) is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and value of mean for it is 3.45. Standard deviation is 2.716 and standard error of mean is 0.179.

Table -4.2.6.9(i) shows the frequency for inclination to absorb their daughters in agriculture. 78% of them are not in favour of absorbing them in agriculture and only 22% are in favour of absorbing them in agriculture.

Table -4.2.6.9(i)-Q.8B

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT ABSORBED	180	78.3	78.3	78.3
	ABSORBED	50	21.7	21.7	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Extent of Inclination of the View for Absorbing Their Daughters in Agriculture**

In table- 4.2.6.9(ii), 35% of the respondents are strongly inclined towards negative side for the view of absorbing their daughters in agriculture. 09% of them rated 5 for their view and 07% rated it 4. 06% rated their view for this question as 6. 05% of them are strongly inclined towards positive side for the view. Since 77% of the respondents rated their view for this question up to 5. This shows the inclination of the view towards negative side. So, we can say that most of the female farmers do not feel for absorbing their daughters in agriculture.

Table -4.2.6.9(ii)-Degree of answer about absorbing their daughters in agriculture-Q.6F2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	80	34.8	34.8	34.8
	2	41	17.8	17.8	52.6
	3	19	8.3	8.3	60.9
	4	17	7.4	7.4	68.3
	5	21	9.1	9.1	77.4
	6	14	6.1	6.1	83.5
	7	11	4.8	4.8	88.3
	8	13	5.7	5.7	93.9
	9	3	1.3	1.3	95.2
	Strong positive 10	11	4.8	4.8	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample't'-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area would like to absorb their daughters in agriculture.

Ho- no more number of sample female farmers would like to absorb their daughters in agriculture.

Ha - more sample female farmers would like to absorb their daughters in agriculture.

From the table 4.2.6.2 we find that value of't' for Feeling about absorbing their daughters in agriculture (F2) is -8.644, which is negative which is negative and also less than 1.96. This is further confirmed by significance level which are 0.00 and also by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted for this feeling, which says that no more number of sample female farmers would like to absorb their daughters in agriculture.

Table-4.2.6. 2(iii)-One-Sample Test

	Test Value = 1.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Q.8B	-10.368	229	.000	-.283	-.34	-.23

The above mentioned findings further get strengthened by the findings of the above Table-4.2.6. 2(iii). In this table, we find that value of't' for it is -10.368, which is negative and also less than 1.96. This is further confirmed by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. This shows that most of them are not interested in absorbing their daughters in agriculture. This proves to be the valid support for this view to show the above mentioned findings.

4.2.6.8 Inclination of the View for Looking After the Responsibility at Home as Well as in Agriculture

- **Parameter Details**:

Statistics for inclination of the view for looking after the responsibility at home as well as in agriculture (G), of female farmers is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and value of mean for it is 7.18. Standard deviation is 2.403 and standard error of mean is 0.158.

- **Extent of the Inclination for this view**

In table- 4.2.6.10, only 02% of the respondents are strongly inclined towards negative side for the view of looking after the responsibility at home as well as in agriculture. 14% of them rated 5 for their view and 07% rated it 4. 12% rated their view for this question as 6. 23% of them strongly feel positive for looking after the responsibility at home as well as in agriculture. Since only 28% of the respondents rated their view for this question up to 5. This shows the inclination of the view towards positive side. So, we can say that most of the female farmers do feel happy for looking after the responsibility at home as well as in agriculture.

Table -4.2.6.10-Degree of answer for feeling of looking after the responsibility at home as well as in agriculture-Q.6G

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	5	2.2	2.2	2.2
	2	3	1.3	1.3	3.5
	3	8	3.5	3.5	7.0
	4	17	7.4	7.4	14.3
	5	32	13.9	13.9	28.3
	6	27	11.7	11.7	40.0
	7	14	6.1	6.1	46.1
	8	39	17.0	17.0	63.0
	9	33	14.3	14.3	77.4
	Strong positive 10	52	22.6	22.6	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area would feel happy about looking after the responsibility at home as well as in agriculture.

Ho – no more number of sample female farmers feel happy about looking after the responsibility at home as well as in agriculture.

Ha - more number of sample female farmers feel happy about looking after the responsibility at home as well as in agriculture.

From the table 4.2.6.2 we find that confidence intervals lie entirely above 0.0 and also it is positive. The value of ‘t’ for Feeling about looking after the responsibility at home as well as in agriculture (G) is 13.775 which is higher than 1.96, mean difference column for it also shows positive values. This is further confirmed by significance levels which are 0.00 and

also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says that more number of sample female farmers feel happy about looking after the responsibility at home as well as in agriculture.

Further, we conclude it by saying that significantly more number of sample female farmers on an average feel happy about looking after the responsibility at home as well as in agriculture.

4.2.6.9 Inclination of the Views to Opt for any Entrepreneurial Activity*

- **Parameter Details**:

Statistics for the views to opt for any entrepreneurial activity (H), of female farmers is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and value of mean for it is 8.12. Standard deviation is 2.064 and standard error of mean is 0.136.

Table-4.2.6.11 depicts the frequency of various options sample female farmers selected. It shows that 43% females have opted for poultry, 09% females have opted for fish farming, 39% females have opted for cow, 05% females have opted for silkworm/honey bee and 04% females have opted for others.

Table -4.2.6.11-Q.5.7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**POULTRY**	99	43.0	43.0	43.0
	FISH FARMING	20	8.7	8.7	51.7
	COW	89	38.7	38.7	90.4
	SILKWORM/ HONEY BEE	12	5.2	5.2	95.7
	OTHERS	10	4.3	4.3	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **District Wise**

In table-4.2.6.11(i), for district wise views to opt for any entrepreneurial activity of female farmers, it is observed that though in all the districts (except North) majority of female farmers have opted for poultry. But, within the districts, in East district dominance for this option is spotted the most and in North it is spotted the least. In all the districts (except North) second option of female farmers is cow rearing. In North majority of female farmers have opted

*"Suggestions for Female Farmer's Areas of Gainful Employment-A study of Rural North- Eastern India", Nidhi Dwivedy, "Research Journal of Humanities and Social Sciences" 3(3): July-September, 2012, Pp 304-315, ISSN 0975 –6795.

for cow and second option of female farmers is poultry. In all the districts third option of female farmers is fish farming followed by silkworm/honey bee and others. Within the districts for fish farming, East is the district where maximum percentage of female farmers who have opted for it, is noted followed by (West and North equally) and South. West did not record even a single female who has opted for silkworm/honey bee.

Table -4.2.6.11(i)-Q.5.7 * District Cross tabulation

			District				Total
			East	West	North	South	
Q.5.7	POULTRY	Count	32	27	11	29	99
		% within Q.5.7	32.3%	27.3%	11.1%	29.3%	100.0%
		% within District	40.0%	45.0%	36.7%	48.3%	43.0%
		% of Total	13.9%	11.7%	4.8%	12.6%	43.0%
	FISH FARMING	Count	9	4	4	3	20
		% within Q.5.7	45.0%	20.0%	20.0%	15.0%	100.0%
		% within District	11.3%	6.7%	13.3%	5.0%	8.7%
		% of Total	3.9%	1.7%	1.7%	1.3%	8.7%
	COW	Count	28	24	13	24	89
		% within Q.5.7	31.5%	27.0%	14.6%	27.0%	100.0%
		% within District	35.0%	40.0%	43.3%	40.0%	38.7%
		% of Total	12.2%	10.4%	5.7%	10.4%	38.7%
	SILKWORM /HONEY BEE	Count	8	0	1	3	12
		% within Q.5.7	66.7%	.0%	8.3%	25.0%	100.0%
		% within District	10.0%	.0%	3.3%	5.0%	5.2%
		% of Total	3.5%	.0%	.4%	1.3%	5.2%
	OTHERS	Count	3	5	1	1	10
		% within Q.5.7	30.0%	50.0%	10.0%	10.0%	100.0%
		% within District	3.8%	8.3%	3.3%	1.7%	4.3%
		% of Total	1.3%	2.2%	.4%	.4%	4.3%
Total		Count	80	60	30	60	230
		% within Q.5.7	34.8%	26.1%	13.0%	26.1%	100.0%
		% within District	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.8%	26.1%	13.0%	26.1%	100.0%

Source: Field Survey

- **Extent of the Inclination for This Views**

In table- 4.2.6.12, only 02% of the respondents strongly feel negative to opt for any entrepreneurial activity (H). 05% of them rated 5 for their view and 05% rated it 4. 06% rated their view for this question as 6.33% of them strongly feel positive to opt for any entrepreneurial activity (H). Since only 13% of the respondents rated their view for this question up to 5. This shows the inclination of the view towards positive side. So, we can say that most of the female farmers do feel to opt for any entrepreneurial activity (H).

Table -4.2.6.12-Degree of answer for their views to opt for any entrepreneurial activity-Q.6H					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	4	1.7	1.7	1.7
	2	2	.9	.9	2.6
	3	1	.4	.4	3.0
	4	11	4.8	4.8	7.8
	5	11	4.8	4.8	12.6
	6	13	5.7	5.7	18.3
	7	17	7.4	7.4	25.7
	8	54	23.5	23.5	49.1
	9	42	18.3	18.3	67.4
	Strong positive 10	75	32.6	32.6	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area would like to opt for any entrepreneurial activity.
Ho –no more number of sample female farmers would like to opt for any entrepreneurial activity.
Ha - more number of sample female farmers would like to opt for any entrepreneurial activity.

From the table 4.2.6.2 we find that confidence intervals lie entirely above 0.0 and also it is positive. The value of ‘t’ for the female farmers view to opt for any entrepreneurial activity (H) is 22.903 which is higher than 1.96, mean difference column for it also shows positive values. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says that more number of sample female farmers would like to opt for any entrepreneurial activity. Further, we conclude it by saying that significantly more number of sample female farmers on an average are interested in and hold the view to opt for any entrepreneurial activity.

4.2.6.10 Knowledge about Plant Disease and their Prevention

- **Parameter Details**:

Statistics for knowledge about plant disease and their prevention (I), of female farmers is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores

and value of mean for it is 1.77. Standard deviation is 1.132 and standard error of mean is 0.075.

- **Extent of knowledge about plant disease and their prevention**

In table- 4.2.6.13, considerable 59% of the respondents strongly feel negative for having much knowledge about plant disease and their prevention. 03% of them rated 5 for their knowledge and 06% rated it 4. Only 01% rated their knowledge for this question as 6. Not even a single female farmer strongly felt positive for having much knowledge about plant disease and their prevention. Since enormous 99% of the respondents rated their knowledge for this question up to 5.

This shows the inclination of the knowledge towards negative side. So, we can say that most of the female farmers do not have much knowledge about plant disease and their prevention.

Table -4.2.6.13-Degree of answer for knowledge about plant disease and their prevention-Q.6I

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	135	58.7	58.7	58.7
	2	47	20.4	20.4	79.1
	3	25	10.9	10.9	90.0
	4	15	6.5	6.5	96.5
	5	6	2.6	2.6	99.1
	6	2	.9	.9	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area have much knowledge about plant disease and their prevention.

Ho –no more number of sample female farmers have much knowledge about plant disease and their prevention.
Ha- more number of sample female farmers have much knowledge about plant disease and their prevention.

From the table 4.2.6.2 we find that value of ‘t’ for knowledge about plant disease and their prevention (I) is -43.347, which is negative which is negative and also less than 1.96. This is further confirmed by significance level which are 0.00 and also by confidence intervals, both

limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted for it, which says that no more number of sample female farmers have much knowledge about plant disease and their prevention.

4.2.6.11 Knowledge about Animal Disease and their Prevention

- **Parameter Details**:

Statistics for knowledge about animal disease and their prevention (J), of female farmers is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and value of mean for it is 1.74. Standard deviation is 1.073 and standard error of mean is 0.071.

- **Extent of Knowledge about Animal Disease and their Prevention**

In table- 4.2.6.14, considerable 56% of the respondents strongly feel negative for having much knowledge about animal disease and their prevention. 02% of them rated 5 for their knowledge and 07% rated it 4. Only 01% rated their knowledge for this question as 6. Not even a single female farmer strongly felt positive for having much knowledge about animal disease and their prevention. Since enormous 99% of the respondents rated their knowledge for this question up to5. This shows the inclination of the knowledge towards negative side. So, we can say that most of the female farmers do not have much knowledge about animal disease and their prevention.

Table -4.2.6.14-Degree of answer for knowledge about animal disease and their prevention-Q.6J

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	128	55.7	55.7	55.7
	2	64	27.8	27.8	83.5
	3	15	6.5	6.5	90.0
	4	17	7.4	7.4	97.4
	5	4	1.7	1.7	99.1
	6	2	.9	.9	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area have much knowledge about animal disease and their prevention.

Ho –no more number of sample female farmers have much knowledge about animal disease and their prevention.

Ha- more number of sample female farmers have much knowledge about animal disease and their prevention.

From the table 4.2.6.2 we find that value of't' for knowledge about animal disease and their prevention (J) is -46.009, which is negative and also less than 1.96. This is further confirmed by significance level which are 0.00 and also by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted for it, which says that no more number of sample female farmers have much knowledge about animal disease and their prevention.

4.2.6.12 Knowledge about Feeding/Nursing of Domestic Animals

- **Parameter Details**:

Statistics for knowledge about feeding/nursing of domestic animals (K), of female farmers is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and value of mean for it is 1.89. Standard deviation is 1.210 and standard error of mean is 0.080.

- **Extent of Knowledge about Feeding/Nursing of Domestic Animals**

In table- 4.2.6.15, 49% of the respondents strongly feel negative for their knowledge about feeding/nursing of domestic animals. About 02% of them rated 5 for their knowledge and 06% rated it 4. Only 01% rated their knowledge for this question as 6. Maximum rating females given to this question are 8. Not even a single female farmer strongly felt positive for having much knowledge about feeding/nursing of domestic animals. 0.4% of them rated 8, for having some knowledge about feeding/nursing of domestic animals. Since 98% of the respondents rated their knowledge for this question up to 5. This shows the inclination of the knowledge towards negative side. So, we can say that most of the female farmers do not have much knowledge about feeding/nursing of domestic animals.

Table -4.2.6.15-Degree of knowledge about feeding/nursing of domestic animals-Q.6K					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	113	49.1	49.1	49.1
	2	69	30.0	30.0	79.1
	3	26	11.3	11.3	90.4
	4	13	5.7	5.7	96.1
	5	5	2.2	2.2	98.3
	6	1	.4	.4	98.7
	7	2	.9	.9	99.6
	8	1	.4	.4	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area have much knowledge about feeding/nursing of domestic animals.
Ho – no more number of sample female farmers have much knowledge about feeding/nursing of domestic animals.
Ha - more number of sample female farmers have much knowledge about feeding/nursing of domestic animals.

From the table 4.2.6.2 we find that value of‘t’ for knowledge about feeding/nursing of domestic animals (K) is -39.031, which is negative which is negative and also less than 1.96. This is further confirmed by significance level which are 0.00 and also by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted for it, which says that no more number of sample female farmers have much knowledge about feed-ing/nursing of domestic animals.

4.2.6.13 Inclination of the Views about Owning Animal/Property

- **Parameter Details**:

Statistics for views about owning animal/property (L), of female farmers is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and value of mean for it is 7.37. Standard deviation is 2.760 and standard error of mean is 0.182.

Table 4.2.6.16 shows that, 10% of the sample female farmers do not think of owning animal/property. But, 90% of the sample female farmers think that they should own animal/property.

Table -4.2.6.16-Q.10					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	24	10.4	10.4	10.4
	YES	206	89.6	89.6	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Extent of Their Views about Owning Animal/Property**

In table- 4.2.6.17, 06% of the respondents strongly feel negative about owning animal/property. About 07% of them rated 5 for their view and 05% rated it 4. 06% rated their view for this question as 6. 32% of them strongly feel positive about owning animal/property. Since only 24% of the respondents rated their view for this question up to 5. This shows the inclination of the view towards positive side. So, we can say that most of the female farmers admit that they should own animal/property.

Table -4.2.6.17-Degree of answer for their views about owning animal/property-Q.6L					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	15	6.5	6.5	6.5
	2	4	1.7	1.7	8.3
	3	9	3.9	3.9	12.2
	4	11	4.8	4.8	17.0
	5	17	7.4	7.4	24.3
	6	14	6.1	6.1	30.4
	7	22	9.6	9.6	40.0
	8	37	16.1	16.1	56.1
	9	27	11.7	11.7	67.8
	Strong positive 10	74	32.2	32.2	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area think that they should own animal/property.

Ho – no more number of sample female farmers would think of owning animal/property.
Ha - more number of sample female farmers would think of owning animal/property.

From the table 4.2.6.2 we find that confidence intervals lie entirely above 0.0 and also it is positive. The value of 't' for the female farmers view about owning animal/property (L) is 13.046, which is higher than 1.96, mean difference column for it also shows positive values. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says that more number of sample female farmers would think of owning animal/property. Further, we conclude it by saying that significantly more number of sample female farmers on an average are interested in owning animal/property.

4.2.6.14 Inclination of the Views About Handing Over the Property to their Daughter-In-Law*

- **Parameter Details**:

Statistics for Views about handing over the property to their daughter-in-law (M), of female farmers is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and value of mean for it is 3.75. Standard deviation is 2.804 and standard error of mean is 0.185. Table 4.2.6.18 shows that, 84% of the respondents are in favour of handing over the property to their son. Only 10% of them want to hand it over to their daughter-in-law.

Table -4.2.6.18-Q.11

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SON	192	83.5	83.5	83.5
	BOTH	15	6.5	6.5	90.0
	DAUGHTER-IN-LAW	23	10.0	10.0	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Extent of Inclination for Their Views**

In table- 4.2.6.19, 34% of the respondents strongly feel negative about handing over the property to their daughter-in-law. About 14% of them rated 5 for their view and 07% rated it 4. 11% rated their view for this question as 6. Only 7% of them strongly feel positive about handing over the property to their daughter-in-law. Since 75% of the respondents rated their view for this question up to 5. This shows the inclination of the view towards negative side.

*"Female farmer's view to hand over the ownership rights of the farming land to daughter-in-law –A Study of Rural Area of Sikkim in North- Eastern India" Nidhi Dwivedy, "Research Journal of Economics & Business Studies",Vol. 1, No 9 (2012): 01 July 2012, ISSN: 2251-1555.

So, we can say that most of the female farmers are reluctant about handing over the property to their daughter- in-law.

Table -4.2.6.19-Degree of answer for their Views about handing over the property to their daughter-in-law-Q.6M

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	79	34.3	34.3	34.3
	2	25	10.9	10.9	45.2
	3	17	7.4	7.4	52.6
	4	17	7.4	7.4	60.0
	5	34	14.8	14.8	74.8
	6	25	10.9	10.9	85.7
	7	7	3.0	3.0	88.7
	8	4	1.7	1.7	90.4
	9	6	2.6	2.6	93.0
	Strong positive 10	16	7.0	7.0	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area are in favour of handing over the property to their daughter-in-law.

Ho – no more number of sample female farmers are in favour of handing over the property to their daughter-in-law.

Ha - more number of sample female farmers are in favour of handing over the property to their daughter-in-law.

From the table 4.2.6.2 we find that value of‘t’ for Views about handing over the property to their daughter-in-law (M) is -6.748, which is negative which is negative and also less than 1.96. This is further confirmed by significance level which are 0.00 and also by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted for it, which says that no more number of sample female farmers are in favour of handing over the property to their daughter-in-law.

4.2.6.15 Inclination of the Views for the Income they get from their Farm

- **Parameter Details**:

Statistics for Views about the income female farmers get from their farm (N), is shown in the Table-4.2.6.1 above. From the table we find that there are 230 valid scores and value of mean for it is 4.47. Standard deviation is 1.725 and standard error of mean is 0.114.

- **Extent of Inclination for their Views**

In table- 4.2.6.20, 9% of the respondent female farmers strongly feel negative (unhappy) about the income they get from their farm. About 28% of them rated 5 for their view and 26% rated it 4. Only 14% rated their view for this question as 6. Only 1% of them strongly feel positive (happy) about the income female farmers get from their farm. Since 76% of the respondents rated their view for this question up to 5. This shows the inclination of the view towards negative side. So, we can say that most of the female farmers are unhappy with the income they get from their farm.

Table - 4.2.6.20 - Degree of answer for the View about the income female farmers get from their farm-Q.6N

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Strong Negative 1**	21	9.1	9.1	9.1
	2	10	4.3	4.3	13.5
	3	19	8.3	8.3	21.7
	4	60	26.1	26.1	47.8
	5	65	28.3	28.3	76.1
	6	33	14.3	14.3	90.4
	7	12	5.2	5.2	95.7
	8	8	3.5	3.5	99.1
	9	2	.9	.9	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area are satisfied with the income they get from their farm.
Ho –no more number of sample female farmers are satisfied with the income they get from their farm.
Ha - more number of sample female farmers are satisfied with the income they get from their farm.

From the table 4.2.6.2 we find that value of‘t’ for views about the income female farmers get from their farm is -4.702, which is negative which is negative and also less than 1.96. This is further confirmed by significance level which are 0.00 and also by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons for null hypothesis to be accepted for it, which says that no more number of sample female farmers are satisfied with the income they get from their farm.

4.2.7 Looking After the Responsibilities of Children at Home by Sample Female Farmers*

- **Representation for the Parameter:**

A, B, C, D in the table represents - Nurturing (A), Health (B), Education (C), Rituals (D).

Table-4.2.7.1-One-Sample Statistics

	N	Mean	Std. deviation	Std. Error Mean
Q.9A	230	2.71	.525	.035
Q.9B	230	2.44	.701	.046
Q.9C	230	1.90	.813	.054
Q.9D	230	1.67	.785	.052

Source: Field Survey

One sample‘t’-test is conducted to test our hypothesis

Table-4.2.7.2-One-Sample Test

	Test Value = 2					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q.9A	20.607	229	.000	.713	.64	.78
Q.9B	9.495	229	.000	.439	.35	.53
Q.9C	-1.946	229	.053	-.104	-.21	.00
Q.9D	-6.465	229	.000	-.335	-.44	-.23

To test the hypothesis for looking after the responsibilities of children at home by farming females of rural area (for points 4.2.7.1 to 4.2.7.4) below, one-sample t-test is conducted. The Mean Difference in table-4.2.7.2 is obtained by subtracting the test value (which is 2 here in this table), from each sample mean. Test statistic 2 represents looking after the responsibilities of children at home by both (male and female). More than 2 mean more female looking after the responsibilities of children at home and less than 2 means more male members look after the responsibilities of children at home.

*“Supplementary Responsibilities of Female Farmers–A Study of Rural Area of Sikkim in North- Eastern India”, Nidhi Dwivedy, Niranjan Upadhyay, AjeyaJha, “International Journal of Research in Social Sciences& Humanities” (IJRSSH) 2012, Vol.No.1, IssueNo.IV,Apr-Jun, ISSN: 2249-4642.

4.2.7.1 Looking After the Nurturing of Children at Home

- **Parameter Details**:

Statistics for looking after the nurturing of children at home (A), by female farmers is shown in the table-4.2.7.1. From the table we find that there are 230 valid scores and a value of mean for them is 2.71. Standard deviation is 0.525 and standard error of mean is 0.035.

- **Frequency of Looking After the Nurturing Of Children at Home (A), by Female Farmers:**

Frequency for looking after the nurturing of children at home (A), shows that 75% of the female farmers perform this responsibility independently. Only 8% males are found fulfilling this responsibility independently. While 49% are found jointly (both male and female) fulfilling this responsibility.

Table-4.2.7.3-Q.9A

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	8	3.5	3.5	3.5
	BOTH	49	21.3	21.3	24.8
	FEMALE	173	75.2	75.2	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area look after the nurturing of children at home.
Ho –no more number of sample female farmers looks after the nurturing of children at home.
Ha - more number of sample female farmers looks after the nurturing of children at home.

From the table 4.2.7.2 we find that confidence intervals lie entirely above 0.0 and also it is positive. The value of‘t’ for looking after the nurturing of children at home (A) is 20.607, which is higher than 1.96, mean difference column for it also shows positive values. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says more number of sample female farmers looks after the nurturing of children at home. Further, we conclude it by saying that significantly more number of sample female farmers on an average looks after the nurturing of children at home.

4.2.7.2 Looking After the Health of Children At Home

- **Parameter Details**:

Statistics for looking after the health of children at home (B), by female farmers is shown in the table-4.2.7.1. From the table we find that there are 230 valid scores and a value of mean for them is 2.44. Standard deviation is 0.701 and standard error of mean is 0.046.

- **Frequency of Looking After the Health of Children At Home (B), by Female Farmers**

Frequency for looking after the health of children at home (B) shows that 56% of the female farmers independently look after this responsibility. Only 12% males are found fulfilling this responsibility independently. While 32% of them are found jointly (male and female) fulfilling this responsibility.

Table-4.2.7.4-Q.9B

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	28	12.2	12.2	12.2
	BOTH	73	31.7	31.7	43.9
	FEMALE	129	56.1	56.1	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area look after the health of children at home.
Ho –no more number of sample female farmers looks after the health of children at home.
Ha - more number of sample female farmers looks after the health of children at home.

From the table 4.2.7.2 we find that confidence intervals lie entirely above 0.0 and also it is positive. The value of ‘t’ for the female farmers for looking after the health of children at home (B) is 9.495, which is higher than 1.96, mean difference column for it also shows positive values. This is further confirmed by significance levels which are 0.00 and also by confidence intervals, both limits of which lie entirely above 0.0 for it. We can safely say that null hypothesis for this view is rejected and thus alternate hypothesis for it is accepted, which says more number of sample female farmers looks after the health of children at home. Further, we conclude it by saying that

significantly more number of sample female farmers on an average looks after the health of children at home.

4.2.7.3 Looking After the Education of Children at Home

- **Parameter Details**:

Statistics for looking after the education of children at home(C), by female farmers is shown in the table-4.2.7.1. From the table we find that there are 230 valid scores and a value of mean for them is 1.90. Standard deviation is 0.813 and standard error of mean is 0.054.

- **Frequency of Looking After the Education of Children at Home(C), by Female Farmers**

Frequency for looking after the education of children at home(C) shows that very less women i.e. only 28% of them are found independently looking after this responsibility. While 39% of males are found fulfilling this responsibility independently and 33% jointly (both male and female).

Table-4.2.7.5-Q.9C

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	90	39.1	39.1	39.1
	BOTH	76	33.0	33.0	72.2
	FEMALE	64	27.8	27.8	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area look after the education of children at home.
Ho –no more number of sample female farmers looks after the education of children at home.
Ha - more number of sample female farmers looks after the education of children at home.

From the table 4.2.7.2 we find that confidence intervals do not lie entirely either above or below 0.0. Its value is positive for one limit and negative for the other limit. For this view, value of‘t’ is -1.946, which is lower than 1.96 but then again significance level is 0.053. But then again if we look at the mean difference, it is negative. The upper limit of the confidence interval is 0 and on the other hand the magnitude of lower limit (negative value) is more than the magnitude of the upper limit (positive value). Consequently, we can safely conclude that looking after the education

of children at home(C) is more inclined towards negative side i.e. more male members look after this responsibility.

4.2.7.4 Looking After the Ritual Ceremonies at Home

- **Parameter Details**:

Statistics for looking after the ritual ceremonies at home (D), by female farmers is shown in the table-4.2.7.1. From the table we find that there are 230 valid scores and a value of mean for them is 1.67. Standard deviation is 0.785 and standard error of mean is 0.052.

- **Frequency of Looking After the Ritual Ceremonies At Home (D), by Female Farmers**

Frequency for looking after the ritual ceremonies at home (D) shows independent male dominance for this responsibility and more than 50% male recording is seen for it. Least independent female involvement (only 20%) for this responsibility is observed. Although they were found fulfilling this responsibility jointly (27%).

Table-4.2.7.6-Q.9D

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	123	53.5	53.5	53.5
	BOTH	62	27.0	27.0	80.4
	FEMALE	45	19.6	19.6	100.0
	Total	230	100.0	100.0	

Source: Field Survey

- **Inferential Analysis**

One sample‘t’-test is conducted to test our hypothesis

Hypothesis Statement – More farming females of rural area look after the rituals ceremonies at home.
Ho –no more number of sample female farmers looks after the ritual ceremonies at home.
Ha - more number of sample female farmers looks after the ritual ceremonies at home.

From the table 4.2.7.2 we find that value of‘t’ for looking after the ritual ceremonies at home (D) is -6.465, which is negative and also less than 1.96. This is further confirmed by significance level which are 0.00 and also by confidence intervals, both limits of which lie entirely below 0.0 for it. Mean difference column for it also shows negative values. Thus there are valid reasons

for null hypothesis to be accepted for it, which says that no more number of sample female farmers looks after the ritual ceremonies at home.

4.2.8 Sample Female Farmers According to Socio- Economic Condition*

Sample farm women according to their socio-economic characteristic have been analysed with SPSS. Cross-tabs tool of descriptive statistics in SPSS, using percentage for cells has been used to analyse for conclusion.

4.2.8.1 Distribution of Sample Farm Women According to their Socio-Economic Characteristic of Sikkim State

In this study the association between socioeconomic factors and participation of 230 women has been evaluated in different farm activities. The composition of sampled farmwomen in different categories of age, education and land holding has been presented in (Table-4.2.8.1). The percentage composition of farmwomen in different categories of age, education and land holding has been presented in Table-4.2.8.2 (Age/Land holding) and Table-4.2.8.3-(Education/Land Possession). Of the total women surveyed 55%, 41% and 04% are of (20-39 yrs), (40-59 yrs) and (> 60 yrs) of age, respectively. The education has been distributed as illiterate, primary, middle, matric and secondary level. The majority of them have studied up to primary level (39%). (21%) are illiterate. 29% are educated up to middle level and 08% and 03% have studied up to matric and secondary level respectively. On the basis of land holding, the percentage of farmwomen in the category of small farmers (<2h a), medium (2-10 ha) and large (> 10 ha) are 64%, 28% and 08% respectively. Out of total respondents, 90% of the farmers are land owners i.e. cultivators and 10% of them are found in possession of the land but not owning it i.e. agriculture labours. As far as gender wise ownership of land holding is concerned 52% are the male owners of the land, 07% are female owners and 41% are holding the joint ownership of the land.

*"Gender Participation in Crop Production and Animal Husbandry & Related Activities in the Rural in North-Eastern India", Nidhi Dwivedy, "Asian Journal of Management" 3(3): July-Sept. 2012, Pp 139-148, ISSN- 0976- 495X.

Table-4.2.8.1-Distribution of farm women according to their socio-economic characteristic of Sikkim State																					
***Character**	**Age**				**Education**						**Size of Land holding**				**Status of Land holding**			**Ownership of Land holding (Gender-wise)**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**1**	**2**	**3**	**4**
Respondents	126	95	09	**230**	48	89	66	19	08	**230**	147	65	18	**230**	207	23	**230**	120	16	94	**230**
Percent(%)	55	41	04	**100**	21	39	29	08	03	**100**	64	28	08	**100**	90	10	**100**	52	07	41	**100**

Source: Field Survey

*** Character:**

Age: - **1**= 20 – 39, **2**= 40 – 59, **3**= 60 and above, **4**= Total**.**
Education: - **1**=Illiterate, **2**=Primary, **3**=Middle, **4**=Matric, **5**=Secondary, **6**=Total.
Size of Land holding: - **1**=Small farmers, **2**=Medium farmers, **3**= Large farmers, **4**=Total**.**
Status of Land holding:- **1**=Land owned, **2**=Land possessed but not owned, **3**=Total**.**
Ownership of Land holding:- (Gender-wise) **1**= Male, **2**= Female, 3= both, **4** Total.

4.2.8.2 Age and Participation in Different Activities

The percentage data in Table 4.2.8.2 for age and participation reveals that 25-45% of sample female farmers for all the categories of age have documented independent participation in sowing, weeding, harvesting, milking and milk disposal. Surprisingly, maximum percentage of respondents in the age bracket of 60 and above has been found participating independently in sowing, winnowing, harvesting, watering, milking, milk disposal and traditional care of fields/crops. The reason reported for that was-getting more time in doing these activities since they do not have their children's obligation as they have either settled down in their own lives or have gone to cities to exploit good avenues of earning money, hence, these activities make them busy. Besides, as most of them are small land owners, so, economic compulsion is also the reason behind their participation. Moreover, in the same category independent male participation is non-existent for all these activities including feeding of animals (barring milk disposal).Whereas for rest of the two categories (20–39 and 40-59), independent male participation in the activities of sowing, harvesting, feeding, watering and milk disposal has recorded a very meagre percentage. Furthermore, data shows the joint participation of the respondents (more than 50%) in these activities for all categories of ages.

Table-4.2.8.2-Percentage participation of sample female farmers in Farm/Animal and related activities according to their socio-economic condition (Age / Land holding) at selected sites of Sikkim state

Farm and related activities	Age group									Land holding								
	20–39			40-59			60 and above			Small farmer			Medium farmer			Large farmer		
	M	F	B	M	F	B	M	F	B	M	F	B	M	F	B	M	F	B
Ploughing of Fields	75	0	25	70	0	30	44	0	56	75	0	25	66	0	34	66	0	34
Sowing of seeds	02	36	62	02	43	55	00	56	44	02	39	59	01	43	56	06	33	61
Weeding	13	31	56	10	27	63	11	33	56	14	30	56	06	32	62	11	11	78
Harvesting	05	32	63	04	26	70	00	44	56	03	33	64	05	26	69	11	17	72
Threshing	18	18	64	20	22	58	22	11	67	19	21	60	20	19	61	11	11	78
Winnowing	20	25	55	29	28	43	0	44	56	26	26	48	17	28	55	28	22	50
Storage of grains/fodder	26	13	61	29	19	52	11	11	78	29	14	57	25	23	52	17	0	83
Collection of fuel from fields / forest	24	12	64	28	18	54	22	11	67	28	14	58	28	15	57	0	11	89
Procurement of feed/ fodder from the market	35	14	51	36	12	52	22	11	67	37	16	48	34	12	54	22	0	78
Cleaning of the animals and their shed	23	09	68	31	04	65	44	12	44	24	07	69	32	08	60	33	0	67
Feeding of animals	03	22	75	09	17	74	0	11	89	04	22	74	08	17	75	11	06	83
Watering	06	28	66	13	23	64	0	44	56	06	29	65	14	23	63	06	22	72
getting green fodder from fields / forest	19	20	61	27	27	46	33	11	56	20	22	58	28	25	48	33	17	50
Milking	15	26	59	19	27	54	0	33	67	14	30	56	25	25	51	06	11	83
Milk disposal	13	37	50	07	33	60	11	33	56	12	37	51	09	34	57	06	22	72
Traditional health care to animals	39	11	50	41	11	48	44	12	44	42	12	46	38	11	51	33	0	67
Vaccination and visits to animal hospitals	70	0	30	74	0	26	67	0	33	73	0	27	71	0	29	61	0	39
Breeding of animals	71	0	29	64	01	35	67	0	33	73	0	27	65	01	34	39	0	61
Traditional care of fields and crops	21	09	70	18	07	75	0	33	67	20	12	68	20	08	72	06	0	94

Source: Field Survey

4.2.8.3 Land Holding and Participation in Different Activities

On the basis of size of land holding, the percentage data of sample farmers at selected sites of Sikkim State in Table 4.2.8.2 above shows joint participation of large farm women in all the activities except for ploughing and vaccination/visits to animal hospitals, in which male dominance has been noticed. Not even a single large farmwomen has been found participating independently in activities like storage of grains and fodder, cleaning of the animals/shed and traditional health care to animals. Most of them are totally dependent upon landless labourers for such works, who, in return generate some extra resources by working for large farmers. Equal/al-most equal percentage of small and marginal farm women have been found participating in weed-ing, threshing, winnowing, collection of fodder/fuel, cleaning of the animals/shed, milk disposal, traditional health care to animals mainly to save money being spent hiring labour.

On the basis of type of land possession attribute (own/not own) in Table-4.2.8.3 below, the percentage data of sample farmers at selected sites of Sikkim State shows that relatively more percentage of landless to land owned female sample farmers independently participating in farm and animal husbandry activities like sowing of seeds, weeding, harvesting, collection of fodder/fuel, procurement of feed and fodder from the market, cleaning of the animals/shed, feeding of animals, watering. In activities like cleaning of the animals/shed, feeding of animals, watering, getting green fodder from fields / forest / community land, care of fields/crops and harvesting, more percentage of landless female sample farmers (more than 50%) has been observed jointly involving in such activities. In the category of landless female sample farmers (almost 50% or more), more percentage of independent male dominance has been noticed in activities like ploughing, threshing, winnowing, storage of grains and fodder, collection of fodder/fuel, procurement of feed and fodder from the market, milking, vaccination/visits to animal hospitals and breeding of animals for these farmers.

On the other hand relatively more percentage of land owners to landless female sample farmers has been observed independently participating in activities like threshing, winnowing, storage of grains and fodder, getting green fodder from fields / forest / community land, milking, milk disposal, traditional health care to animals. Independent male dominance was discovered in ploughing, vaccination/visits to animal hospitals and breeding of animals for this category of female farmers (almost 50% or more). In rest of the activities, joint involvement of both the genders was observed for land owned female sample farmers (more than 50%).

Table-4.2.8.3-Percentage participation of sample female farmers in Farm/Animal and related activities according to their socio-economic condition (Education/Land Possession) at selected sites of Sikkim state

Farm and related activities	Education level															Land Possession					
	Illiterate			Primary			Middle			Matric			Secondary			Own			Not Own		
	M	F	B	M	F	B	M	F	B	M	F	B	M	F	B	M	F	B	M	F	B
Ploughing of Fields	81	0	19	64	0	36	74	0	26	68	0	32	100	0	0	70	0	30	91	0	09
Sowing of seeds	0	52	48	04	35	61	02	42	56	0	32	68	0	12	88	02	38	60	04	57	39
Weeding	13	33	54	15	30	55	05	27	68	10	21	69	12	37	51	10	28	62	22	39	39
Harvesting	04	29	67	07	28	65	02	27	31	0	47	53	12	25	63	04	29	67	09	35	56
Threshing	25	25	50	19	18	63	15	18	67	13	24	63	25	0	75	16	20	64	39	13	48
Winnowing	31	27	42	24	25	51	15	24	61	21	26	53	37	50	13	20	28	52	52	09	39
Storage of grains and fodder	33	08	59	27	19	54	22	14	64	21	21	58	37	13	50	25	16	59	48	09	43
Collection of fodder/fuel	23	15	62	30	15	55	22	14	64	26	16	58	12	12	76	24	13	63	44	26	30
Procurement of	42	19	40	44	10	46	24	15	61	16	16	68	25	0	75	33	13	54	48	22	30

feed and fodder from the market																					
Cleaning of the animals/shed	35	04	61	25	09	66	17	08	75	42	0	58	50	12	38	28	06	66	22	13	65
Feeding of animals	06	21	73	06	21	73	03	21	76	11	05	84	12	12	76	06	19	75	04	26	70
Watering	21	33	46	05	30	65	08	20	72	05	16	79	0	25	75	08	26	66	08	35	57
getting green fodder from fields / forest / community land	42	23	35	17	25	58	20	23	57	26	21	53	0	0	100	23	23	54	26	18	56
Milking	23	23	54	15	29	56	14	26	60	10	37	53	25	12	63	12	28	60	57	17	26
Milk disposal	08	44	48	14	33	53	08	32	60	05	37	58	12	25	63	08	36	56	30	26	44
Traditional health care to animals	42	14	44	47	11	42	35	08	57	10	16	74	63	0	37	39	11	50	48	08	44
Vaccination/visits to animal hospi-tals	88	0	12	72	0	28	62	0	38	63	0	37	62	0	38	70	0	30	87	0	13
Breeding of animals	73	0	27	68	0	32	62	01	37	63	0	37	100	0	0	66	01	33	87	0	13
Care of fields/crops	17	17	66	25	05	70	14	09	77	16	16	68	12	0	88	18	09	73	22	13	65

Source: Field Survey

4.2.8.4 Education and Participation in Different Activities

Data presented in Table 4.2.8.3 above, indicates that there is a strong impact of education level on laborious farm and animal related activities. Comparatively more percentage of Illiterate farm women has been noticed, participating in these of activities.

On the basis of education, the percentage data of sample farmers at selected sites of Sikkim State shows independent female participation in sowing, harvesting, weeding, threshing, winnowing, collection of fodder/fuel, milking and milk disposal for all education level. But, maximum per-centage of illiterate female respondent was found participating in sowing (52%), milk disposal (44%), threshing (25%), secondary level educated was found in winnowing (50%), weed-ing (37%), matric level educated was found in harvesting (47%), milking (37%). The least per-centage of sample farmers at secondary level was noticed participating in all above mentioned activities except for winnowing and weeding, for which least was found at matric level. Secondary level female farmers were located jointly participating in rest of the activities. Almost same percentage at all education level was noticed for collection of fodder/ fuel. Very interestingly, negligible or almost trifling male percentage was observed for all these activities. Women get better chances for making decision also in these activities. Male dominance has been noticed so

overriding for vaccination/visits to animal hospitals; breeding of animals and ploughing at all level of education that joint participation also did not show very significant percentage for these activities, even showed nil percentage at secondary level.

4.2.9 Traditional Knowledge in Plants, Agriculture and Its Related Activities and Its by Female Farmers of Sikkim*

The researcher tried to extract some knowledge the sample female farmers are possessing related to plants, its usage and the management of different agriculture/animal related activities/practices. The information was further verified by crosschecking and validated by the common response from the other village farmers (people) on same species treatment.

The researcher noticed that the sample female farmers, who possess the knowledge and usage of the plants, have grown it in their vicinity, so that they can use it whenever required.


Figure 1


Figure 2


Figure 3


Figure 4


Figure 5


Figure 6


Figure7


Figure 8


Figure9

1 **Bui-champa** (local language) Root of this plant, which looks like potato, is used to cure the fracture (both animals and human). Paste made by leaves and bulbs are applied to bone fractures and bandage is made with the help of bamboo strips.

2 **Abhijal plant** (local language) used to cure sinusitis and pneumonia and diarrhoea of infants. For sinusitis, take handful of it, crush it a bit, wrap it in any big leaf, heat it and put the heated crushed plant in a thin cotton cloth. Inhale the steamed air by holding it in both the hands. For pneumonia and diarrhoea in infants, crush the stem as well as the leaves. Take out juice of it and give 2-3 drops thrice a day.

3 **Bhang** A very common plant and is used to treat gastric and dysentery problems of animals. The matured plant is used to treat above mentioned disease. A handful of chopped plant is boiled in water and is given to the animals.

*"Traditional knowledge in plants, agriculture/related activities and its management/practices by female farmers of Sikkim", Nidhi Dwivedy, "International Journal of Multidisciplinary Research"Vol.2 Issue 8, August 2012, Pp.43-58, ISSN 2231-5780.

4 **Banmara grass (**local language). It is a good anti-septic as well as anti-biotic. The substance which comes out of it after plucking, it stops bleeding immediately. To treat cuts and wounds, leaves and stems are crushed, and the juice is applied over the effected part 2-3 times.

5 **(Bojo plant) and** 6**. (Root of bojo plant)** A handful of chopped bhang and bojo plant is boiled in water. Once it cools down, lemon juice and honey is mixed in it. This mixture is given to treat the animals when they fall sick with fever. Roots are chewed to cure cough.

7 **Chirowto plant** - A handful of dried and chopped Chirowto plant is boiled in water. Once it cools down, is given to the animals when they are down with fever. The root of the plant is useful in checking hiccups. The powdered whole plant is used as a drug for chronic fevers, skin diseases, intestinal worms, bronchial asthma and loss of appetite.

8 and 9 **Iskus** –Figure 8 shows the vegetable which is cooked. Root of this plant which looks and tastes like potato is also cooked. But figure 9 shows the tip of this creeper. This portion of Iskus are cooked and eaten to cure anemia.





Figure 10 **Figure 11** **Figure 12** **Figure 13** **Figure 14**

10 Leaves and shoots of **Sisnoo** plant are cooked as vegetable/ can be taken as a soup also and taken in case of low blood pressure.

11 **Tethaypathay** (local language). It means bitter leaves in Nepali language. Most of the communities of the South Asian region and hilly areas use it as a herb for many kinds of diseases. It is used as a cleansing agent. It is believed a good room freshener as well as help in sterilizing the room. It is crushed properly and is put in the bucket of water. With this water the floor is mopped. The herb is boiled in water for few minutes and left to cool down and is also used as a drink with the belief that it washes away all the dirt or diseases inside the body. If anybody in the house is suffering from infectious disease like chicken pox, it is used to disinfect

the house. It is also used for purification of the atmosphere of the house before any holy act of worshipping. It is also used as a paste for any cuts or bruises. The leaves of the plant are crushed properly and then juice is extracted. These drops are also reported using as a medicine to check excess nose bleeding. So this herb has a very important value in the communities.

(12and13)**Binajari** plant is crushed to extract the juice of it and one table spoon is mixed with one cup of water and filtered through a thin cloth piece, and taken early in the morning before breakfast for one week to cure jaundice.

14 **Gundruk -** It is particularly popular among Nepali community and the production is carried out at the household level. Ladies are involved in its preparation when made on a small scale. But when made on a large scale, male members are involved in the preparation. It is a traditional fermented vegetable products prepared during winter when fresh perishable vegetable is in plenty. It is a fermented product of leafy vegetable such as Rayo sag (Brasicca rapa spp. campestris variety cuneifolia), Toriko Sag (leaves of mustard), Mulako Sag (radish leaf) and Banda kopi (cauliflower) to produce a sour brownish black product. It is an important source of minerals particularly during the off-season in rural areas when the diet consists of mostly starchy tubers and maize which tend to be low in minerals. In the months of October and November, large quantities of leaves accumulate – much more than can be consumed fresh. These leaves are allowed to wilt for one or two days and then shredded with a knife or sickle. The shredded leaves and chopped radish are first put in warm water at about 30°. Afterwards it is taken out, squeezed nicely and tightly packed in earthenware. The mouth of the pot is then sealed and kept in a warm place. After few days/one month, a mild acidic taste indicates the end of fermentation and the gundruk is removed and dried, traditionally under the sun. But, the process for making it on a large scale is – the pit hole is dug and fire is burnt inside it to make the walls of it harder. Later, big leaves of bamboo are placed along the hardened walls of the pit. Subsequently, same method is followed with the stock of leaves as above. The top is covered with big bamboo leaves. Subse-quently pit is covered with wooden planks and top of the pit is sealed properly and left for its fermentation. The quality attributes to Gundruk basically depends upon the typical flavour and sour-acidic taste which is developed during natural fermentation by lactic acid bacteria, mainly spp. of Lactobacillus and Pediococcus. The ambient temperature at the time of fermentation should be about 18°C. Once processed, the dried gundruk can be kept in airtight containers for several months. It is a good appetizer due to high content of lactic and acetic acid developed during fermentation.

Figure 15 **Figure 16** **Figure 17** **Figure18** **Figure 19** **Figure 20**

15 **Dhikuti** (local language) - It means place/enclosure to store food. Enclosure like this is made up with wood. Paddy is stored in this. They have put their (Kul Dewata) in it. People offer the produce to their God first and then install it in the produce believing that by doing this; it will help in keeping the enclosure full always.

(16and17)**Dhikuti** (local language) – Another form of Dhikuti. This enclosure is made up with bamboo strips. Paddy is stored in this. On the top of it they have placed a few eggs and corn cobs. The superstition behind this is that it saves the produce from any bad intuition of anybody.

18 The food which is stored in the basket is called **kodo** (local language). It is very protein rich food and is used both for humans and for poultry. People eat it in the form of chapatti also.

19 After harvesting paddy is stored along with the straw in this type of temporary enclosure made up of straw to protect it from rains. Threshing will be done after-wards during their free time.

20 The way Sikkim people store the rice straw which is used as dry fodder during lean season.

Figure 21 **Figure 22** **Figure 23** **Figure 24** **Figure 25** **Figure 26**

21 Male members are busy in cutting the trees and chopping them into small pieces but making the bundles of 05-06 of such pieces of woods and carrying them in the baskets to the place of storage is done by females.

22 - The way people store wood which is used for cooking, making concentrate for animal on fire, de- moisturizing cardamom pods and for the winters.

23 - The stored wood is getting used by people for making concentrate for animal and for cooking.

24 - To make the wood ready for cooking, one lot of it is placed on the shelf above the firing place and once it is dried up, it is used and is replaced by the new lot.

25 - Corn-cobs are stored in the kitchen and get dried up both with the heat of the roof as well as of the fire place.

26 - This is the way they de-moisturize their cardamom pods. Cardamom pods are kept on the gauge above this structure. Fire is lit below it. When the pod starts splitting with the heat, cardamom is taken out of it and is dried up to make it ready for selling.





Figure 27 **Figure 28** **Figure 29** **Figure 30** **Figure 31**

27 **Nepeer grass** (local language) is also given to increase the milk.

28 **Dhonda grass** (local language) given to milch animals to increase the milk.

29 **Pipla** (local language)-It helps stimulate the appetite and it dispels gas from the intestines. It is most commonly used to treat respiratory infections such as stomach-ache, bron-chitis, diseases of the spleen, cough, tumours and asthma.

30 Green fodder is carried by an elderly lady in a basket for the livestock.

31 Nepeer grass, Dhonda grass, Pipla (leaves and soft stems) and Abhijal. All these things are mixed and are given to milch animals to increase the milk and to treat minor stom-ach related ailments. It is not kept directly on the ground because moisture in the weather spoils it. So, is kept on the bed made up of bamboo which is fixed in the slanting position with the wall.

Figure 32 **Figure 33** **Figure 34** **Figure 35** **Figure 36**

32 Shed for cows. On the top of it, shed is made to store the dry corn straw as well as dry corn cobs, which is used as fodder. Corn is used here as feed for cow as well as for poultry.

33 Place to store fodder and corn cob for animals. It is built on the top of the shed where animals are kept.

34 Porch is made to keep goats. They are reared for commercial purpose. A fully grown up goat fetches them Rs. 250-260/Kg.

(35and 36) Sty for pigs. They rear them to augment the income. People get baby pigs for 1,000 rupees or so and dispose them off when they grow in size say about 160-170 Kg. in 5-6 months and get good return (120-130 rupees per Kg.)

Figure 37 **Figure 38** **Figure 39** **Figure 40** **Figure 41**

(37and 38) Women farmer members of different S.H.G.s of Kadamtam village in Nanchaybong block of East Sikkim standing on their respective counters and selling own farm grown vegetables.

39. Women farmers are selling their farm home grown vegetables.

40 Male farmer is ploughing the field.

41 Women farmer is getting questioned for her participation in farm and related activities.





Figure 42 **Figure 43** **Figure 44** **Figure 45** **Figure 46**

(42 and 43) Farms which are left uncultivated. In some cases the reason for it is-the land is taken over by some company for some project, in some cases-the owner does not stay on the land, in some cases-it is family land dispute and they are on the lookout for a trustworthy person to whom they can give the land on 'Adhia'.

(44, 45and46) **Water of 'Dhara** - means spring water' is getting channeled into both the sides to fields. Under the road, it is crossing over to the other sides and by the road side water channel is made till farms. Figure 45 shows the water of this Dhara flowing over to the other side of the road. Next this water is supplied to farms through these channels (shown in figure 46).




Figure 47 **Figure 48** **Figure 49** **Figures 50**



Figure 51 **Figure 52** **Figure 53** **Figure 54**

(47 – 54) Work done by them. MGNAREGA members of Sama Savik village of East District– Pucca road, House for poorest of the poor members, Water tank.

- **Some more management/practices of different agriculture/animal related activities the sample female farmers adopt:**

1. To keep animals healthy, a mixture of meat juice, corn flour and salt is given to them.
2. A mixture of kakara leaves, Gundruk and Corn bhus is given to the animals when they fall sick with fever.

3. For animal's wellbeing, they are given every alternate day a mixture of Tethaypathy, egg and honey.
4. Dalley chilly plant is chopped off from the top to make the plant grow thickly. Then the juice of meat is put in the root to get good produce of it.
5. Cardamom and lemon grass is boiled in water. To treat lai problem of the plant, this solution is sprayed on the plants as well as put in the roots of it.
6. A mixture of manure and wood ash is put near the roots after digging it to have good growth of it.
7. A bottle's lid full of cow's urine mixed in one litre of water helps in killing ants of soil when sprayed on the affected land and is a good spray also for plant disease.
8. To store seeds they make a thick layer with a mixture of cow's urine and dung in the internal as well as the external side of the bamboo enclosure to protect the seeds from insects, ants and the seepage.
9. Farmers in the State use compost in the fields made up of animal and bio degradable waste. Farmers do not dig compost pits for the collection of cow dung, residues and garbage as is the practice prevalent in plains for compost making. Instead of pits they accumu-late the matter in heaps in the open for decomposition. The reason behind it is that decomposition is slow due to low temperature and little sunshine. In pits compost would not get ready in time. In the open rapid decomposition takes place. This practice is traditional but has a scientific basis.

4.2.10 Integrated Low Investment Rain-Water Harvesting*

India is endowed with unique wheat germplasm (collection of genetic resources for an organism. For plants, the germplasm may be stored as a seed collection) capable of yielding satisfactorily under sub-optimally higher temperatures. The wheat varieties grown in the central and southern parts of the country carry genetic potential for tolerating usually higher temperatures prevalent in these areas during wheat growing season especially at grain filling stage. Therefore, these materials offer scope for improving varieties with respect to heat tolerance for cultivation in other parts of the country also. It has been conclusively shown that biomass production is a key factor in high grain yield performance under late sown high temperature environments (Singh and Singh, 2010).

*"Suggestions for Female Farmer's Areas of Gainful Employment-A study of Rural Area of Sikkim in North- Eastern India", Nidhi Dwivedy, "Research Journal of Humanities and Social Sciences" 3(3): July-September, 2012, Pp 304-315, ISSN 0975 – 6795.

To remove the problem of food security, low investment but high productive rain water harvesting in dry land is recommended and shown in the model as well as in the flow diagram. For this purpose, drought and pest resistant native crops which require less water can be grown in the farms. Azolla (that will thrive with very little care) can be grown in the farms along with paddy cultivation. In addition, rain water can be harnessed for storage in reservoirs through Rooftop Rain Water Harvesting and also in ponds. Azolla can also be grown in these ponds. Azolla grows very quickly in ponds and buckets, and it makes an excellent fertilizer (green manure) and garden mulch. In these ponds fish can be grown. Apparently fish and shrimp relish the Azolla. In fact, Azolla was grown for fish food and water purification at the Biosphere II project in Arizona (a 2.5 acre glass enclosure simulating an outer space greenhouse). Azolla has reportedly been used as a feed for pigs and ducks in South East Asia; for cattle, fish and poultry in Vietnam; and for pigs in Singapore and Taiwan. It is described as an excellent substitute for green forage for cattle in Vietnam and may replace up to 50% of the rice bran used as feed for pigs in that country (Azolla spp., website). Azolla is very useful feed for cattle as well as for poultry, as it increases the milk yield in cattle and egg laying in chicken. Azolla is rich in proteins, essential amino acids, vitamins and minerals. Studies describe feeding azolla to dairy cattle, pigs, ducks, and chickens, with reported increases in milk production, weight of broiler chickens and egg production of layers, as compared to conventional feed. One FAO study describes how azolla integrates into a tropical biomass agricultural system, reducing the need for inputs (T.R. Preston and E. Murgueitio, 2008, Wikipedia). Azolla cannot survive in winters with prolonged freezing, so is often grown as an ornamental plant at high latitudes where it cannot establish itself firmly enough to become a weed. It can prove to be very useful farming system in populated countries like India as it requires more man-power being labour-intensive farming systems. Women can be gainfully employed in this type of farming system.

Plants need nitrogen, phosphorus, and potassium, as well as micronutrients and symbiotic relationships with fungi and other organisms to flourish, but getting enough nitrogen, and particularly synchronization so that plants get enough nitrogen at the right time (when plants need it most), is likely the greatest challenge for organic farmers(Watson CA,2002). Azolla is very useful for refuting this challenge in the farms as it fixes nitrogen from the atmosphere which is very essential nutrient for plants, giving the plant access to the essential nutrient. This has led to the plant being dubbed a "super-plant", as it can readily colonies areas of freshwater, and grow at great speed. Some species can double their biomass in three days under optimal

environmental conditions. The nitrogen-fixing capability of Azolla has led to it being widely used as a bio fertilizer, especially in parts of Southeast Asia. Indeed, the plant has been used to bolster agricultural productivity in China for over a thousand years. When rice paddies are flooded in the spring, they can be inoculated with Azolla, which then quickly multiplies to cover the water, suppressing weeds. The rotting plant material releases nitrogen to the rice plants, providing up to nine tones of protein per hectare per year (Azolla spp., website). Azolla are also serious weeds in many parts of the world, entirely covering some bodies of water. It acts as an additional benefit to its role as a paddy bio fertilizer. Azolla has been used to control mosquito larvae in rice fields. The myth that no mosquito can penetrate the coating of fern to lay its eggs in the water gives the plant its common name "mosquito fern"(Mosquito Fern, website). The plant grows in a thick mat on the surface of the water, reducing the rate at which oxygen dissolves into the water, effectively choking the larvae (Okech, Bernard A. et. al., 2008). **If these fern colonies cover the surface of the water, then oxygen depletions and fish kills can occur. These plants should be controlled before they cover the entire surface of the pond.**

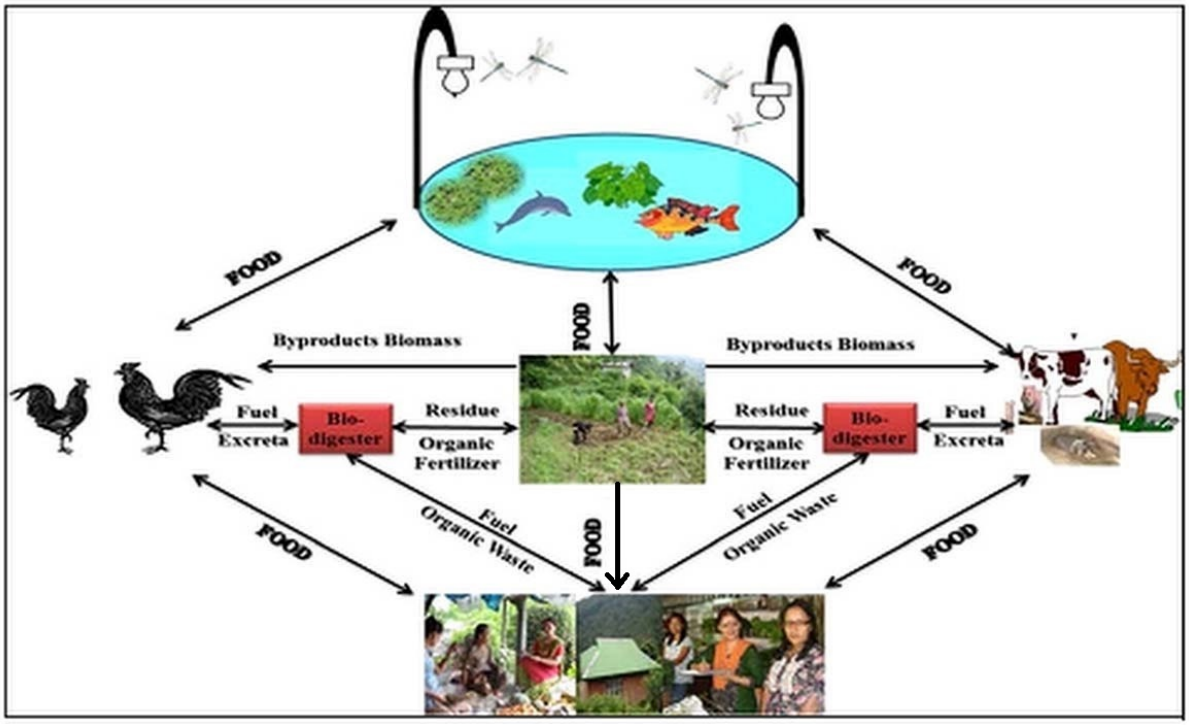
By lighting bulbs around the pond, serves as an insect trap, attract insects which fell into pond can be consumed by fishes. Even bird's droppings fell into water also serve as food for fishes. The pellets of poultry/goat/sheep shed also become food for them. Feeding types among fishes range from predatory gulpers to sifters of organic materials in mud, to zooplankton (very small animals) feeders and to herbivores that eat algae or phytoplankton (very small plants) or even leafy plants. The rationale of poly-culture is the selection of compatible species with different feeding habits. In addition, as fish learn to feed on almost anything, it is relatively easy to develop pelleted foods for fish culture, dietary quality considerations aside. At the same time, such feeding habits permit the use of plant materials, especially cheap or nearly valueless crop residues. All sorts of other wastes, even sludge, can be fed to fish (Kerns and Roelofs 1977; Viola 1977; Bayne et al 1976) with very low conversion efficiencies, but presumably favoring cheap production costs.

Fruit trees can be grown on the borderline of the farms. This not only provides economic returns to the farmers but also helps in checking soil erosion of the agriculture land. The dried fallen leaves of the trees spread on land serve as effective mulches; it can help in preventing evaporation, thus retaining moisture of the soil. It also serves as shelter for earthworms which help in vermicomposting thus retaining the fertility of the soil and also act as effective weed suppressor. Most importantly it helps in mitigating the impact of climatic change and sustaining agriculture. Mixed farms with both livestock and crops can operate as ley farms, whereby the land gathers fertility through growing nitrogen-fixing plants such as azolla and grows crops or

cereals when fertility is established. Farms without livestock ("stockless") may find it more difficult to maintain fertility, and may rely more on external inputs such as imported manure.

Biological research on soil and soil organisms has proven beneficial to organic farming. Varieties of bacteria and fungi break down chemicals, plant matter and animal waste into productive soil nutrients. In turn, they produce benefits of healthier yields and more productive soil for future crops (Ingram M., 2007). Fields with less or no manure display significantly lower yields, due to decreased soil microbe community (Fließbach et al., 2006). The adoption of these multiple cropping systems rather than mono cropping system by farmers helps a long way in making them economically viable and environment friendly.

After going through the literature, a model and a flow diagram has been made



Model of Integrated Dry land Commercial Farming by Rainwater Harvesting

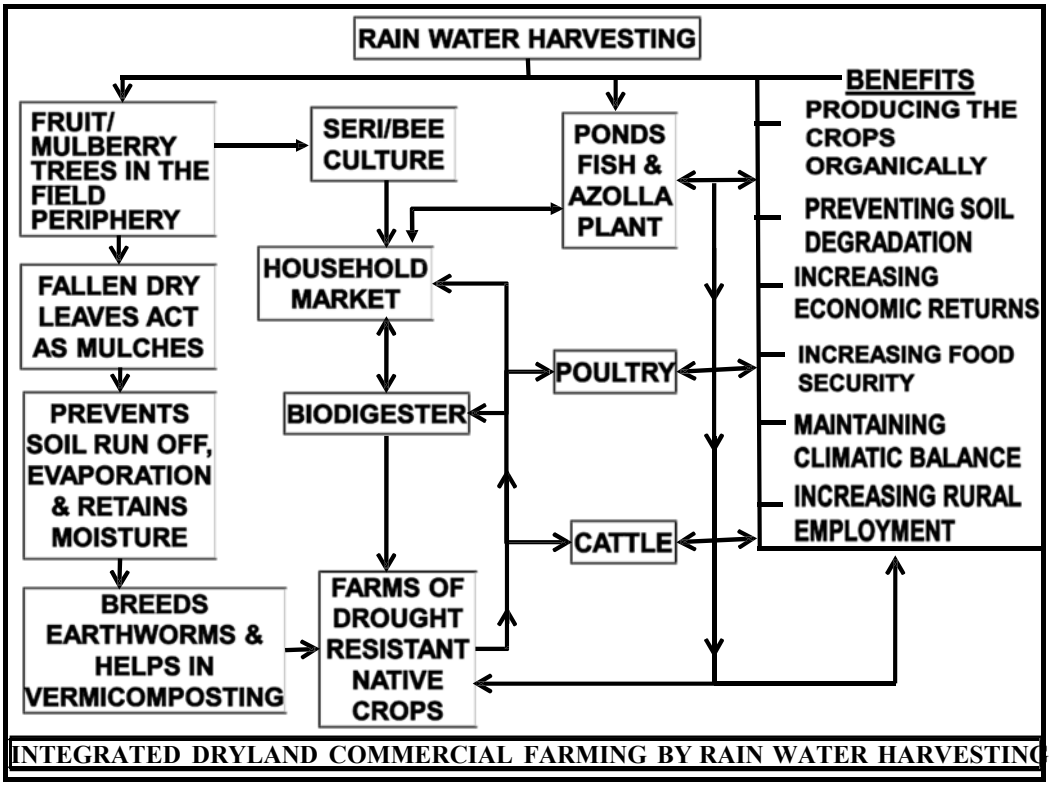
4.2.10.1 Efficient Integrated Farming

For integrated farming to give good results, it is suggested and shown in the model above that cropping system should be such which uses efficiently solar energy giving maximum biomass and also efficient in fixing carbon dioxide into biomass and also require minimum inorganic

input. It should be accompanied by forage tree and integrated by domestic livestock which use local resources. Low cost biodigesters are recommended at the place of integrated farming. Though there are lots many biodigesters available in the market, but the installation and performance of low-cost polyethylene tube biodigesters on small-scale farms can be accessible at (Bui Xuan An et. al., website). This is particularly important at the places where deforestation activities happen for household fuel. Biogas produced through biodigesters at the place of Integrated Farming is helpful in using as a fuel at homes, to light bulbs in markets place, cow/ poultry sheds/fish ponds.

- **Flow diagram of Integrated Dry land Commercial Farming by Rainwater Harvesting**

Integrated farming has been explained in the flow diagram also below. It shows that farms of drought resistant native crops should be accompanied by fruit/mulberry trees in the field periphery which will help in seri/bee culture. It should be complemented by ponds of fish & azolla plant, poultry and cattle. Biodigester are greatly recommended at the place of such type of integrated farming. The benefits of this type of integrated dry land commercial farming by rainwater harvesting are given below:-



4.2.10.2 Advantages of the Model as well as the flow diagram given above

4.2.10.2.1 Bio Digester Helps in Reducing Greenhouse Effect

Accumulation principally of carbon dioxide and methane are the major causes of the warming of the earth's atmosphere. Though fossil-fuel based industrial development is the major cause of the environmental imbalance; but, agricultural practices based on the most modern inorganic production technologies are also adding to greenhouse gases. Since bio digester uses substances like cattle and human organic waste which emit methane and crop residue which emit carbon dioxide on burning/decaying, it helps in preventing carbon dioxide and methane from spreading into the atmosphere directly. Thus, this system helps in reversing the greenhouse effect by utilizing the resources which are provided by the nature (like biomass, animal and human organic waste) and also are combined sources of fuel and feed which helps in reducing the dependency on fossil fuels and chemical fertilizers.

Organic agriculture helps in mitigating and even reverses the effects of climate change. Organic agriculture decreases fossil fuel consumption and sequesters carbon in the atmosphere. The elimination of synthetic nitrogen in organic systems decreases fossil fuel consumption by 33 percent and carbon sequestration takes CO2 out of the atmosphere by putting it in the soil in the form of organic matter which is often lost in conventionally managed soils. Carbon sequestration occurs at especially high levels in organic no-till managed soil (LaSalle et. al.2008). Agriculture has been undervalued and underestimated as a means to combat global climate change. Soil carbon data show that regenerative organic agricultural practices are among the most effective strategies for mitigating CO2emissions (LaSalle et. al.2008).

4.2.10.2.2 It Helps in Producing the Goods Organically

"Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved." (IFOAM, Websites)

Organic farming is the form of agriculture that relies on techniques such as crop rotation, green manure, compost and biological pest control to maintain soil productivity and control pests on a farm. Organic farming excludes or strictly limits the use of manufactured fertilizers, pesticides (which include herbicides, insecticides and fungicides), plant growth regulators such as hormones, livestock antibiotics, food additives, and genetically modified organisms.

The model and the flow diagram given above will help in producing the goods organically.

4.2.10.2.3 It Helps in Increasing the Crop Yield in a Unit Area in a Sustainable Way

Sustainable agriculture is the method of doing agriculture which integrates three main goals, environmental health, economic profitability, and social and economic equity. These are broadly the goals which have been defined by a variety of philosophies, policies and practices, from the vision of farmers and consumers. But the perspectives and approaches may diverse.

Agriculture in India has got transformed from subsistence farming till late 1960's to commercial farming since early 1980's. But during the initial decade of the adoption of green revolution, chemical fertilizer was used heavily to increase the production which is not sustainable. Presently, though the use of it has been reduced but efforts are on to eliminate it completely to ensure sustainability. During the periods 1950-2010 agriculture production especially food grain production has increased from 50 M tons to 220 M tons. It was possible only with the adoption of new technology (Kumaraswamy and Khan, 2010). Along with it, research and development activities also contributed a lot to increase yields and decrease inputs so that smaller land area can also generate more returns. It also helped India in achieving self-sufficiency level. But, the population which is expected to reach 1.8 billion in 2050 and demand for food is increasing con-tinuously with increase in human and animal population and arable land which is continuously decreasing with the commercial use of land (Kumar Ananda P., 2010). Also raising the produce organically is very important for sustainable agriculture. So, the need of the hour is to maximize crop production in a unit area in a sustainable way at reasonably low cost without undue exploitation of natural resources, through proper soil and water conservation measures and by adopting appropriate integrated soil management practices.

Scientific Review by Cornell University into a 22 year-long Field Study has shown the following results (Pimental et al 2005):

a) The improved soil allowed the organic land to generate yields equal to or greater than the conventional crops after 5 years.

b) The conventional crops collapsed during drought years.

c) The organic crops fluctuated only slightly during drought years, due to greater water holding capacity in the enriched soil.

d) The organic crops used 30% less fossil energy inputs than the conventional crops.

e) Although labour inputs average about 15% higher in organic farming systems (ranging from 7% to 75% higher), they are more evenly distributed over the year in organic farming systems than in conventional production systems.

The model which has been given above helps in sustainable agriculture.

4.2.10.2.4 It can be helpful in tackling Solid Waste Management and Deforestation Problems

As is discussed in the section 2.1.1.1.7 of chapter II, solid waste collection in the inaccessible houses and in the outlying areas, which are very much urban but are, not covered under the jurisdiction of notified town area, is a pressing problem of the state. It is also depicted in the table 2.7 that though the percentage figures of use of fire-wood for cooking as a total in the State have registered a decrease in the decade, but the same has shown an increase in the urban and only a marginal decrease in the rural area. This is a clear indication of deforestation activity, though it is banned in the State. Therefore, if converting biodegradable solid waste into fuel through the use of bio digester can be taught to such inaccessible lot by the agriculture department, then this model can be proved useful in tackling solid waste management and deforestation problems.

4.2.10.2.5 It Justifies Farm Mechanization

In the modern age talking of non-mechanization will be unjustifiable even if any country is over-populated or the area is hilly. Also, it is increasingly very difficult and expensive to rear animals especially bullocks even in the rural areas by resource poor farmers. There are no common resources available any longer such as common forests or grazing lands so farmers have to go for confined feeding that means higher costs hence it is not feasible at all. Hence animal husbandry is no longer feasible option for ploughing. With

the above model along with mechanization, one can go for animal husbandry also. But, finding the alternate ways for the displaced labour in case of mechanization and also operating the machine optimally is a very important. The study of (Mishra and Sundram, 1975) compared the cost of harvester combine with other alternative technologies and found it to be unprofitable unless farmers take third crop in a year. The study also assessed the cost and benefits of harvester combines. It was estimated that the use of harvester combine resulted in saving of about 15 man-days of unskilled labour per acre. The labour displaced by this can be absorbed in meeting the demands of more unskilled labour which is required at the place of integrated farming. It is of utmost importance to examine whether the use of machines has been economical or not. Since integrated farming shows good results with multiple cropping rather than mono cropping, so, it justifies farm mechanization. On the basis of a study covering 203 farmers having 218 tractors in different districts of Punjab (Singh and Jindal, 1993) it was brought out that the total use of the tractor, which on an average came out 397 hours per annum is much less than the possible extent of 1000 hours. The cost per hour turned out to be very high due to high fixed cost, which can be reduced by increasing the hours of working of the tractor. If it finds work for 600 or more hours per annum, the cost per hour can be lowered significantly.

The overall average cost/hour, which was Rs.103.04 by its existing quantum of work i.e. 397 hours declines to Rs.91.77, Rs.86.26 and Rs.82.97 by working per 600, 800 and 1000 hrs. per annum.

The machine becomes economical only if it is gainfully employed for rather than accounting for its unproductive use. The labour displaced by this can also be absorbed in agro-business by mak-ing them trained in the new technologies to reduce post-harvest losses through appropriate post-harvest operations including grading, value addition, packaging, processing and transportation so as to get remunerative price to the farmers.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

Chapter V
Conclusion and Recommendations

Sikkim is a land of villages and agriculture was and is a way of living, but still is in evolving shape and faces a variety of challenges like - the average land holding is small i.e. 2 to 5 hectares; the problem of land absenteeism which hinders the development of land and the productivity because the tenants (to whom the land has been given on 'Adhia'), who actually cultivate the land take little care for its development and increasing its productivity; dependence upon monsoon in the absence of proper irrigation facilities; the basic infrastructure as well as tools and the implements used by the farmers are primitive.

Apart from this, topographical location of the area is such that people working in it have to face a great hardship. It has been recently that tertiary as well as secondary sectors are expanding in the state. For the sake of it, more and more trees have been cut, leading to global warming and causing imbalance in climatic conditions which often end up in disasters thereby making farming occupation even harder and making rural life miserable. Therefore people from agriculture are shifting towards the expanding sectors to get rid of hardship and to have a more gainful livelihood. Here it makes important that this sector which traditionally was the main source of employment with females as their main contributor should be studied to gain food security.

This work has studied the present contribution and status of women in the farming sector in the state of Sikkim.

In order to improve the socio-economic condition of its main contributors i.e. farming females in the state of Sikkim, data was collected from all the four districts to judge and analyze their present socio-economic condition through their contribution and status in the farming sector, so that befitting suggestion can be worked out for them.

This chapter has been divided into three parts:

1. **Conclusion**
2. **Recommendations**
3. **The chapter winds up with the discussion on scope for further studies.**

5.1 Conclusion

The present study has been carried out with the help of primary source of data. The following aspects of female labour in Sikkim farming sector were studied:-

a) Firstly, we studied land/ cattle possession and their ownership by the Sikkimese female farmers.

b) Secondly, we analyzed their decision making rights viz-a-viz use of land and livestock.

c) Thirdly, their employment intensity (Number of hours worked/day) was analyzed.

d) Fourthly, access to production resources, inputs, credit and technology of rural female farmers of Sikkim was studied.

e) Fifthly, we examined the gender participation in crop production and animal husbandry and related activities in the rural area of Sikkim in North- Eastern India.

f) Sixthly, their views on farming/ family roles, integrated farming, value addition and technology were evaluated.

g) Finally, their indigenous knowledge related to their farms/animals was assessed.

The findings derived from the primary source of data are substantiated by the literature review done of the Indian, Asian, African countries mainly and also with the mountainous countries of the other region if found any during the literature review. On the basis of the analysis of the data collected from sample farming females of the four districts of the state of Sikkim, our study - 'The role of female labour in farming sector of Sikkim' has yielded the following conclusions :-

5.1.1 Possession and Gender-wise ownership of domestic animals:

- **Women are found rearing milch livestock**

The data in Table 4.2.1.2 of descriptive analysis about gender-wise possession of domestic animals has not shown even a single respondent not rearing milch livestock (cow). The majority of the farmers in the state are small and landless labourers who are not able to afford rearing of working bullocks. They are however, able to rear one/two cows/buffaloes within their limited resources. Maintaining these animals does not demand much effort and burden to them as normally the crop residues like cereal and legume crop straws, husk and grass which is the main source of feed to these animals, gets available from their farms and vicinity area to majority of the respondents who rear them. A study by (Price and Butt, 2000) shows that the major activities of mountain people have been listed as “pastoralism and agro forestry activities”. Another study of a mountainous region in the Kurdistan province of North West Iran shows that the rearing of livestock is a major activity because they have nearby expanses of forests and pastures for grazing (Kirk and Sawdon, 2002, pp.16).

It has also shown that (84%) of them are rearing milch cattle equivalents of 3 or below. Only 16% were having more than 3 cattle. The findings are in close agreements with those of (Kurup, 2001). About possession of bullocks, it has been found that a considerable amount of the sample female farmers i.e. 78% do not at all possess this animal. Very few of them i.e. only 5% are rearing only one, 14% - two, 2% - three and only 1% has been found rearing four numbers of this animal.

- **Women are discriminated in animal ownership**

The descriptive as well as inferential analysis findings of the researcher’s data in the chapter iv about the ownership rights of the domestic animals shows that women own fewer cows and pigs, no bullocks but relatively more of small animals i.e. goats and poultry than men. Similar findings have been reported in the Gambia in West Africa, where women own 67 per cent of goats and 52 per cent of sheep (Jaitner, et al., 2001). One more study also has shown that women play an important role as keepers of small animals, sustainers of household food security and in improving health and livelihoods of families, although they faced more difficulties than men in gaining access to resources such as land, credit and other productivity enhancing inputs and services (Okech, Bernard et al., 2008). However, men dominated the ownership of bullock, pig and cow while women own the low-value small animals, such as goats and poultry.

Female participation dominance has been seen in most of the activities like feeding of animals, watering of animals, milking and milk disposal in Table-4.2.4.2 which shows the frequency of gender wise participation in different activities and also in table-4.2.4.3 which shows One-Sample‘t’-test results. But, the extent of accessibility for livestock rearing in Table-4.2.5.2 for rarely, sometimes, frequently and always is (06%), (58%), (25%) and (11%) respectively. They do participate in decision making of selling of milk/poultry items but dominance of men has been found in decision making of selection of breed of animals, purchasing/selling of livestock and procurement of dry fodder from the market. The main reason behind this is that women have little access to market, so, market related activities remain under men’s control and hence, women have been deprived of getting real benefits from livestock. Male participation dominance has been seen in the activities like vaccination and visits to animal hospitals, breeding of animals and health care of animals. The lack of cattle ownership and equal access to land and other production resources have made women poor and socio-economically insecure.

Besides for material benefits, the respondents, however, reported that rearing cattle, goats, pigs and poultry has also helped in their consumption of nutritious food as well as rearing them help in integrated farming. A study by (Kirk and Sawdon, 2002, pp.16) has found that milk and meat from livestock balance the nutritional requirements of a mountainous population, which has very little land available for agriculture. But the shortage of animal fodder is a constant problem and limits their income-generation capabilities (Kirk and Sawdon, 2002, pp.5). Similar trend, that animals/livestock were primarily kept to produce milk for family consumption was observed by (Ram et.al. 2009). The findings are also in agreement with (Annamalai, 2005) who stated that small, marginal farmers and the landless labour wanted to keep cows in lieu of bullocks. The farmers always take holistic view and are good example of systems manager who has to make decision on variety of factors (Kumar et al., 2000).

5.1.2 Land-holding status

- **Women cultivators outnumber women agriculture labourers**

The researcher’s data in table-4.2.2.10 and table-4.2.2.11 confirms about the significantly more number of sample female cultivators than the agriculture labours. The data in chapter 1V has revealed only 10% of females as agricultural labourers. On the other hand, a massive i.e. 90% of female sample farmers in the data are cultivators.

- **Most women possess small land-holdings**

Table-4.2.2.6 and Table-4.2.2.7 corroborates that possession of large farms by women is significantly not more than that of smaller one. The land holding data of sample farmwomen in Table-4.2.2.6 has revealed 64% as small farmers (<2ha). As a result subsistence farming is prevalent here and production is mainly done for consumption purpose. In the absence of good marketing facility the farmers grow a little bit of everything that they require. Low scale of operation does not generate much surplus to be taken to the market. In spite of the State being declared an organic one yet the females complained about not getting timely and in sufficient quantity the inputs like organic seeds/saplings. This forces farmers to use HYV seeds which are not organic. There is scarcity of good post harvesting processing and storage facilities. However, most of them reported, were selling vegetables in local vicinity (Figure 38, 37 and 39 in section 4.2.9 of chapter IV). Post harvest activity like storage etc. was not recorded much in the areas and confined mainly to household level.

Moreover, storage facility for crops in all the districts is almost negligible in the State. More than rice, sampling units were engaged growing maize, which is used for consumption, feed/ fodder as well as a little bit for commercial purpose. The bullocks were found widely used for ploughing (Figure 40 in section 4.2.9 of chapter IV) in view of the fact that mechanized farming is difficult in the state because of the hilly terrain as was reported by the female farmers. This activity is mainly carried out by male member of the family/hired labour.

- **Women are discriminated in land ownership**

The finding of descriptive as well as one-sample 't'-test of inferential analysis in Table-4.2.2.3 and 4.2.2.2 confirms the fact that ownership of farm land by women is significantly not more than that of men. However sample female farmers were asked to share their views if they are given the right to own an animal and property.

The reasons given by them as to why this right should rest with them are-

a) Because of the ancestral property, we will feel proud in owning

b) When it is in our name, extra pain will be taken to extract more money out of it.

c) Till today, we have been fulfilling the responsibility of looking after it nicely and will keep on doing it for ever.

d) We can make use of it independently the way we feel like (for the family, animal as well as agriculture).

e) We can improve our socio- economic condition with self earned money.

Reasons given by female farmers for not feeling proud in owning an animal/property

a) They find it difficult in managing everything on their own.

It has been observed that socio-economic condition of the female farmers in the study area entails contemplation. Multiple factors have contributed to women's impoverishment; however, a major impediment to the advancement of women has been the discriminatory laws and traditions prohibiting women's land ownership and inheritance rights—leaving women without adequate collateral to obtain credit to support either on- or-off farm income-generating activities. (Tiwari Nivedita, 2010) is also of the opinion that discrimination in remuneration/wages for women working in the field and their poor purchasing power does not allow them to get the necessary costly inputs. Furthermore complemented by saying that there are no special training programmes to develop women's agricultural practices and technological skills with which they can improve their socio-economic condition. (Hossain, 1989) and (Islam and Omori, 2004) have also identified the inequality of land ownership as a key factor for farm income inequality for Bangladesh.

Female farmers in the study area were also asked to share their views about handing over the farm land ownership rights to their daughter-in-law. For this question in Table-4.2.6.18 a massive 84% of the respondents replied in favour of handing over the property to their son. Only 10% of them want to hand it over to their daughter-in-law for the reason of wanting to give equal right to daughter-in-law.

Reasons given by sample female farmers for handing over the property in favour of their son:-

a) This tradition is going on since ages.
b) He has to perform all the rituals during life time as well as after death.
c) He is our blood, so, we can trust him.
d) We are sure that he is capable of handling it, which daughter-in-law may not be.
e) Whatever is son's property, ultimately that becomes of daughter-in-law's also.
f) He is the legal heir.

On the basis of the data collected and analyzed, we can conclude that women in the area are subject to discrimination in land ownership and are in possession of small size of landholdings. (Chandrakala Diyali, pp-72) also admits discrimination in land ownership. In some pockets of

the State, though awareness level of women is good, still the data does not show the female ownership and control of the land, not only because they are unaware of their rights but because of socioeconomic and geographic constraints such as lack of capital, illiteracy, scattered land and hilly terrain.

The findings also reveal cultivators outnumber agriculture labourers. Agricultural labourers data has shown an increase from 4887 (3.31%) in 1981 to 13,793 (7.8%) in 1991 of total main worker. The main reason for this is that within the increasing poverty and unemployment, the lower strata both male and female were increasingly joining the total number of agricultural labourers till 1991. But a decrease of 4,712 was recorded from 1991 to 2001. The main reason behind that is the development of tertiary/secondary sector and a lot of other developmental activities which are going on in the State and they get more gainful employment at these places rather than working as agricultural labourers (Chandrakala Diyali). (Singh, E. Bijoykumar, 2009) while analysing the nature of growth among the eight states in the North Eastern Region (NER) using NSDP data holds the view that the share of primary sector has declined substantially and that of tertiary and secondary has increased in the region. Table-2.5 also depicts the very same thing.

The same reason was reported by sampling females also for this. In land market analysis, (Hossain, et al. 2003) has observed a decreasing trend of land transactions through purchases and sales during 1987 and 2000 to have some source of income for Bangladesh. This was because many farmers facing a hazard tried to overcome it by engaging in non-farm activities rather than selling land.

5.1.3 Gender participation

- **Women participation is high in certain activities and low in the other**

Analysis of the data in tables-4.2.4.2 and 4.2.4.3 shows that participation women in sowing of seeds, weeding, harvesting, feeding of animals, watering, milking, milk disposal, threshing and winnowing is more than that of men. Participation women in ploughing of fields, storage of grain, collection of fuel from fields / forest / community land, procurement of feed and fodder from the market, cleaning of the animals and their shed, health care to animals, vaccination and visits to animal hospitals, breeding of animals and care of fields is not more than that of men. If we look at the district wise participation, we observe that only for activities like ploughing,

vaccination and visits to animal hospitals, breeding of animals in tables 4.2.4.4, 4.2.4.20, 4.2.4.21, female participation is totally absent in all the districts for them. Rest in all the activities joint participation dominance is spotted.

In most parts of the world, men and women tend to perform different tasks. Numerous time allocation studies have examined this issue (McSweeney 1979; Pala 1983; Saito 1994). These studies often identify some tasks as men's tasks and some as women's tasks. Sample female farmers of the researcher's study area reported that though men are responsible for ploughing, vaccination/visits to animal hospitals; breeding of animals, irrigation of field, embankment and work which require intensive use of spade on work for long hours or may be at night while women are clearly responsible for hand digging, sowing, harvesting, weeding, threshing, winnowing, collection of fodder/fuel, milking and milk disposal independently but joint participation in all the activities is reported by most of the female farmers.

(Rahman et al 2009) also holds the similar view for gender participation in Sikkim. Likewise (Pala, 1983) supports the same opinion for Kenya in East Africa. Nonetheless, there are relatively fewer tasks where independent gender participation is documented (Guyer 1980; von Braun and Webb, 1989). Though tasks may be viewed as women's or men's, in practice, the divisions are blurred with both men and women involved in many tasks. (Axinn, 1977), (Sontheimer, Basnyat and Maharjan, 1997) and (Timsina Dibya, et. al., 1989) also holds the similar views for Nepal.

- **Women work for longer hours for farming activities**

We can conclude that since operational holdings in the area are very small and also the terrain is steep, mechanization of agriculture is still a distant reality. Due to this, agriculture practices require very high human energy inputs and are full of drudgery. This is the main reason also for participation data of female sample farmers in farm/animal and related activities in tables 4.2.4.2 & 4.2.4.3 shows more than 50 percent of respondents jointly partaking (both men and women) in most of these activities. But at the same time employment intensity data in tables 4.2.4.25- t test and 4.2.4.25(i) - Paired-Samples Test confirms that females work for longer duration than the men.

5.1.4 Decision making:

- **Women are less involved in farming related decision-making**

Participation in decision making of farm and related activities for sample female farmers on the basis of mean score shows that they get better chances for making decision in activities like-selection of crops of the season to be sown, selection of harvesting time. In these activities, their relative participation is also greater than that of men.

They get good chance in decision making for-selling of milk/poultry items, changing of crops, selling of crops/cereals/vegetables, purchase of agricultural equipment, selection and procurement of seeds of new variety, storage of green fodder for lean period.

They get limited chance in decision making for-selection of breed of animals, procurement of fertilizer, purchasing/selling of livestock.

Decision making was found to be poor in activities like-selling of green fodder in the market, procurement of dry fodder from the market, selling of surplus dry fodder.

These finding of descriptive analysis also gets confirmed by one-sample 't'-test of inferential analysis, which also revealed the same results as are revealed by descriptive statistics about decision making of a rural woman in different animal, farms and the related activities. Activities for which descriptive statistics has shown good and better chances in decision making 't'-test of inferential analysis rejects null hypothesis for those activities and thus accepts alternate hypothesis for these activities hence showing women sometimes/frequently make decisions for these activities.

For rest of the activities for which descriptive statistics has shown poor and limited chances in decision making,'t'-test of inferential analysis accepts null hypothesis for those activities and thus rejects alternate hypothesis for these activities hence showing women never/rarely make decisions for these activities.

On the basis of above findings of the data, we can conclude that they do participate in decision making for some of the activities in which their independent participation is more than that of

men. (Awais Mohammad et. al.2009) also holds the similar view for tribal women and concludes that they have more say in the activities of family decisions for which they share more responsibilities than their non-tribal counterparts. Moreover, joint involvement in decision making has been observed in agricultural/animal and the related activities even though women perform more in agricultural related activities than men. Even they need not be consulted at the time of purchase of animals or change of crop. (Chaudhary Sarmishta, 2004) and (Sethi, 1991) also holds the similar view. (Brara, N. Vijaylakshmi 2006) also confirms the similar view for the hills of Manipur and concludes that though much of the work is done by women and there is "iron like grip" rigidity in the division of labour. They work quietly and are invisible in any decision making bodies. Study of (Mishra Seema, et al. 2008) is also of the same opinion for participation of women in decision making, but at the same time concedes the fact that this may be because of the low risk bearing capacity of farmers in that region that they cannot afford to make the costly mistakes.

5.1.5 Access of Rural Women to Production Resources in Sikkim

- **Women have less access to productive resources in Sikkim**

We can conclude on the basis of analysis of the data that though half of the sample farmers are the members of either any cooperative or formal or informal association/institution/group, but they do not have always and frequent access to them. It means those who are members, they also hardly exploit the benefit of these institutions. The key reason for it can be attributable to the fact that women farmers lack the knowledge and the skills of latest technologies of farm-related operations, which is also a major constraints faced by farm women in their advancement. (Chandel et. al., 2008) is also of the same opinion. Data of the sample farmers regarding awareness and access to technology and Government policies also reveals almost the same picture. These findings are supported by the findings of (Umale et al. 1991), (Singh and Sharma, 1995) and (Meena, 2005). It causes low productivity of female labour in agriculture sector compared to other sector (Joshi, 1999). A study by (Parveen, Shahnaj, 2008) in Bangladesh also shows the same result for women's access to productive resources. Studies by (Spring Anita, 1987) and (Tamale, 2004) in Africa show that although some women earn a good living from agriculture but most women tend to be among the lower resource farmers. This is not because they are deficient in farming skills, but because they lack access to labor, land, credit, training, and mechanization, especially in years of agricultural intensification. A study

done by (Acharya, 2003) in Nepal concludes that lack of access to and control over productive resources is the main factor limiting women's equal participation in economic activities, thereby hampering the human development process.

- **Informal source of credit is used for commercial purpose**

The data for credit in table 4.2.5.8 and 4.2.5.9 has revealed that more number of sample female farmers avail credit, but it is not availed on their name. We can also safely conclude on the basis of these tables that significantly more number of sample female farmers on an average use informal source of credit for commercial purpose.

The reasons given by farm women for getting excluded to avail credit on their name were-

a) Lack of land ownership as collateral property
b) Some banks ask for the Government job/Salary certificate
c) Usually male member, who is also head of the family gets it

Furthermore, more of informal source of credit is used for commercial purpose. The reasons given by farm women for availing credit from informal institution were-

a) Inadequate banking network
b) Topography as well as climatic conditions of Sikkim force them to use informal source
c) Infrastructural bottlenecks such as transport and communication connectivity, lack of awareness of banking services, lack of simple customized and flexible financial products to suit the needs of local people

But at the same time for district wise availing credit from institution, it has been observed that only in East district formal institution dominates for availing credit. But, informal source dominance for availing credit has been observed in West, North and South districts. One of the reasons for it can be attributed to the fact that in East district, there are more number of bank branches and average population/branch office comes out to be 4,901 while the same figure stands at 5,861, 10,117 and 12,326 for North, South and West districts respectively as on March 31, 2010. Although, there is demand for credit by the farmers, but due to inadequate banking network, particularly in West and South districts of the State, timely credit needs of the farmers do not get fulfilled. As a result they are forced to pay high rates of interest (which is generally as

high as 10%/month/Rs 100), for timely and hassle free borrowing from informal source (moneylenders and middlemen). Topography, climatic conditions as well as infrastructural bottlenecks in North Sikkim forces them to use informal source. For district wise purpose of availing credit by female farmers, it has been observed that in all the districts commercial purpose dominates for it. Within the districts, in South district availing credit for commercial purpose has been spotted the most, followed by East, North and West. Personal purpose of availing credit dominance within the districts is noticed the most in East district followed by South, West and North.

- **Education level of farming female is low**

We can safely conclude by saying that there is significant number of sample female farmers who are either illiterate or are educated till primary level. But, as is evident from the table 4.2.5.2, for education till secondary level, very meagre i.e. only 03% of the sampled farming females have always (till secondary level) access to education. Within the districts in table 4.2.5.23, East is the district where maximum percentage of female farmers who are not educated i.e. illiterate has been observed followed by (South and West equally) and North. As has been noted in section 1.2.5.1, though the decade has seen an increase in female literacy rate from 66.81 to 79.41 in East district, which is the highest of all the districts as far as increase in decadal female literacy rate is concerned, yet the district has got the maximum percentage of sampled female farmers who are not educated i.e. illiterate. The reason behind is that the tertiary and the secondary sectors are developing in the district the maximum, which provides gainful employment to the educated lot. Therefore they get absorbed there leaving behind the illiterate lot. Even those who are a less educated, they start shifting there to get rid of the hardship faced in the rugged terrain of the mountainous region. In North district least percentage of female farmers who are not educated i.e. illiterate has been observed. Section 1.2.5.1 has shown that increase in decadal female literacy rate is the minimum of all the districts in North. The reason for it is the less number of educational institutions in the district than other districts.

5.1.6 Women keen to give up farming activity

Analysis of data shows that significantly neither more number of sample female farmers would like to accompany their husbands in case they move towards urban area (Table -4.2.6.7(i) nor would they like to move towards urban area (Table -4.2.6.6). The data which is collected from

sample female farmers also reveals that significantly more number of them on an average feel proud of their contribution in farming (Table -4.2.6.5) and feel happy about looking after the responsibility at home as well as in agriculture (Table -4.2.6.10). In spite of all these concerns significantly more number of sample female farmers on an average are interested in leaving farming (Table-4.2.6.4) because of generating less income (Table-4.2.6.20) and the hardship faced by them in it.

5.1.7 Female Farmers are reluctant to absorb the future generations in agriculture

Tables-4.2.6.8(ii) and 4.2.6.9(ii) for wanting to absorb their sons and daughters in agriculture depict that almost about 75% of the female farmers have rated their answer up to 5. Besides the reasons mentioned in the point 5.1.6 for their reluctance, the other reasons given by them for not wanting to absorb the future generation in agriculture are-—

a) We do not want our children to face the same hardship which we are facing by engaging ourselves in agriculture.

b) There is no future in agriculture.

c) City job is an easy and comfortable way to earn income. The city life is good for education and better living also.

d) Younger generation would not like to settle down in agriculture after getting educated.

However very few of them were in favour of absorbing the younger generation in agriculture also. The reasons given by sample female farmers for that are –

a) Proud to be land owner and love their sons also to be engaged in this occupation but in an advanced way

b) Till now we have been doing it and want to get our children also engage in farming because city job is not secure.

In the region, during past time, the structural shift from the primary to the secondary sector was slower than in the country as a whole (Lama, 2001) due to the sluggish growth of the rest of the two sectors. It has been since recently that nonetheless agriculture is the main economic activity of all the districts in the state, yet, with the development of (Singh, E. Bijoykumar, 2009) non-farm sectors in the State, the future generation is not keen to adopt the ancestral occupation of farming and the initiation of off-farm income-generating activities is deemed an essential shift for rural folk for the reason that i) the small land holdings in the State does not generate much income ii)hardship faced by the people due to hilly terrain. Study by (Price, 2004, pp.11) also holds the similar view and concludes that the lack of basic infrastructure like roads, electricity,

water and fuel make the mountainous populations face hardships. Walking long distances to fetch water and food becomes a routine for them and iii) most importantly tertiary as well as the industrial sector is developing at a very fast pace making rural population to move to these places for greener pastures leaving behind the female population in the farming. Nonetheless there is no denying the fact that the jobs which appear in non-commodity producing sector are none too cheerful as only low quality employment such as taxi driver, peon, sentry or work at any construction/road site is available, but it demands less hardship while having some source of income. The findings derived from the literature and substantiated by the findings of the structured interviews of female farmers confirm that both pull and push factors affect rural-urban migration.

5.1.8 Women undertake greater familial responsibilities than men

The researcher's data in section 4.2.7 has confirmed the fact by showing significantly more number of female farmers on an average look after the nurturing and the health of children at home. The movement of men out of agriculture has led to an increase in women's share of the agricultural workforce and an expansion of their role in the sector. However, with labour absorption in agriculture on the decline, particularly in terms of paid jobs, more than two thirds of women workers are self-employed, working as managers and helpers on the family farm without any remuneration. Those who continue to work as casual labour earn wages less than the statutory minimum. In all, women in agriculture face increasing responsibility for ensuring household food security under adverse economic conditions and an intensification of their work burden.

However, impeding this shift and making the women participate efficiently in their farming place requires access to education, knowledge, information, financial services and markets. Women, who are the mainstays of the agricultural food sector and labour force, are continually prone to various constraints like insufficient production inputs and educational access, which hinder the advancement of women. This scenario thwarts the income earning capacity of the stakeholders thereby making them feel dissatisfied with the income they earn from the farms. Hence, it causes the female farmers to have the feeling of leaving farming and turn into non-assertive about absorbing the future generation in farming. Analysis of data of the study area depicts the very same thing. This mindset has to be reversed because sustainable rural development through agriculture cannot be achieved without full participation of women's intellect and younger generation's enthusiasm. Another interesting aspect is that women in mountainous regions are under immense workload and emotional pressure because the men from mountains have been migrating to cities so that they can find a livelihood.

5.1.9 Female farmers keen to involve in allied entrepreneurial activities

we also can conclude on the basis of the questions which were asked to have deep information about sample female farmer's views for their participation in farm, animal and related activities, that because of generating less income (Table-4.2.6.20) and the hardship faced by them in performing these activities, they hold the view of doing anything except agriculture (Table-4.2.6.3). Also more number of sample female farmers would like to opt for any entrepreneurial activity (Table-4.2.6.12).

The frequency for various options which sample female farmers have selected to augment their income shows that 43% females have opted for poultry, 09% females have opted for fish farming, 39% females have opted for cow, 05% females have opted for silkworm/honey bee and 04% females have opted for others.

- **Reasons given by sample female farmers for such options:**

1. Cow

a) Since childhood, familiar with such type of work and easy also.
b) Helps in integrated farming. (Benefits: milk products and manure).
c) Easy to maintain and helps in making money also.
d) Yak can be used as carrying loads also.

2. Poultry

a) It is easy to maintain and helps in making money also.
b) The State Government provides it (the whole kit) free of cost.

3. Fish Farming

a) There is abundance of water in the area.

4. Silkworms/Honeybees

a) It is an easy farming with low investment, and helps making money also.

5. Others

a) Want to run a hotel for village tourism.
b) Want to run a stall next to construction sites for selling snacks and tea etc.

The district wise data for views of female farmers to opt for any entrepreneurial activity shows that though in all the districts (except North) majority of female farmers have opted for poultry. But, within the districts, in East district dominance for this option is spotted the most and in

North it is spotted the least. In all the districts (except North) second option of female farmers is cow rearing. In North majority of female farmers have opted for cow and second option of female farmers is poultry. In all the districts third option of female farmers is fish farming followed by silkworm/honey bee and others. Within the districts for fish farming, East is the district where maximum percentage of female farmers who have opted for it, has been noted followed by (West and North equally) and South. West did not record even a single female who has opted for silkworm/honey bee.

5.1.10 Women farmers are the custodian of substantial Traditional knowledge related to care of plant and animal

While collecting data the researcher also tried to extract some knowledge the sample female farmers are possessing related to plants/animal, its usage and the management/practices of different agriculture/animal and the related activities. The information was further verified by crosschecking and validated by the common response from the other village farmers (people) on same spe-cies treatment.

The researcher noticed very interesting fact that the sample female farmers, who possess the knowledge and usage of the plants, have grown it in their vicinity, so that they can use it whenever their need arises.

For knowledge about plant/animal disease and their prevention 99% of the respondents rated their knowledge for plants and animals up to 5 in Tables-4.2.6.13 and 4.2.6.14. Here, it is important to mention that degree of answers ranges from 1 to 10, where 1 indicates strongly negative and 10 indicate strongly positive knowledge. Whereas, degree level 5 indicates moderate knowledge for the question.

5.2 Suggestions

Keeping in view the above mentioned problems/needs of the area and conclusions derived there from, the researcher has made a fair endeavour to suggest some points for the upliftment of the beneficiaries.

5.2.1 Possession and Ggnder-wise ownership of domestic animals of sample farmers of Sikkim State:

- **Government to encourage greater participation of women in decision making of the animals they manage**

In view of the fact that rural women traditionally play a very important role in raising livestock and in most cases they are solely responsible for goat, sheep, poultry and other animals kept near home. The researcher's data regarding possession and gender-wise ownership of domestic animals confirms the significant possession of milch and small sized livestock without the female ownership (only for poultry female ownership has been noticed). At this point**,** it is suggested that the decision making authority on the animals they manage should be with the women only. Besides, it is easier to operate a productive enterprise with smaller animal and initial costs are lower. Profits may be low, but so are risks. Surely, women benefit most when they have decision making authority about the animals they manage even without legal ownership rights. Needless to mention here that women would be willing to work even harder if they could earn some more money from the livestock they manage.

- **Government to educate the farmers to feed livestock the Azolla plant to increase productivity**

Data in the Table -4.2.6.15 shows that huge 98% of the respondents do not have much knowledge about feeding/nursing of domestic animals. Also is given in point 4.2.9 of chapter 1V that mostly the sampling units are making their own concentrate mixture, so, feeding purchased concentrate mixture is not very much reported by most of the sample farmers. For most of the farmers animal husbandry rearing is a complementary activity to farming. As many researches have proved that feeding locally available balanced concentrates can enhance productivity of animals. Hence, by educating the farmers to feed livestock the Azolla plant (consumption of which can increase the productivity) by producing it the way given in the model of chapter iv, can be helpful in increasing the productivity of animals. This will not appear as an extra burden and cost for them.

- **Government to ensure supply of good quality bullocks for ploughing**

The researcher's data regarding possession of size of farm landholdings confirms the fact that significantly more number of the sample female farmers are in possession of small land holdings ploughing of which is done by bullocks and their socio economic condition is poor. However, many small farmers fail to exploit fully this limited natural resource (land) because they lack the necessary small farm and livestock best-management practices/skills to successfully manage or operate it. The researcher's data has shown that though these small farmers are aware of available training and counselling support provided by agriculture extension organizations, but due to topographical constrainsts many farmers fail to take advantage of resources that are designed to help them succeed. Researches have shown that participation in relevant and effective training can reduce the failure rate and help owners make better management decisions and avoid costly mistakes (Muske and Stanforth, 2000). A productive agricultural economy relies upon a well prepared agricultural workforce (Samy, 2003) and sound and healthy livestock capital base. These are of potential importance not only to the farmers, but also to animal welfare, public health and food supply. As the terrain of the hilly State is sloppy, hence livestock production through mobile artificial insemination units using frozen semen would prove to be very beneficial to remotely located locality. In the absence of mechanization, bullocks are widely used for ploughing. So, supply of good quality bullocks through bull rearing farms would be of great help to the farmers using them.

5.2.2. Gender wise participation

Suggestions under this heading are

- **Government to design farm policies more lucrative to make farm involvement impetus**

Tertiary sector in the State is budding enormously. Consequently, a lot of male cultivators and agricultural labourers and the male population have migrated from rural area to these expansion sites to add extra source to income and to get rid of hardship of agriculture sector. Even if migrants return, there may be a reluctance to take up agriculture again. Hence, women's participation in the smallholder sector contributing to food supply, always central, becomes indispensable. This is the rationale behind the researcher's data in tables -4.2.8.2 and 4.2.8.3

shows (25-45%) of female farmers as documented participating independently in sowing, weeding, harvesting, milking and milk disposal for all the categories of age and education. Even they have reported that their children extend them helping hand for milk disposal while going to school and getting green grass/fuel after coming back from school. Hence, lucrative policies designed to overcome the hardship faced by farm women in farming left behind is of core importance, so that food supply does not get affected. This initiative is particularly essential for twin motives-

1. As is shown in the data of sample female farmers that most of them in spite of their proud feeling about their contribution in the farming, a significant number of sample female farmers would feel happy leaving farming because of getting less income from it and the hardship faced by them in this sector. Having adopted the lucrative policies one can prevent them leaving farming sector so that food supply does not get affected.

2. These farm women can be prevented from getting accustomed to the cash remittances by male members and there by shifting their production and consumption patterns. (Chaney M. Elsa and Lewis W. Martha, 1985) also holds the similar view. (NCW, 2005) also studied the same concern for Bundelkhand economy in which agriculture plays an important role and women play an equal role in agriculture. Due to non favourable policy for traditional rice in the State, farmers would tend to stop growing the traditional varieties, which would then get lost. Also, these way women are getting economically weak. Therefore, they are getting ill-treated in their homes.

5.2.3 Government to ensure more equitable property rights

There is no denying the fact that women possess a strong innate quality of conservation. With a proper technical guidance and training this can be harnessed more efficiently. According to re-searcher, given some motivation in the form of ownership rights of the farm land can give more fruitful returns. Same thing has been admitted by sample female farmers also when asked to share their views about owning the property. Given it a try, it also helps in integrated organic farming which will gel well with the State policy. Besides the 2005 Hindu succession Act brings all agricultural land at par with other property and makes Hindu women's inheritance rights in land legally equal to men's across States, overriding any inconsistent State laws. This can benefit millions of women dependent on agriculture for survival. (Sridhar Lalitha, 2003) who

studied the same issue also concedes the fact that women work on the land but do not inherit it. She further emphasizes that due acknowledgment needs to be given to the contribution of women to agricultural activities which definitely will act as a bridge in getting down the cases of violence and ill treatment of women (Info Change News & Features, August 2003). At this point, it is suggested that joint ownership rights of the farms on which they are working can be tried for the betterment of the farms as well of the socio-economic condition of the female farmers. Needless to mention here that having some ownership rights of the farms they are working in, women would feel extra enthusiastic and high-spirited working there.

Female farmers in the study area were also asked to share their views about handing over the landed property to their daughter-in-law. For this question in Table-4.2.6.18 a massive 84% of the respondents replied in favour of handing over the property to their son. Only 10% of them want to hand it over to their daughter-in-law.

Handing over the ownership rights of the farm to the daughter-in-law in any patriarchal nation is not very easy and cannot be at one fell swoop. Because it is a source of income to the family and a sense of possessiveness and belongingness is always attached to it. People don't want to hand it over to anybody out of their blood relationship; this very thinking has been observed in the reason given by sample females for handing over the farming land ownership rights. The act of handing over the right is in support to the reason mentioned in the previous points of this section. But making people aware about the changing scenario by discussing it in the social gathering including spouses can be helpful. In these types of gatherings spouses should also be given a chance to open up and share their ideas about handling the farming land assuming them being the owner of the same. This endeavour can give them a platform for projecting themselves and instilling confidence in the minds of their elderly generations about the safety of the hands their farming land is getting transferred to. The process of handing over the farm does not happen overnight. There are several issues that will crop up in this process and should be identified (like - delegation of different responsibilities along with their accountability, what happens in case there is a divorce etc.) and should be discussed well in advance. Here, the point of suggestion is if legal binding can be attached to this attempt, one can find it logical of converting it into practical. Legal binding can be in the form of automatic seizure of the ownership rights in case of a

divorce. Changing the mind-set of people in the society is a gradual process. Holding the farm in the family for several generations requires good planning and management skills. Researcher is of the opinion that combining the experience of older generation with the younger generation's ideas and enthusiasm can do wonders. (Chandel et. al., 2008) and (Aryal S. S. et. al., 2004) also hold the similar view.

5.2.4. Access of rural women to productive resources in Sikkim

- **Since most farmers have small land-holding and consequentially they live in subsistence economy, mechanisms to enhance their income may be devised**

Tables 4.2.1.2 and 4.2.1.8 confirm the significant possession of milch animal by females to ensures sustained source of income as cattle rearing is neither seasonal like farming, nor it gets affected by drought or floods. Development of secondary and tertiary sector is leading to a spurt in urbanization in the State. This is consequently triggering the demand for milk/milk products/ and poultry/meat. Increase in the demand has led to increase in their prices. The findings of the study in the tables 4.2.4.2 and 4.2.4.1(ii) show significantly more women participatig in milk disposal activity. While milk is sold at rupees 32/Kg in the urban markets, the resource poor female farmers, unknowing about the worth of their produce, still selling milk locally at almost half the prices i.e. rupees 17-20/Kg in remote and inaccessible areas. Since most of the maintenance needs of the cattle of the farmers are managed at their own farm level, so, this much price of the milk is also making some amount of profit to them.

The findings of the study in the table 4.2.3.2 show that women frequently/always make decisions for selling of crops/cereals/ vegetables and milk. Therefore the important suggested activity that emerges in marketing and making agriculture a commercial venture is to make efforts to organize these small farmers and make arrangements to market their pooled products under a major brand name so that it can be sold nationally and internationally. The same product when produced and sold by different farmer groups in small quantities under different brand names usually does not reach the national/international market. Organic products have a parallel market which, if captured in a strategic manner, can lead to improve the financial position of the female farmers thus leading to the rapid development of these hill districts. As the organically produced products are free from chemical ingredient, it can fetch better prices. It is very crucial to mention here that the benefits so generated should directly reach the producer i.e. females so that it helps in making a way to improve the socio economic condition of the females.

- **Informal credit supply through SHGS (rather than moneylender) should be encouraged**

The researcher data in the tables 4.2.5.8 and 4.2.5.9 showed the dominance of informal source to avail credit. Moreover, in order to fulfil the credit demand of the farmers, in the absence of adequate banking network, informal credit supply through SHGS (rather than moneylender) should be encouraged (the suggested activity). Otherwise, women may need to convert "savings goods" into cash for loan repayment, thus impoverishing themselves further. Awareness campaign regarding the same can be initiated and female farmers can be motivated by showing the examples of some successful SHGs of their own state/other areas, who also generate the financial resources through their own savings. Thus, sharing this type of experience will act as a source of inspiration for many other poor women with the similar socio-economic conditions. A study of the assessment work of NGO's Grama Vikas in South India shows that Grama Vikas' collective programs implemented by the women provide them with practical experience in the management of credit and help them understand financial responsibility (Viswanath Vanita, 1989). Creation of awareness, enabling women to realize their latent potential, suitable skill up gradation trainings among them is very important for successful running of SHGs (Thapar Ruby, 2010). It is also argued that for women to benefit from credit, only improved access is not enough. Since monetary transactions traditionally have been handled by men, most women do not understand financial responsibility. Therefore, they must be motivated to accept credit and trained in the management and effective use of credit.

- **Government to help in promoting the use of bio-digester to save female's time of fuel collection to be utilized in other productive chores**

The findings of the study in the tables 4.2.4.2 and 4.2.4.1(ii) show women participatig in collection of fuel from fields /forest /community land. Even though the gas connections have been distributed by the State government, still the vast majority of rural women still depend on the locally available non-commercial sources of energy such as fuel wood. Despite the state government's policy of banning the deforestation activities, trees are being cut and widely used by inhabitants for cooking, making concentrate for animal on fire, de-moisturizing cardamom pods and for the winters. The same thing has been shown in section 4.2.9 of chapter 1V (Figure 23-26). Table 2.6 and 2.7 in section 2.1.7 of chapter II also depicts that though the use of LPG for cooking has increased from 19 to 41 percent, but the use of fire-wood for cooking has been decreased only from 65 to 53 percent over a period of ten years. In practically all third world countries the problems of getting enough food to eat began to be overshadowed by the problems

of acquiring the energy needed to cook it. This strategy is not sustainable as it pollutes the atmosphere thereby leading to global warming; the more appropriate option which is suggested in this case is to convert the manure to biogas through anaerobic digestion as suggested by the researcher in the model given in section 4.2.10 of chapter 1V. As the state has been declared an organic one, also the data showed possessing and rearing of milch animal by every household, so after making use of livestock dung in making biogas in the suggested manner the same can be applied in farms to produce the crops organically. The biogas can be used to satisfy household fuel demand instead of the fire wood that before was used as fuel for cooking and helps women in increasing the quality of life by saving time and energy and physical fatigue which earlier used to get wasted due to collection of fire-wood.

It will also help in checking deforestation thus maintaining Himalayan climate and also in preserving numerous herbal species of plants. Time saved by adopting these measures can be utilized in some other productive chores like (marketing, processing) rather than in collecting fuel/firewood. Considering the impact of environmental factors on their livelihoods, women's participation should be ensured in the conservation of the environment and control of environmental degradation thus maintaining climatic balance.

- **Technical capacity building of female farmers through extention workers will help in making agriculture sustainable**

As the data collected by the researcher from farming females of Sikkim for the extent of education accessibility in table-4.2.5.2 as well as in table-4.2.5.22 show a significant number of female farmers who are either illiterate or are educated till primary level, consequently it becomes one of the main reasons which makes them the victim for not getting benefitted from modern scientific and technologic technique. Data in table-4.2.5.15 for opportunity to have services from extension agencies shows that it is more but at the same time in table-4.2.5.2 has also revealed that almost half of the sample female farmers do not/rarely get an opportunity to have such services. The reason, they reported for this is-being residing in the interior and remote area, they do not get the timely information for the same and also they reported that most of the time male member of the family goes for it. As a result, they lack modern avenues of knowledge and information, new technologies and opportunities for training to increase their farm productivity and income. Though, the data in table-4.2.5.18 shows that significantly more number of sample female farmers on an average are aware regarding Technology and Government policies but again their extent in table-4.2.5.2 shows less access to it. It in turn will limit their capacity to fully exploit the piece of land they possess thereby making their attitude reluctant for absorbing the younger age band in the agriculture.

A study by the (USAID, 2001) has also found that countless women in the developing world are removed from the information age because of their lower levels of education and negative attitudes towards other forms of achievement. The suggested activity which emerges here is that technical capacity building through extention workers will make the female farmers understand the dynamics of the existing structures and appreciate the need for change in the desired direction. This act will also lead the female farmers to have an empathy to the growing need of making agriculture sustainable by changing the mindset of educated youth for absorbing them in agriculture. .

The time to act is now. Combinations of adaptive and preventive measures are urgently required with future generation willingly ready to accept risk to ensure sustainable agriculture development, so that food security does not suffer. Failure to respond to this growing crisis at both a national and global level will result in catastrophe consequences that will affect us all.

Undoubtedly, by converting their role from passive recipients to active own managers helps them in improving their condition in the State.

5.2.5 Traditional Knowledge (TK)

As has been noted under this heading in the conclusion that few of the sample female farmers (most of them were the elderly females) possess some Traditional Knowledge (TK). Some suggestion to harness that (TK) is given below:

- **Efforts should be made to conserve the TK of the indigenous people**

Traditional Knowledge of Indigenous people should be included in the textbooks of the students according to its importance and applications so that it can be passed on to the next generation. Projects can be given to students as an assignment to extract some more traditional knowledge about the different variety of plants their elderly family members possess along with their application. (Awais Mohammad et. al.2009) suggests that traditional knowledge is sought to be converted into private property and treated as an open access system for free exploitation by those who want to privatize and patent it, so that the real benefit goes to the one who owns it.

- **Summary**

Studies on women in agriculture conducted in India and other developing and under developed countries point to the conclusion that women contribute far more to agricultural production than has generally been acknowledged. Studies by (Remesh, 2004) and (SEWA, website) also reveal

the invisible participation of women. We cannot ignore the fact while recognizing their crucial role in agriculture, that women continue to be concerned with their primary functions as wives, mothers and homemakers. This fact is confirmed by the researcher's data also by showing significantly more number of sample female farmers on an average looks after the nurturing (Table-4.2.7.3), the health (Table-4.2.7.4) of children at home. (Kaur, 1996), (Uma Rani et. al., 2003) and (Gill J K, 2007) also share the similar views and suggested that there is a need to reform the social security system to recognize the value of women's labour at home.

In view of the critical role of women in the agriculture and allied sectors, as producers, concentrated efforts should be made to ensure that benefits of training, extension and various programmes should reach them in proportion to their numbers. The programmes for training women in soil conservation, social forestry, dairy development and other occupations allied to agriculture like horticulture, livestock including small animal husbandry, poultry, fisheries etc. should be expanded to benefit women workers in the agriculture sector.

The rural women need to be provided with reliable and empowering platforms and supportive forums for interactive dialogue, idea sharing, skill development and capacity building. They also need to be provided access to the resources in order to ensure their effective integration in development and increase their participation in economy.

By providing women farmer's easy access to credit, adequate training and instilling in them the importance of saving and enabling them with microfinance program helps women to engage in income-generating activities to increase their incomes and invest in their families and communities. Studies show that when women are supported and empowered, it helps in improving the health of their families, improving the education of the children, increasing the agricultural productivity and ultimately increasing their income. In short, communities become more resilient.

Improving rural women's access to finance will give them a chance to become economically independent. By increasing their economic power, they will be able to organize themselves and to participate in decision making processes more efficiently and to draw up policies which concern them; as well as defending their own interests with public authorities and other relevant institutions which ultimately will help women to convert subsistence agriculture to commercial agriculture.

Here, the researcher wants to convey a message to women is that the first step to self-empowerment is to learn to love one, because if one looks down upon oneself, one can never truly love anyone else. Any policy made by the Government or any initiative taken by others to uplift women will prove fruitless unless the initiative comes from within. Moreover, it is a sheer wastage of time, if one expects perfection from oneself or anyone else since no one on this earth is perfect. So, by honouring oneself, treating oneself with respect and making oneself a social asset, one can set the stage up for others to treat the one with respect.

Another very important thing which the researcher wants to share with all females is, that don't be afraid to have a dream. Because one of the most amazing things about this life is that if we work hard to fulfil the dreams, they can be converted into reality. Success story given in the (IPR, News Service, 2010, website) can help women enabling them to participate efficiently on the path of development. With self-belief, determination and faith, impossible things can also be achieved. Though, it won't be easy, but it's easier than spending one’s life wishing that one would have done something, and feeling disappointed in one for never having tried.

Women's empowerment cannot take place unless women come together and decide to self-empower themselves. Success story of (Mittal, Priyanka Mukherjee, 2010) is a live example of self-empowerment through political empowerment. A movement has to be build which awakens the individual self in each and every woman for creative and generative action. This shall help us sow the seed for real women empowerment in India.

With a strong focus on gender equality, there is a requirement to sustain a global effort for education as well as developmental programmes for the upliftment of the women. The goal of any developmental policy, programme or project should be directed towards enabling the women in learning a skill, literacy and earning income to support their family in particular and in building social capital for the balanced progress of any country/state. Such kind of endeavours directed towards the womenfolk will lead to a positive change in their social and economic status, life, attitude, and behaviors ultimately leading to the development of the rural economy. It would be a very long drawn and difficult battle but the reward is worth the effort.

5.3 Scope for Future Research

A review of research work done on this topic shows that the following areas can be identified as potential for future research.

5.3.1 Interest of younger generation in taking up farming activities

Analysis of the data for age wise frequency of female farmers has shown that out of the total 230 women surveyed, 55%, 41% and 04% fall in the 20-39 years, 40- 59 years and > 60 yrs categories of age respectively. The data has depicted the older aged female participation in the farming is more. The data also has portrayed their views about not wanting the younger generation to be absorbed in the farming. This becomes a matter of great concern that this type of view will prevent the younger generation to enter in farming thereby negatively affecting the food supply. Why females hold these type of views offer the future scope to be studied.

5.3.2 Problems and prospects in creating other income generating activities for rural women

Analysis of the data has depicted the preference wise frequency of various options sample female farmers opted for doing any entrepreneurial activity to enhance their income. It shows that 43% females have opted for poultry, 39% females have opted for cow, 09% females have opted for fish farming, 05% females have opted for silkworm/honey bee and 04% females have opted for others.

Since significantly more number of sample female farmers have opted for doing any entrepreneurial activity to enhance their income for improving their socio-economic condition. Hence, few activities like food processing business, milk processing, poultry/fishing industry, and sericulture have been suggested for them.

Problems and prospects faced by rural women in creating such income generating activities provide the basis for future scope to be studied.

- **Milk processing-**

The export of dairy products has been growing @ 25% per annum in terms of quantity and 28% in terms of value. So, it provides a great scope for the manufacturing of value added milk products like milk powder, packaged milk, butter, ghee, cheese and ready to drink milk products. The presence of healthy casein of type A2 offers great scope for export of cow's milk and milk products from India.

The data collected by the researcher did not find even a single sampling unit who is not rearing milch animal (cow)/ not selling milk. Since the state has been declared an organic one, so, things including milk are produced organically here. Milk by-products viz. cheese, churpi, ghee, paneer etc. are produced locally but in a limited scale. In Sikkim an autonomous body under the name of Sikkim co-operative milk producers' union limited has been established. Milk is handled through 150 milk societies in the state.

Since organically produced things are in great demand nationally/internationally, it can even help them in earning foreign exchequer also if handled properly and operated commercially under some expert supervision of animal husbandry department. This act will definitely make them economically independent and becomes the scope for further study.

- **Poultry/fishing industry-**

Fish farming provides many profitable opportunities. On the commercial level, the raising and selling of fish has proven to be economically successful at many places. The healthy farm-reared fish, guarantee free of diseases, pesticides and other harmful toxicants is more desirable substitute for the wild fish from potentially polluted waters. Fish farming requires special knowledge, skills, and careful considerations. There is also great scope for women to earn money by rearing fish. As 9% of the females have given their choice for it, therefore small scale fish farming as is suggested in the model in section 4.2.10 of chapter IV, can be proved beneficial and economical to the small land sized female farmers. Farming with Azolla requires more man-power being labour-intensive farming systems. Women can be gainfully employed in this type of farming system. Therefore, pisciculture with this type of integrated farming involving women provides the basis for future study.

- **Sericulture**

Sericulture is an eco-friendly agro-based labour intensive rural cottage industry. Also the services of women are required more in this industry. More number of women get involved in mulberry cultivation as well as in silkworms rearing houses. Though the sericulture programme has been implemented in the state and the Sericulture Department of Sikkim promotes exports of silk from Sikkim, yet there is not enough manpower that is skilled and capable to make use of the opportunities as people do not have the required capacity or the skill for that. So, if guided properly female farmers can harness it fully to multiply their income. Mulberry trees if grown in a manner as suggested in the flow diagram will help in integrated farming. Any problem faced by females while conducting this activity can get a solution from sericulture department or (http://www.csb.gov.in/faq/csrti-pampore) can be referred. Solutions by the department for the problems faced by the farmers of Pampore while conducting mulberry cultivation for sericulture are given on this site. This is also given in the literature review.

But to get the optimum results from this activity, training of women in sericulture by extension personnel is very important as they need close help and constant encouragement to acquire skills in sericulture. Special training and attention can be taken from Women Sericulture Cooperative Society to organize and support the women, who are interested to take up sericulture as their main income generating source. Women in the venture will provide the scope for future study.

- **Food processing business –**

With continuously growing middle class, incessantly expanding secondary and tertiary sectors, busy working schedules with both spouses working and rigid food habits, the demand for packaged chapaties, quick cooking rice, packaged ready to heat and eat dals and curries, though produced at small scale but using modern packaging and handling technology is going to get increased in the due course of time.

Sikkim is an apple/orange growing state. Because of the suitable climate for apple growth in the North district, it is grown in that area the most. It will help in integrated farming if grown in a manner as suggested in the flow diagram. Unskilled women labour can also be employed in these orchards productively.

During hailstorm/heavy rains so many unripe fruit fall on the ground. They can be taught the alternative innovative uses of this fruit like making different types of achar, murabba, chutney with them. Also very valuable phytochemicals which are used to fight cancer can be extracted from unripe apple. This way, along with getting gainful employment for collecting raw fruit, farmers can get even economic returns from their fallen fruits.

If guided and trained properly using extension workers, women can harness opportunity in this up coming-area and also becomes the scope for further study.

- **Avenues in floriculture (Saffron)**

Floriculture is one of the allied sectors of the agriculture. It is believed that if females are employed in this noble sector, it will flourish more. For the simple reason that flowers are being nurtured by nature and females, who also nurture their families, can help in exploiting the plethora of potential waiting to be tapped and efficiently running of this sector. In Sikkim, there are 4500 species of flowers. To promote Sikkim at the international level, an international show is also held in the state. At present, Sikkim is producing cut flowers, which includes roses, Lilium and Anthurium on a commercial scale. Sikkim is the only state in the country which produces high value cymbidium orchids. It has also been designated as the agriculture export zone with particular emphasis on production and export of large cardamom, ginger and cherry pepper.

Besides this, as is seen in literature review, saffron is cultivated in Pampore town of Pulwama district in the state of Jammu and Kashmir, located at 34.02°N 74.93°E and has an average elevation of 1,574 meters (5,164 feet). It is one of the only four producers of saffron in the world. It produces world famous quality saffron. Along with employing women in this noble venture it fetches them good return, as it is sold at a very high price. If saffron is cultivated on the pattern of Pampore in the area of same elevation and climatic conditions as of Pampore in Sikkim also, it will help in earning a good amount by meeting the intensified demand throughout the globe. Women in this activity in Sikkim provide the scope to be studied.

5.3.3 Micro-credit status of farmers in Sikkim

The data has shown the dominance of informal source through moneylender to avail credit. Moreover, in order to fulfil the credit demand of the farmers, in the absence of adequate banking network, informal credit supply through SHGS (rather than moneylender) has been suggested . Microcredit is the extension of very small loans (microloans) to impoverished borrowers who typically lack collateral, steady employment and a verifiable credit history. It is designed not only to support entrepreneurship and alleviate poverty, but also in many cases to empower women and uplift entire communities by extension. Microcredit is widely used in developing countries and is presented as having "enormous potential as a tool for poverty alleviation. Therefore micro-credit status of female farmers in Sikkim can be studied.

5.3.4 Impact of women's participation in decision-making of farm/animal related activities on productivity

What is impact of the suggestion that the decision making authority of farm/animals related activities in which their relative participation is more on the productivity becomes the basis of further study.

5.3.5 Economic valuation of the contribution made by women in farming sector

The data has shown that most farmers have small land-holding and consequentially they live in subsistence economy. Therefore economic valuation of the contribution made by women in farming sector for the suggestion (mechanisms to enhance their income may be devised), can be studied.

BIBLIOGRAPHY

A. Journal Articles

Adereti, F.O. (2005). Rural Women's Access to and Control over Productive Resources: Implications for Poverty Alleviation Among Osun-State Rural Women, Nigeria. *Journal of Human Ecology*, 18 (3): 225-230.

Agriculture Department (soil), Government of Sikkim

Ahmad, F. (2001). Gender Division of Labour: Bangladesh Context. *Steps towards Development*, 6 (1): 7-26.

Akanda ,M. Aminul Islam and Shoichi Ito,(2008). Evolution of Land Ownership and its Market in Rural Bangladesh - case study of a selected clan in Krishnapur village, Sherpur district, *International Journal of Rural Studies (IJRS)* vol. 15 no. 2 Oct 2008, Article 7 Page 1 to 9.

Alam, M. R., Sarker, R. I., Hossain, M. D. and Islam, M. S. (2000); Contribution of Livestock to Small Farms in Bangladesh, *Asian-Australian Journal of Animal Sciences*, 13 Supplement, 339-342.

Awais Mohammad, Alam Tosib, Asif Mohd. (2009). Socio-economic empowerment of tribal women:An indian perspective, *International Journal of Rural Studies (IJRS)* vol. 16 no. 1 October 2009, Article 5 Page 1 to 11.

Balk, D. (1997) Change Comes Slowly for Women in Rural Bangladesh. *Asia-Pacific Population & Policy*, 41: 4.

Barry, R.G. (1992). Mountain climatology and past and potential future climatic changes in mountain regions: a review. *Mountain Research and Development*. 12: 71-86.

Bayne, D. R., Dunseth D., and Ramirios C. G. (1976). Supplemental Feeds Containing Coffee Pulp for Rearing Tilapia in Central America" *Aquaculture* 7, pp. 133 – 46.

Bhattarai, N.K. (1988). Home herbal remedies of the urban population of Kathmandu valley, Nepal. *Journal of Nepalese Pharmacog. Association*, 15(1-2):13-27.

Bhatty, Kiran (2006). "Employment Guarantee and Child Rights", Economic & Political Weekly, 41(20): 1965-67. - (2008), "Falling through the Cracks", *The Hindu*, 16 March.

Bui Xuan, An, Preston T. R . and Dolberg F.(1997). The introduction of low-cost polyethylene tube biodigesters on small scale farms in Vietnam. *Livestock Research for Rural Development.* (9) 2: http:/www.cipav.org.co/lrrd/lrrd9/2/an92.htm.

Cecelski E (1987). Energy and rural women's work: Crisis, response and policy alternatives. *International Labour Review,* 126(1).

Chandel, S.; Chandel, K.S.; Dogra, R. and Singh, S. (2008). Trends in women's contributions agricultural productivity–a sociological perspective in Himanchal Pradesh. *Kurukshetra*, 56 (3): 28-32.

Chara J, Pedraza G X and Conde Natalia (1999). The productive water decontamination system: A tool for protecting water resources in the tropics. *Livestock Research for Rural Development* (11) 1: http:/www.cipav.org.co/lrrd/lrrd11/1/cha111.htm

Chat Tran Hoang, Dung Ngo Tien, Binh Dinh Van and Preston T R, (2005). Effect on yield and

composition of water spinach (Ipomoea aquatica), and on soil fertility, of fertilization with worm compost or urea, *Livestock Research for Rural Development*, 17 (10) 2005. Retrieved June 2, 2012 from, http://www.prairieswine.com/pdf/34420.pdf

Chattopadhyay Manabendu, (1982). "Role of Female Labour in Indian Agricultures". *Social Scientist*, Vol 10, No 7, Jul 1982, P-43.

Chattopadhyay S. S.,(2006), Harvest of prosperity, *Frontline*, Volume 23 - Issue 24 :: Dec. 02-15, 2006.

Chaudhury Sarmishtha, (2004) .Invisible Activities of Rural Women, *Kurukshetra*, vol. 52, No. 9, July 2004.

Chekkutty N. P. (2005) "Indian women in the Age of Globalisation", *InfoChange* News & Features, February 2005 available at http://infochangeindia.org/women/books-a-reports/indian-women-in-the-age-of-globalisation.html

Chelladundi, A. (1999). "Employment Generation in Sericulture." *Khadi Gramodyog*, 38(1): 20-22.

Dhamala, Ranju R., (1985). A Study of Local Self Government and Democratic Decentralization in Sikkim (*unpublished Ph.D. thesis*), University of North Bengal, Darjeeling.

Fließbach A., Oberholzer H., Gunst L., and Mäder P. (2006). Soil organic matter and biological soil quality indicators after 21 years of organic and conventional farming. *Agriculture, Ecosystems and Environment* 118: 273-284.

Flora, C.B. (2001) Access and Control of Resources: Lessons from the SANREM-CRSP. *Agriculture and Human Value*, 18 (1): 41-48.

Fujita, Koji, Masayoshi Nakawo, Yoshiyuki Fuji and Prem Paudyal (1997). Changes in glaciers in hidden valley, Mukut Himal, Nepal Himalayas, from 1974 to 1994. *Journal of Glaciology* 43 (145) : 583-588.

Gaur, V.K. (1998). Mitigating disasters in the Himalaya – A basic agenda for development. Pt. G.B. Pant memorial lecture : VIII, *GBPIHED*, Kosi-Katarmal, Almora.

Ghosh , Gopi & Chowrasia Sneha (2010). Enhancing capacity of farmers to face disasters. Survey of Indian agriculture, *The Hindu*. pp-115-116.

Gill J K, Dhillon MK, Sidhu M K(2007).Women in agriculture: Impact of their participation on the home environment, *International Journal of Rural Studies (IJRS)* vol. 14 no. 1 April 2007, Article 2, Page 1 to 7.

Goetz, A.M. and Gupta, R.S. (1996) Who Takes the Credit? Gender, Power and Control over Loan Use in Rural Credit Programs in Bangladesh. *World Development*, 24 (1): 45-63.

Govt. of Sikkim, Krishi Bhawan 1. *Krishi Samachar*, Vol. 1, No. 5, Special issue, p. 13.

Govt. of Sikkim, Krishi Bhawan 2. Op. cit., p 14.

Griffin, K., Khan, A. R. & Ickowitz, A. (2002). Poverty and Distribution of Land. *Journal of Agrarian Change*, Vol. 2 (3): 279-330.

Guyer, Jane I. (1980). 'Food, cocoa and the division of labour by sex in two West African societies', Comparative Studies in *Society and History*, 22, (3): 355-73.

Harris, J. R. and M. P. Todaro (1968), "Urban Unemployment in East Africa: An Economic Analysis of Policy Alternatives," *East African Economic Review* (Dec. 1968).

Harris, J. R. and M. P. Todaro, (1970). "Migration, unemployment and development: A two sector analysis. *American Economic Review*, 60; 126-142.

Husain, A.M.M. and Mallick, D. (1998) Conclusion and Policy Implications, pp. 173-183, in: A.M.M. Husain (ed.) Poverty Alleviation and Empowerment. Research and Evaluation Division, BRAC Centre, Dhaka in Bangladesh, *Asian-Australian Journal of Animal Sciences*, 13 Supplements, 339-342.

Info Change News & Features, (August 2003). Women who own property are less likely to face marital violence, *Info Change*, August 2003. D.o.i. http://infochangeindia.org/women/books-a-reports/women-who-own-property-are-less-likely-to-face-marital-violence-study.html

Ingram M. (2007). "Biology and Beyond: The Science of ''Back to Nature'' Farming in the United States.". *Annals of the Association of American Geographers* Volume 97, Issue (2): 298–312. doi:10.1111/j.1467-8306.2007.00537.x.

Islam, M. T. & Omori, K. (2004). Inequality, Poverty and Agriculture in Rural Bangladesh: Perspective from a village study. *Japanese J. of Farm Management*, Vol. No. 122, P p. 24-36

Jaitner, J., Sowe, J., Secka Njie, E., Dempfle, L. (2001). Ownership pattern and management practices of small ruminants in The Gambia - implications for a breeding programme. *Small Ruminant Research*. 40: 101-108.

Jensen, K. L., B. C. English, and R. J. Menard. (2009). Livestock Farmers' Use of Animal or Herd Health Information Sources. *Journal of Extension*. Vol. 47 No. 1 pp. 1,FEA7. Available at ttp://www.joe.org/joe/2009february/a7.php

Joshi, Meenakshi. (2004).Women's empowerment : experience from watershed project. *SocialWelfare*, 51(4) : 32-37. June 2005. USA: US Library of Congress.

Justice, J. (1981). International planning & health; an anthropological case study of Nepal, *PhD thesis*. Berkeley CA. The University of California Press. USA.

Kaur H (1996). Impact of women's employment on family environment. *PhD dissertation*, Punjab Agricultural University, Ludhiana, India.

Kean Sophea and Preston T R (2001). Comparison of biodigester effluent and urea as fertilizer for water spinach vegetable. *Livestock Research for Rural Development* (13)6. Retrieved June 2, 2011 from, http://www.cipav.org.co/lrrd/lrrd13/6/Kean136.htm

Kelkar Govind (2011). Gender and Productive Assets: Implications for Women's Economic Security and Productivity, *Economic & Political Weekly*, June 4, vol xlvi no 23, 59-68.

Kerns, C. L. and Roelofs E .W. (1977).Poultry Wastes in the Diet of Israeli Carp, Israeli *Journal of Aquaculture – Bamidgeh*, 29 (4) pp. 125 – 35.

Khera, Reetika and Nandini Nayak (2009). "Women Workers and Perceptions of the National Rural Employment Guarantee Act", *Economic & Political Weekly*, 44(43):49-57.

Krishna Radha, P.G., B. M. Sekharappa and V.G.Manibashetty (2000). "Silk and Milk – an Economic Package for Rural Upliftment." *Indian Silk*, Sept. pp. 11 - 12.

Krishnaraj, Maithreyi, Divya Pandey and Aruna Kanchi (2004). "Does EGS RequireRestructuring for Poverty Alleviation and Gender Equality? II - Gender Concerns andIssues for Restructuring", *Economic & Political Weekly*, 39 (17): 174-47.

Kumar, Ananda p. (2010). Conventional technologies are inadequate. Survey of Indian agriculture, *The Hindu* . pp-72-73.

Kumar, S., Chander, M. and Harbola, P.C. (2000); Livestock based farming system – A case study of Kumaon hills, *Himalayan Ecology & Development* Vol. 8, (2).

Kumaraswamy & Khan, (2010). Management for sustainable for high- productive farming, Survey of Indian agriculture. *The Hindu* . pp-66.

Kwapong O. Adwoa Tiwaah Frimpong, (2008). The most affected in land issues – women, migrants, urban dwellers, *International Journal of Rural Studies (IJRS),*vol. 15 no. 2 Oct 2008. Article 4 Page 1-10.

Lalnilawma, (2009), Employment assurance scheme: An impact assessment, *International Journal of Rural Studies (IJRS)* vol. 16 no. 3 April 2009, Article 3 Page 1 to 8.

LaSalle, T. and P. Hepperly (2008). Regenerative Organic Farming: A Solution to Global Warming. *Rodale Institute*. The Rodale Institute has been comparing organic agricultural systems and conventional systems since 1981,Pp-3.

Lastarria-Cornhiel, S. (1997). Impact of privatization on gender and property rights in Africa. *World Development* 25 (8): 1317-1333.

Le Ha Chau (1998a). Biodigester effluent versus manure from pigs or cattle as fertilizer for production of cassava foliage (Manihot esculenta). *Livestock Research for Rural Development* (10) 3. Retrieved June 2, 2011 from http://cipav.org.co/lrrd/lrrd10/3/chau1.htm.

Le Ha Chau (1998b). Biodigester effluent versus manure, from pigs or cattle, as fertilizer for duckweed (Lemna spp.). *Livestock Research for Rural Development* (10) 3. Retrieved June 2, 2011 from http://cipav.org.co/lrrd/lrrd10/3/chau2.htm.

Manandhar, N.P. (1980). Some lesser known medicinal plants of Rasuwa district, Nepal, *International Journal of Crude Drug Research*, 18(3):147-151.

McSweeney, B.G. (1979). Collection and analysis of data on rural women's time use. *Studies in Family Planning* 10(11/ 12): 379–83.

Meena, M. (2005). Adoption of improved technology of Aonla plantation in Udaipur district of Rajasthan. *M.Sc. (Ag.) Thesis*, Maharana Pratap University of Agriculture and Technology, Udaipur.

Meena,HR, Sharma FL(2006).Constraints in Jatropha Cultivation Perceived by Farmers in Udaipur District, Rajasthan, *International Journal of Rural Studies* (IJRS),vol. 13 no. 2 Oct 2006, Article 5 Page 1 to 4.

Mehrotra, Santosh (2008). "NREG Two Years On: Where Do We Go from Here?", *Economic & Political Weekly*, 43(31): 27-35.

Meludu, N.T.; Ifie, P.A.; Akinbile, L.A. and Adekoya, E.A. (1999). The Role of Women in Sustainable Food Security in Nigeria: A Case of Udu Local Government Area of Delta State. *Journal of Sustainable Agriculture*, 15 (1): 87 - 97.

Mette I .L. (1998) Evaluation of the impact on women's lives of the introduction of low cost polyethylene biodigesters on farms in villages around Ho Chi Minh City, Vietnam. *Livestock research for rural development*, vol. 3 No 3 1998.

Mishra Seema, Sharma Satyawati, Vasudevan Padma, Bhatt R. K., Pandey Sadhna, Singh Maharaj, Meena B.S. and Pandey S.N.(2008). Gender Participation and Role of Women in Livestock Management Practices in Bundelkhand Region of Central India, International Journal of Rural Studies (IJRS),vol. 15 no. 1 April 2008,ISSN 1023–2001 www.ivcs.org.uk/IJRS, Article 2 Page 1 to 9.

Mishra, P. and Sundram.(1975).Some aspects of the economics of harvest combines in Punjab. *Economic & Political Weekly*. 10(39).

Muske, G., & Stanforth, N. (2000). The education needs of small business owners: A look into the future. *Journal of Extension* [On-line], (38)6 Article 6FEA4. Retrieved May17, 2011 from http://www.joe.org/joe/2000december/a4.html

Nandy, S.N. and Samal, P.K. (2005). An outlook of agricultural dependency in the IHR. ENVIS Newsletter : *Himalayan Ecology* 2 : 4-5.

Narayanan, Sudha (2008): "Employment Guarantee, Women's Work and Childcare", *Economic & Political Weekly*, 43(9): 10-13.

Neelam, K. (2006). Knowledge and adoption of Garlic production technology by the farmers of Begun Tehsil in Chittorgarh district of Rajasthan. *M. Sc. (Ag.) Thesis*, Maharana Pratap University of Agriculture and Technology. Udaipur.

Nichols, S.; Crowley, E. and Komjathy, K. (1999). Women's Access to Land: Surveyors can Make a Difference. *Survey Quarterly*, 20: 16-19.

Okech, Bernard A.; Mwobobia, Isaac K.; Kamau, Anthony; Muiruri, Samuel; Mutiso, Noah; Nyambura, Joyce; Mwatele, Cassian et al. (2008). "Use of Integrated Malaria Management Reduces Malaria in Kenya". PLoS ONE. 2008; 3(12): e4050. doi:10.1371/journal.pone.0004050 http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0004050

Sinn, R., Ketzis, J. and Chen, T. (1999). The role of woman in the sheep and goat sector. *Small Ruminant Research*. 34: 259-269.

Pala, A.O. (1983). Women's access to land and their role in agriculture and decision-making on the farm: experiences of the Joluo of Kenya. *Journal of Eastern African Research and Development,* 13: 69–85.

Parveen, Shahnaj (2008).Access of rural women to productive resources in Bangladesh: a pillar for promoting their empowerment, *International Journal of Rural Studies (IJRS),* vol. 15 no. 1 April 2008. Article 4 Page 1- 8.

Pich Sophin and Preston T R (2001). Effect of processing pig manure in a biodigester as fertilizer input for ponds growing fish in polyculture. *Livestock Research for Rural Development* (13) 6. Retrieved June 7, 2011 from http://www.cipav.org.co/lrrd/lrrd13/6/Pich136.htm

Pimentel, D., Hepperly, P., Hanson, J., Seidel, R., and Douds, D. (2005). Environmental, energetic, and economic comparisons of organic and conventional farming systems. *Bioscience* 55(7): 573-582.

Pitt, M.M.; Khandker, S.R. and Cartwright, J. (2006). Empowering Women with Micro Finance: Evidence from Bangladesh. *Economic Development and Cultural Change*, 54 (4): 791–831.

Prabu, M.J. (2010). Integrated farming can alone help farmers. Survey of Indian agriculture, *The Hindu*. Pp-18-19.

Quisumbing, A. R., and K. Otsuka. (2001). Land inheritance and schooling in matrilineal societies: Evidence from Sumatra. *World Development* 29 (12): 2093-2110.

Rahman et. al. (2009). Traditional ginger cultivation in northeast India, *Indian J Traditional Knowledge*, Vol. 8, No. 1, January 2009.

Ram S., Tripathi, A. and Shankar, R. (2009); Investment pattern in crop – livestock production system in Gonda district of Uttar Pradesh, *Agricultural Science Digest*, 29 (1)

Rani Usha J., (2007). Employment Generation to Women in Drought Prone Areas: A Study With Reference to the Development of Sericulture in Anantapur District of Andhra Pradesh. *Journal of Social Science*, pp: 249-255.

Regmi PP, Weber KE (1997). Achieving sustainable agriculture through recognizing genderroles: some salient points. *Gender and Technological Development*. 1997 May-Aug;1(2):225-45.

Sadangi, B.N; Mishra, B. and Patel, J.B. (1996). Socio-personal dimension of participation of women in Farm Activities. *Indian J. Extn. Edu*., 32 (1 & 4):30-34.

Samnohtra Nidhi (1992). Role of Female Labour in India's Agriculture Sector. *M.Phil dissertation, Himachal Pradesh University, Summer Hill, Shimla, India,* pp-2.

Singh S. S. & Singh S. K. (2010). Marching towards enhanced productivity. Survey of Indian agriculture, *The Hindu* . pp-28-30.

Singh Y K, Kaushal S K, Gautam SS,(2007). Performance of women's self help groups (SHGs) in district Moradabad, U.P. *International Journal of Rural Studies (IJRS)* vol. 14 no. 2 Oct 2007, Article 4, Page 1-5.

Singh, E. Bijoykumar (2009). 'Understanding Economic Growth in the North', *Dialogue* January - March, 2009, Volume 10 No. 3. Available at http://www.asthabharati.org/Dia_Jan%2009/E.Bij.htm

Singh, N.B. and Sharma, D.D. (1995). Tribal farmer's constraints in adoption of scientific agro forestry practices. *Advances in Horticulture and Forestry*. 4:205-208.

Singh, S. (2007). Schooling Daughters and the Gender and Development Paradigm: Quest for an Appropriate Framework for Women's Education. *Journal of Interdisciplinary Social Sciences*, 2(3), 1-12.

Singh, S., & Hoge, G. (2010). Debating Outcomes for 'Working' Women – Illustration from India, *The Journal of Poverty*, 14 (2), 197-215.

Sridhar Lalitha, (2003), Women work the land but do not inherit it, *InfoChange* News & Features, May 2003 available at http://infochangeindia.org/women/books-a-reports/women-work-the-land-but-do-not-inherit-it.html

Talukdar, Ratna Bharali (2008). "NREGA Shines for Tripura Women", *IndiaTogether*, 30 June available at http://www.indiatogether.org/2008/jun/wom-nrega.htm

Tamale, S. (2004) Gender Trauma in Africa: Enhancing Women's Links to Resource. *Journal of African Law*, 48 (1): 50-61.

Thapar Ruby, (2010). Empowering women through Self-Help-Groups, *Yagna*, Vol. 3, April-June 2010. http://www.vedantaresources.com/sustainability/files/Yagna%20-%20Vol%203.pdf

Tiwari Nivedita, (2010). Economic and Technological Constraints facing Farm Women, *International Journal of Rural Studies (IJRS),*vol. 17 no. 1 April 2010, Article 7 Page 1 of 5.

Uma Rani and Unni Jeemol, (2003).Women, work and insecurities in India. Ahmedabad : *Gujarat Institute of Development Research*, Pp.- 30.

Umale, P.B., Bhople, R.S. and Sangane, M.A. (1991). Adoption of agro-forestry by farmers. *Maharashtra Journal of Extension Education*, 10:145-147.

Umeh, J. C., W.L. Lawal, V.U. Oboh (2006). Agricultural Productivity and Poverty Alleviation Issues: The Nigerian Perspectives. *International Journal of Agriculture Research and Extension*.9 (27-42)

Vaish, S. (1999). Involvement of rural women in decision making relating to rice production technology adoption in community development block Milkipur, Faizabad (U.P.) *M.Sc. (Ag.) Thesis*, NDUAT, Faizabad.

Valdivia, C. and Gilles, J. (2001) Gender and Resource Management: Households and Groups, Strategies and Transitions. *Agriculture and Human Value*, 18 (1): 5-9.

Vieyra R R (2000). Monitoreo de biodigestor de bajo costo usando como sustrato estiercol bovino. *MSc thesis*. University of Michoacán, México.

Viola , S. (1977).Energy Value of Feedstuffs for Carp. Israeli Journal of Aquaculture – *Bamidgeh*, 29 (1), pp. 29-30.

Von Braun, J., and P.J.R. Webb. (1989). The impact of new crop technology on the agricultural division of labor in a West African setting. *Economic Development and Cultural Change* 37(3): 513–34.

Watson CA, Atkinson D, Gosling P, Jackson LR, Rayns FW. (2002). "Managing soil fertility in organic farming systems". *Soil Use and Management* 18: 239–247.

B. Book

Acharya, M. (2003). *Efforts at Promotion of Women in Nepal. Kathmandu*: Tanka Prasad Acharya Foundation.

Arthur, W. (2000). Process design of Agricultural digesters. AD-NETT- A Network on Anaerobic digestion of Agro- industrial wastes, *Anaerobic digestion : Making energy and solving modern waste problems* edited by Henrik O 2000, p: 8-21.

Baumgartner, A. (1980). Mountain climates from a perspective of forest growth. In: Benecke, U. & Davis, M.R. (Eds.). *Mountain Environments and Sub-alpine Tree Growth*. New Zealand Forest Service, Wellington. pp. 27-39.

Bhadra Mita, (1991).*Women in Tea Plantation in Women in Agriculture: Their Status and Role*, Vol. 1, Edited by R.K. Puria, Northern Book Centre, New Delhi.

Bhagoliwal, T.N., (1976) *Economics of labour & Social Welfare*, Sahitya Bhawan, Agra, 1976, P-49.

Bhasin, M.K. & Bhasin, Veena. (1995). *Sikkim Himalayas: Ecology and Resources Development*, Kamla-Raj Enterprise, Delhi.

Bhatt, N., Shrestha, L., Thomas-Slayter, B. and Koirala, I. (1994). *Managing Resources in Nepalese Village: Changing Dynamics of Gender, Caste and Ethnicity*, Clark University, Massachusetts.

Botero ,R. and Preston, T. R.(1995). *Low-cost bio digester for production of fuel and fertilizer from manure*. Manuscript in edited CIPAV, Cali, Colombia, pp 1-20.

Chandrakala Diyali, *A Situational Analysis of Women and Daughters in Sikkim, National Commission for Women*, New Delhi available at http://ncw.nic.in/pdfreports/Sikkim%20Book.pdf

Deckard, Barbara S. (1983); The Women's Movement: Political, Socio-economic and Psychological Issues. Harper & Row Publishers, NY.

Denholm, Jeannette (1991). *Agroforestry in mountain areas of the Hindu Kush-Himalayan region*, Published by International Centre for Integrated Mountain Development (Kathmandu, Nepal), Volume 17 available at http://www.getcited.org/puba/103267688

Grace, J. (2005). *Who Owns the Farm? Rural Women's Access to Land and Livestock*. Kabul: Afghanistan Research and Evaluation Unit (AREU).Implications, pp. 173-183, in: A.M.M.

Griffin, K. (1974). *The Political Economy of Agrarian Change: An essay on the green revolution*. London: Macmillan Publishing Company.

Haque T., (2003). *Decent Work in Agriculture in India* In a Report of the Asian Regional Workshop 18th to 21st August 2003, International Labour Office, Bangkok edited by D.P.A. Naidu and A. Navamukundan, Pp-194 available at http://ilo-mirror.library.cornell.edu/public/english/dialogue/actrav/new/agsymp03/dwaa032.pdf.

Hossain, M. (1989). *Green Revolution in Bangladesh: Impact on growth and distribution of income*. Dhaka: University Press Limited.

Hossain, M., Bose, M. L., Chowdhury, A. & Dick, R. M. (2003). *Changes in Agrarian Relations and Livelihoods in Rural Bangladesh*. In Agrarian Studies, Ramachandran, V. K. and Swaminathan M. (eds.), London: Zed Books, pp. 369-391.

IFPRI (2000). *Resource Allocation and Empowerment of Women in Rural Bangladesh*. International Food Policy Research Institute, Washington, DC.

Joshi Mahesh V., (1999). *Women Rural Labourers: Problem and Prospects*. 1991 APH Publishing Corporation, 5, Ansari Road, New Delhi.

Majumdar, R. C. and Pusalker, A. D. (Editors) (1951): *The history and culture of the Indian people*. Volume I, The Vedic age. Bombay: Bharatiya Vidya Bhavan 1951, p.394

Marshall Alfred, (1964). *Principles of Economics*, Macmillan & Company Ltd., London-1964, P-54.

Negi, S.S., (1991). *Himalayan rivers, lakes and glaciers*. Indus Publishing Co. New Delhi, pp.182.

Parrota, J.A., (2001). *Healing Plants of Peninsular India*. CABI, New York.

Lewis, W. A., (1954). *Economic development with unlimited supplies of labour*. The Manchester school, Pp 131-191.

Prasad C. and Singh R.P., (1992). *Farm Women: A precious Resource. in Women in Agriculture*, Vol. 2, Education, Training and Development edited by R.K. Punia, 1992, Northern Book Centre, Ansari Road, New Delhi.

Pruthi, Raj Kumar; Rameshwari Devi and Romila Pruthi (2001). *Status and Position of Women: In Ancient, Medieval and Modern India*. Vedam books. ISBN 81-7594-078-6.

Rahman, H Z. (1998). *Rethinking Land Reform*. In Bangladesh Agriculture in the 21st Century, Faruqee Rashid (ed). Dhaka: The World Bank and University Press Limited. pp. 67-80.

Rajula Devi A.K. ,(1989). *Women in agriculture and rural areas-India*, Working Paper 183, Published by Michigan State University, April 1989.

Ramakrishnan, P.S., (1992), *Shifting Agriculture and Sustainable Development: An Interdisciplinary Study from Northeastern India*. UNESCO-MAB Series, Paris, Parthenon Publ., Carnforth, Lancs. U.K. p. 424. (republished by Oxford University Press, New Delhi 1993).

Rao, K.S. & Saxena, K.G. (1994). *Sustainable Development and Rehabilitation of Degraded Village Lands in Himalaya*. Bishen Singh Mahendra pal Singh, DehraDun.

Sathianathan, M. A. (1975). *Biogas Achievements and Challenges*. Assoc. Voluntary Agencies for Rural Development. New Delhi, India.

Sethi, Raj Mohini, (1991) .*Women in Agriculture*. Rawat Publications, Jaipur, Rajasthan.

Sharma, E., Sundriyal, R.C., Rai, S.C., Bhatt, Y.K., Rai, L.K., Sharma, R. & Rai, Y.K. (1992). *Integrated Watershed Management*. Gyanodaya Prakashan, Nainital.

Sharma, M. (1995). *Gender Implications of Changes in Technology and Cropping Patterns for Labor Use in Rice-Based Farming Systems in Nepal*. Bangkok, Asian Institute of Technology.

Shiva Vandana, (1991). *Most Farmers in India are Women*, FAO, New Delhi, 1991.

Singh, R.L. (1971). *India - A Regional Geography*. National Geographical Society of India, Varanasi.

Sujaya, C.P. (2001).Climbing a long road : women in agriculture in India : ten years after Beijing.Chennai : M.S. Swaminathan Research Foundation. 132 p.

Trager, J. (1996). *The Food Chronology*, Aurum Press, London
Valdiya, K.S. (2001). *Himalaya : Emergence and evolution*. University Press Publ., Hyderabad, pp. 139.

Valdiya, K.S.(1993). *Environmental status assessment – The Himalaya*. In, Environmental problems and prospects in India (ed. M. Balakrishanan), Oxford & IBM Publishing Co. Pvt. Ltd., New Delhi.

Verma Shashi Kanta, (1992).*Women in Agriculture: A Socio Economic Analysis*. 1992, Concept Publishing Company, A 15-16, Commercial Building, Mohan Garden, New Delhi.

C. Report and conference

ADB (2001). *Women in Bangladesh*: The Country Briefing Paper. Manila: Asian Development Bank.

Agriculture Statistics at a Glance, sourced from *Registrar General of India*, New Delhi 2001

Annamalai, S.J.K. (2005); *Long-term Strategies and Programmes for Mechanization of Agriculture in Agro Climatic Zone–X: Southern Plateau and Hills region*. In report of the project. "Study relating to Formulating Long-term Mechanization Strategy for each Agro Climatic Zone/State" Indian Agricultural Statistics Research Institute, New Delhi, 2001

Anon, (1995). *Environmental Education Training Module in Agriculture*. Graduate Training Institute, Bangladesh Agricultural University and Food and Agriculture Organisation.

Aryal S. S. et. al., (2004). *The role of women in land management and conservation - a case from the middle-hill region of Nepal*, 13th International Soil Conservation Organisation Conference ISCO– Brisbane, July 2004,Conserving Soil and Water for Society: Sharing Solutions.

Axinn, N. (1977). *Reports on women's role: The Status of Women in Nepal*, Volume I, Part 04.Centre of Economic Development and Administration, Katmandu, Nepal.

Baden, S. (1997). *Gender Inequality and Poverty: Trends, Linkages, Analysis and Policy Implication*. BRIDGE (development - gender), Institute of Development Studies, University of Sussex, UK.

Barbara ,K.(2000). *Environmental aspects of Biogas technology*. Result from GTZ -project " Promotion of anaerobic technology 1998.

Brara, N. Vijaylakshmi. (2006). *A Situational analysis of women and daughters in Manipur.* New Delhi : National Commission for Women. Pp - 179.

CBS (1996). *Nepal Living Standards Survey Report 1996*. Main Findings - Volume One. Kathmandu, Central Bureau of Statistics.

Census of India (2011), available at http://censusindia.gov.in/2011-*prov- results*/prov_data_products_sikkim.html

Census of India : 1981, 1991, 2001

Census of India,(2001). *Economic characteristics of Indian Population*, Office of the Registrar General, Government of India, New Delhi.

Chaney M. Elsa & Lewis W. Martha, (1985). *Women, migration, and the decline of smallholder agriculture*, Working Paper 97, October 1985.

Davison Jean, (1987).*Gender relations of production in collective farming in Mozambique: Case studies from Sofala province*, Working Paper 153, December 1987.

Dept. of Agriculture & DESME (2006-2007). *Sikkim- A statistical profile*. Department of Economics, Statistics, Monitoring and Evaluation.

Ding Jieyi and Han Yujin (1984). *Comparative studies on the effects of fresh pig manure and anaerobically fermented pig manure upon fish farming, Proceedings Integrated Fish Farming Systems*. Fresh Water Fisheries Research Centre of Chinese Academy of Sciences. Pp:288-296.

Economic Survey 2010-11

Government of India, Agricultural Census Division, and Ministry of Agriculture 2002.

Jones, G.E. and Garforth, C. (1997). *The history, development, and future of agricultural extension in Swanson, B*. "Improving Agricultural Extension: A Reference Manual (3rd Edition)" FAO.

Khera, Reetika (2008): *"Group Measurement of NREGA Work: The Jalore Experiment*", International conference on "NREGA: Impacts and Implementation Experiences", New Delhi, 16-17 September.

Kirk, A and Sawdon, G (January 2002). *The household economy: understanding Kurdish livelihoods in Northern Iraq, Final report*. The Northern Iraq Country Programme and the Food Security and Livelihoods Unit. Save the Children (UK).

Kumar, S.K. and Hotchkiss, D. (1989). *Consequences of Deforestation for Women's Time Allocation, Agricultural Production and Nutrition in Hill Areas of Nepal*. Research Report No. 69.International Food Policy Research Institute, Washington D.C.

Kurup M P G., (2001); *Crossbreeding of Indigenous Indian Cattle with Exotic Breeds to Increase Milk Production: A Critical Analysis*. In Proceedings of the Workshop on Documentation, Adoption, and Impact of Livestock Technologies in India, ICRISAT-Patancheru, India, 18–19 January 2001, NCAP, New Delhi, 54.

Lama, Mahendra P (2001), *Sikkim human development report* 2001,pp-(17-18, 33-34, 46)

Liggins, F. (2008). *Impacts of Climate Change India*. Met Office Report.

Maarten van Klaveren, Kea Tijdens, Melanie Hughie-Williams, Nuria Ramos Martin (2009). An Overview of Women's Work and Employment in Mozambique Decisions for Life MDG3 Project Country Report no. 1, revised edition Amsterdam, Netherlands, July 2009 Pp-20.

Mikkle S. L., Sandie S. A. and Torry- Smith M.(1996). *Building of a flexible bag biogas digester in Tanzania*, Student Report of Center for developing countries Technical University of Denmark, 8809 Environmental field studies in developing countries.
Mishra, R. C. (2006). *Towards Gender Equality*. Authors' press. ISBN 81-7273-306-2.

Muchena, O.N. (1994). *The changing perceptions of women in agriculture*. In M.R. Eicher and C.K. Eicher (eds.), Zimbabwe's Agricultural Revolution. Harare, Zimbabwe: University of Zimbabwe Press.

Murshid, S. and Yasmeen, A. (2004). *Women of the Coast*. Gender status paper, Program Development Office for Integrated Coastal Zone Management Plan, Dhaka.

Musokotwane, R., R.M. Siwale, and B. Nkhata (2001). *Gender Awareness and Sensitization in Basic Education*. Paris: People's Action Forum UNESCO Basic Education Division.

National Commission for Women (NCW, 1998), *Report on scheduled caste women in agriculture*. New Delhi: Pp - 110.

National commission for women (NCW, 2005), *Impact of WTO on Women in Agriculture*, Research Foundation Science & Technology; New Delhi.

NCW (National Commission for Women, (2004), *Report of the National Task Force on Technological Empowerment of Women in Agriculture*. New Delhi: Pp - 107.

Ojha, G.P. (1989). *Women in farming system: Factors Influencing Participation*. Institute of Agriculture and Animal Science, Rampur, Chitwan, Nepal.

Okuneye, P.A. (2000). *"Employment Generating Potentials of Agricultural Processing and Storage: Additional Gain in Increased Food Availability Pursuit"*. Paper presented at the Workshop for Local Government Officials in Lagos State. April.

Pankaj, Ashok K (2008): *"Processes, Institutions and Mechanisms of Implementation of NREGA: Impact Assessment of Bihar and Jharkhand* available at http://knowledge.nrega.net/861/1/2007-08_report.pdf

Parthasarathy Rao, O; Birthal, P.S; Kar, D; Wickramaratne and Shreshta, H.R. (2004). *Increasing livestock productivity in mixed crop livestock systems in south Asia, International* Crops Research Institute for Semi-Arid Tropics (ICRISAT), Hyderabad, India.

PRB (2005). *Women of Our World. Population Reference Bureau*, Washington, DC. Available at http://www.prb.org/pdf05/Women Of Our World200, pdf (searched date: 12 August 2010).

Preston T. .R.(2000). *Livestock production from local resources in an integrated farming system ; a Sustainable alternative for the benefit of Small scale Farmers and the environment.* workshop-seminar on making better use of local feed resources SAREC- UAF.

Preston T. R. and Rodríguez L. (2002). *Low-cost biodigester as the epicenter of a ecological farming systems.* Proceedings biodigester workshop March 2002. http://www.mekarn.org/probiod/pres.htm.

Price, M.F. (2004). *Conservation and sustainable development in mountain areas, Switzerland*: the International Union for Conservation of Nature (IUCN), pp.11.

Quisumbing Agnes R., Payongayong Ellen M. , Otsuka. Keijiro, (2004). *Are wealth transfers biased against girls? Gender differences in land inheritance and schooling investment in Ghana's Western Region.* Food Consumption and Nutrition Division (FCND) Discussion Paper No. 186, August 2004, International Food Policy Research Institute (IFPRI) 2033 K Street, N.W. Washington, D.C. 20006 U.S.A.

Ramachandran, N. (2006). *Women and Food Security in South Asia: Current Issues and Emerging Concerns.* Research Paper No. 2006/131, UNICEF, New Delhi.

Registrar General of India, (1989). *Regional Divisions of India: A Cartographic Analysis,* Occasional Papers, Series-I, Vol. XIX, Sikkim, Census of India, p. 15.

Remesh Babu P., (2004). *Labour Relations in Small Holding Plantations: The Case of Rubber Tappers in Kerala*, V.V. Giri National Labour Institute, Noida (U.P.), NIL Research Studies Series No. 053/2004.

Saito, K.A. (1994). *Raising the Productivity of Women Farmers in Sub-Saharan Africa*. World Bank Discussion Paper No. 230. Washington, DC: World Bank.

Samy, M. M. (2003). *Agricultural exports for agricultural income (AERI) institutional linkage cooperative agreement proposed first year work plan*. Unpublished manuscript, USAID MUCIA Linkage Project, Cairo, Egypt.

San Thy, Preston T. R. and Ly J. (2003). *Effect of retention time on gas production and fertilizer value of biodigester effluent*, MEKARN MSc 2001-2003.

Singh, H.P., (2001). *National perspective on development of medicinal and aromatic plants*. Technical report, Agri Watch.

Singh, J. and Jindal, B.R. (1993), *"Tractorisation of Punjab agriculture-socio economic considerations", A Report*, Department of Economics & Sociology, Punjab Agricultural University, Ludhiana.

Sontheimer, S., Basnyat, B.B. and Maharjan, K. (1997). *Gender and Participation in Agricultural Development Planning: Lessons from Nepal*, FAO, Kathmandu and Rome.

Spring Anita, (1987).*Using male research and extension personnel to target women farmers*,Working Paper 144, September 1987.
Spring Anita, (1987).*Women farmers and food issues in Africa: some considerations and suggested solutions*, Working Paper 139, September 1987.

Sudarshan, Ratna (2008): *"Impact of NREGA on Rural Labour Market in Kerala: Preliminary Findings on Women's Work"*, International conference on "NREGS in India: Impacts and Implementation Experiences", New Delhi, 16-17 September.

Swaminathan M S (1985). *Imparting rural women perspective to agricultural research and development*. Report of the Project Design Workshop on Women in Rice Farming Systems, held at the International Rice Research Institute, Los Banos, Philippines, April 10.

Timothy E S and Bo Gohl (1996). *Tubular plastic bio-digester design, installation and management.* Farm level Applied by Research Methods in East and Southern Africa.

Timsina Dibya, et. al., (1989). *Women's role in Nepalese farming systems: A comparative study of a hill and an inner terai farming systems site*, Working Paper 193, November 1989.

UN, (2008). *United Nations Expert Group Meeting on Population Distribution, Urbanization, Internal Migration and Development,* United Nations Population Division, UN/POP/EGM-URB/2008/01.

UNDP (2007/8). *Fighting Climate Change: Human Solidarity in a Divided World. Human Development Report.*

USAID, (2001). "Gender, Information Technology and Developing Countries: An Analytic Study Executive Summary, *LearnLink* Project, AED 1875 Connecticut Avenue NW Washington, DC 20009. At http://pdf.usaid.gov/pdf_docs/PNACM871.pdf

Valdiya, K.S. (1997). *Developing a paradise in peril*. Pt. G.B. Pant memorial lecture: VII, GBPI-HED, Kosi-Katarmal, Almora.

Vijayakumar, B and S N Thomas (2008). "*Governance, Institutions and NationalRural Employment Guarantee Scheme"*, International conference on NREGS in India: Impacts and Implementation Experiences, New Delhi, 16-17 September.

Viswanath Vanita , (1989). *Extending credit to rural women: NGO models from South India,*Working Paper 184, April 1989.

Wambebe, C.O.N. (1990). *Natural products in developing economy.* in A.C. Igbocchi & I.U.W. Osisigu (eds.): National workshop on natural products. University of Benin press, Nigeria.

WB (The World Bank), (2008). *Agriculture for Development* – World Development Report 2008: available at http://siteresources.worldbank.org/INTWDR2008/Resources/WDR_00_book.pdf Washington DC.

Wennergren Boyd E. et. al.,(1986). *An overview of women's roles and usaid programs in Bangladesh*, Working Paper 109, January 1986.

Wily L.A. and Hammond D., (2001). *Land Security and the Poor in Ghana. Is There A Way Forward? A Land Sector Scoping Study*. A Summary; commissioned by DFID Ghana's Rural Livelihoods Programme.

World Bank (2008I,) Beating the Odds: Sustaining Inclusion in a Growing Economy -- A Mozambique Poverty, Gender, and Social Assessment (2 vls.). Washington D.C.: World Bank Report No. 40048-MZ.

WRC (Women's Resource Center), (2000). *Women's Rights in Muslim Family Law in Pakistan.* Special Bulletin of Women's Resource Center (WRC). Lahore: Arqam Printers.

WTO (2010): Agriculture Sector in India, at http://ncw.nic.in/pdfreports/Impact%20of%20WTO%20Women%20in%20Agriculture.pdf

D. Websites

(Amu Nora Judith, website). The role of women in ghana´s economy, Sponsored By: Friedrich Ebert Stiftung, Ghana, ISBN 9988 - 0 - 2606 – 4 available at http://library.fes.de/pdf-files/bueros/ghana/02990.pdf

Anonymous, 2005. *Watch out! Gangotri is on the run*. Downloaded from http://timesofindia.indiatimes.com/articleshow/1051446.cms.

Azolla spp. available at http://www.fao.org/ag/AGA/AGAP/FRG/afris/DATA/558.htm

Bui Xuan An, Rodríguez J. L., Sarwatt S.V., Preston T.R. and Dolberg F., *Installation and performance of low-cost polyethylene tube biodigesters on small-scale farms* available at http://www.fao.org/ag/AGA/agap/frg/feedback/war/W5256t/W5256t06.htm

Entrepreneurship in Agriculture & Allied Sectors,Animal Husbandry and Dairying available at http://business.gov.in/agriculture/animal.php

FAO(Food and Agriculture Organization of the United Nations),2005b,FAO(2010). *Agr.-Gender.*Statistics Toolkit available at http://www.fao.org/gender/agrigender/agri-gender-toolkit/en/#c64356.

Gazette Notification, *State-wise Wage rate for Unskilled Manual Workers - Notification – Documents*, available at http://nrega.nic.in/circular/WageRate_1jan2011.pdf http://beacononline.wordpress.com/2009/08/27/sikkim-sikkim-ranks-10th-in-nrega-wage-rate/

IFAD (The International Fund for Agricultural Development), 1998. Ghana - *Women's contribution to household food security* available at http://www.ifad.org/gender/learning/household/46.htm

IFOAM (International Federation of Organic Agriculture Movements*),"Definition of Organic Agriculture"* available at http://www.ifoam.org/growing_organic/definitions/doa/index.html.

IPR, News Service (2010). *MGNREGA ensuring rural water security in Sikkim. Voice of Sikkim*, pp. 1-3 available at http://knowledge.nrega.net/661/2/MGNREGA_Sikkim.pdf.

Katuwal, (1990). SD : People : *Asia's women in agriculture, environment and rural Production – Nepal.* A Country Profile, United Nations, New York available at www.fao.org/sd/wpdirect/WPre0110.htm

Luitweiler B,(No date). *Biodigester Online Web Library* available at http://www.steadi.org/owl/library/data/biogas-4.htm.

Minor Irrigation and Flood Control, available at (http://www.neportal.org/northeastfiles/Sikkim/Planning/02_03/chapXI.asp

Mittal, Priyanka Mukherjee (2010). *Stepping up women's empowerment in local self-governance.* Available at http://www.danchurchaid.org/news_publications.

Mosquito Fern available at http://www.americaswetlandresources.com/wildlife_ecology/plants_animals_ecology/plants/mosquitofern.html

PIC AT DUGA, *Awareness of citizens is the key to measurable development* available at http://smilingsikkim.org/?p=2917

SD (Sustainable Development), Food and Agriculture Organization of the United Nations (FAO) available at www.fao.org/sd/wpdirect/WPre0110.htm

SEWA (*Self Employed Women's Association*), Available at http://www.sewa.org/

The Economic Times, (2011). *'Mission Saffron' brings smile for Pampore farmers*.' Nov 21, 2011. Pp-1 Available at www .economictimes.com.

UDHD, (Urban Development and Housing Department, Government of Sikkim). Tnuurm, available at **http://jnnurm.nic.in/wp-content/uploads/2010/12/Gangtok_Chapter-4.pdf**

US country studies. (2011) available at http://countrystudies.us/bangladesh/67.htm, USA: US Library of Congress, visited on 16 August, 2011.

Zaney G. D. (2011). Women Farmers Deserve More Attention and Support, Government of Ghana, Thursday, 07 July 2011 15:55, available at http://www.ghana.gov.gh/index.php/news/features/6533-women-farmers-deserve-more-attention-and-support

E. Wikipedia

"*CSIR wing objects to Avesthagen patent claim*" (2010). Live Mint. April 28, 2010.

"*India Partners with US and UK to Protect Its Traditional Knowledge and Prevent Bio-Piracy" (2010).* Press Information Bureau, Ministry of Health and Family Welfare. April 28, 2010. Retrieved 25 May 2010.

Gupta (page 54), Gupta (page 57), Harris and Gosden(page 385), Lal R, agriculture, Iqtidar(page 52-57) and Shaffer (page 315), Palat (page 63) and Kumar (page 182), Roy 2006 and Kumar 2006, "India Country Overview 2008", Farmers Commission, Sengupta (22 June 2008), "Satellites Unlock Secret To Northern India's Vanishing Water" Sciencedaily.com., "Columbia Conference on Water Security in India" (PDF), Keepers of the spring: reclaiming our water in an age of globalization, By Fred Pearce, (page 77) Books.google.com., Objectives, Retrieved on 2011-041-11- http://en.wikipedia.org/wiki/Agriculture_in_India

Kalyani Menon-Sen, A. K. Shiva Kumar (2001). *"Women in India: How Free? How Equal?"*. United Nations. Archived from the original on 2006-09-11. Retrieved 2011-08-24.

Kalyani Menon-Sen, A. K. Shiva Kumar (2001*). "Women in India: How Free? How Equal?"*. United Nations. Carol S. Coonrod (June 1998). *"Chronic Hunger and the Status of Women in India", "Asia's women in agriculture, environment and rural production: India" (2006), "Women of India: Frequently Asked Questions" (2006), Kalyani Menon-Sen, A. K. Shiva Kumar (2001), THE HINDU SUCCESSION (AMENDMENT) ACT, (2005), "Vedic Women: Loving, Learned, Lucky!", (NRCW) National Resource Center for Women ,(2006),* Retrieved 2011-09-11. http://en.wikipedia.org/wiki/Women_in_India

Lester, *Indian agriculture*. Retrieved on 2011-04-20.http://flaggedrevs.labs.wikimedia.org/wiki/Economy_of_India

T.R. Preston and E. Murgueitio. *"Sustainable intensive livestock systems for the humid tropics"*. FAO. Retrieved 2008-01-14 T.R. Preston and E. Murgueitio, 2008

APPENDIX 1

Research Instrument

House Hold Schedule

Identification

पहचान

गृहस्थी सूची

S. No क्रमांक		Name नाम		
1	State राज्य			
2	District जिल्ला			
3	Block छल			
4	Village बस्ती / गाउँ			
5	Hamlet/Segment सानो गाउँ / खण्ड़			
6	House No घर संख्या			
7	Household Head घर मुखिया			
8	Caste/Tribe/Religion जाती / वर्ग / धर्म			
9	Population of village Panchayat and Block पंचायत र दल को जनसंख्या			
10	Investigator's Name खोज गर्ने को नाम			
11	Supervisor's Name प्रबन्धक को नाम			
12	Respondent's Name & Signature उत्तरदायी को नाम र सही			
13	Respondent's Age, Gender(Male/ Female) & Contact Number उत्तरदायी को उम्र, लिंग र फोन नंबर	Age उम्र	Gender (Male/ Female) (पुरुष/ स्त्री)	Contact Number फोन नंबर
		Date गते	Month महीना	Year साल
14	Date of Survey निरीक्षण गर्ने तारीख			
15	Start Time शुरु गर्ने समय			
16	End Time शेष गर्ने समय			

1. OWNERSHIP STATUS
प्रभुत्व दर्जा

1.1 LIVESTOCK POSSESSION
जीव–जन्तु को अधिकार

Please Tick mark✓ in the box

S.No क्रमांक	Animal जीव–जन्तु	Number possessed आपनो अधिकारमा रहेको	Number used for commercial purpose अकं निम्ति व्यापार सम्बन्धों अभिप्राय प्रयोग गरेको	Ownership प्रभुत्व		
				Male पुरुष	Both दुवै	Female स्त्री
1	Cow/Buffalo (She) गाई/भैंसी (तिनी)					
2	Bullock/Buffalo (He) बैल/भैंसी (त्यो)					
3	Pig सुंगुर					
4	Goat/ Sheep बाखा/भेड़ा					
5	Hen/Chicken/ Duck कुखुरी/चल्ला/ हॉस					
6	Yak चौरी					
7	Other (Specify) अरु (एक–एक गरेर वर्णन गर्ने)					

1.2 LAND POSSESSION
जमीन को अधिकार

(Please Tick mark✓ in the box)

Sr No क्रम.इंक	Land Type जमीन को प्रकार	Cultivation Land खेती गर्ने जमीन																		
		Irrigated (in hectares) सिचांई गर्ने (हेक्टेयर मा)									Unirrigated Land (in hectares) सिचांई गर्न नसक्ने जमीन (हेक्टेयर मा)									
		Small (upto-2) सानो(2 सम्म)			Medium (2-10) साघान (2–20)			Small (upto-2) सानो(2 सम्म)			Medium (2-10) साघान (2–20)			Small (upto-2) सानो(2 सम्म)			Medium (2-10) साघान (2–20)		
		M पुरुष	Both दुवै	F स्त्री	M पुरुष	Both दुवै	F स्त्री	M पुरुष	Both दुवै	F स्त्री	M पुरुष	Both दुवै	F स्त्री	M पुरुष	Both दुवै	F स्त्री	M पुरुष	Both दुवै	F स्त्री
1	Neither land possessed nor owned (agri. labours) अरुको जमीन																		
2	Land owned/ possessed but not owned (cultivators) आपनो जमीन																		

2. DECISION MAKING

फैसला रचनु

Relative participation in decision making of Farm and related activities of sample farmers at selected sites in Sikkim State. (Please Tick mark✓ in the box)

Sr No क्रमांक	Decision Making In Farm Activities खेत कारवाई अनि फैसला रचनु	1 Never उहिल्य पनि	2 Rarely गाह्रो संग	3 Sometimes क्दाचित,	4 Frequently वारवार	5 Always सधैं
1	Selection of crops of the season to be sown खेती उब्जा छानेर रोप्ने उचित अवसर					
2	Selection of harvesting time अन्न कटाई छान्ने समय					
3	Changing of crops खेती उबजा को परिवर्तन					
4	Purchase of agricultural equipment खेतीपाती को किन्ने सामान					
5	Procurement of fertilizer प्रासि को खाद					
6	Selection and procurement of seeds of new variety धैरे किसिम को नया बीज छान्ने र प्रासि गर्ने काम					
7	Selling of crops/cereals/ vegetables खेती की उब्जा/अन्नको/तरकारी बेचनु					
8	Purchasing/selling of livestock किन्न योग्य/बिक्री गर्नु बाचेको ठिगुरा					
9	Selection of breed of animals जन्तुहरु की वंश छान्ने काम					
10	Storage of green fodder for lean period ताजा घास लाई सहारा दिने बखत					
11	Selling of surplus dry fodder बाकी की सूखा घास बिक्री गर्नु					
12	Procurement of Dry fodder from the market ताजा प्रासि को सूखा खास पात बेचनू					
13	Selling of green fodder in the market ताजा खाना गाई वस्तु को लागि बेच्नु त्यो बजारमा					
14	Selling of milk/poultry items दूध बेच्नू / हॉस सम्बन्धि					

3. GENDER WISE PARTICIPATION
लिंग तरिका साझेदारी

Gender wise participation in Farm and related activities of sample farmers at selected sites in Sikkim state.
व्याकरणको जाति विभाग बोलचाल को तरीका, साझेदारी को खेत अनि नातेदार कारवाई को अनुभव प्रास गर्नु, खेतीवाल तिर छानिएको स्थिति मा सिक्किम राज्य।(Please Tick mark✓ in the box)

Sr No क्रमिक अंक	Farm Activities खेत कारवाई	Male पुरुष	Both दुवै	Female स्त्री
1.	Ploughing of Fields हलो जोत्नु को मैदान			
2	Sowing of seeds बीउ रोपाई			
3	Weeding घॉस पात हटाउने काम			
4	Harvesting अन्न र अरु बालीको कटाई र बडुलाई			
5	Threshing वनस्पति देखि कण छान्नु संग पिटेर			
6	Winnowing फडफडाउने काम			
7	Storage of grains and fodder भॅडार को कण अनि खाना गाई वस्तु को लागि			
8	Collection of fodder/fuel from fields / forest / community land संग्रह को खाना / दाउरा देखि मैदान/ जंगल/एउटै जमीन			
9	Procurement of feed and fodder from the market प्रासि को भोजन गराउने अनि खाना देखि त्यो बाजार बाट			
10	Cleaning of the animals an their shed जन्तु की सफाईहरु अनि उनीहरुको आगॅन			
11	Feeding of animals जन्तु हरु को भोजन			
12	Watering पानी हाल्ने काम			
13	Grazing चराई			
14	Milking दूध दुहुनु			
15	Milk disposal दूध बेच्नु			
16	Traditional health care to animals परम्परागत जन्तु को आरोग्य ध्यान			
17	Vaccination and visits to animal hospitals जन्तुलाई चिकित्सालय दर्शन गरउनु र खोपाउने काम			
18	Breeding of animals जन्तु को आचारण गराउनु			
19	Traditional care of fields and crops परम्परागत मैदान अनि खेती को उब्जा को ध्यान			

How much are you paid in cash/kind for your work? (Please provide details if paid in kind) काम गर्नु भन्दा कति पैसा या अन्ना/सामान पउंछ ? (कपाया अ्न्ना/सामान ब्योरा दिनुहोस,?)

4. EMPLOYMENT INTENSITY

रोजगार मा तीव्रता (Please Tick mark✓ in the box)

	working hours in a day (01 hour to 16 hours) दिन मा प्रचलित काम गर्ने समय (1 घण्टा देखि 16 घण्टा)															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Male पुरुष																
Female स्त्री																

5. ACCESSIBILITY

प्रवेशाधिकार

Extent of accessibility to productive resources of sample farmers at selected sites in Sikkim State.

ठाउॅ निम्ति प्रवेशाधिकार लाई उपजाउ साघन विषयमा नमूना कृषक मा छानिएको स्थिति।

(Please Tick mark✓ in the box)

Sr No क्रमिक अंक	Do women have access to these Resources? आइमाई हरुलाई साधन की पहुॅच पाउॅछ?	1 Never उहिल्यपनि	2 Rarely गाह्रो संग	3 Sometimes क्दाचित,	4 Frequently वारवार	5 Always सधैं
1	Production inputs उत्पादान निवेश					
2	Credit धाक उधार					
3	Extension service and training वृद्वि सेवा अनि शिक्षा					
4	Technology & Govt policies शिल्पकला विज्ञान अनि सरकार की नीति हरू					
5	Education शिक्षा					
6	Rural institution ग्रामीण संस्था					
7	Livestock Rearing पशु पालन					

Production inputs above include (Seeds and saplings, Water sources, Medicine, Fertilizers). माथि की उत्पादन निवेश मिश्र ;बीउ अनी सानी बिरुवा, पानी को मूल, औषिधि, मलद्ध।

Q1. Do women have access to these inputs?

प्रश्न 1. आईमाई हरुलाई निवेश हरु को पहुँच छः? (Please Tick mark✓ in the box)

Sr No क्रमिक अंक	Inputs निवेश		1 Never उहिल्य पनि	2 Rarely गाह्रो संग	3 Sometimes क्दाचित,	4 Frequently वारवार	5 Always सधैं
1	Seeds and saplings बीउ अनि बिरुवा						
2	Water sources पानी को मूल	Well कुवॉ					
		Tube well पानी गडेकी कुवॉ					
		Bore well ज्वार को कुवॉ					
		Dhara धारा					
		Pond पोखरी					
		Others अरु					
3	Medicine for औषधि निम्ति	Plants वनस्पति					
		Animals जीव जन्त					
4	Fertilizers मलजल / खाद						

Q2. (a) Do you avail credit?

No ठिक छैन ☐ Yes ठिक छ ☐

(b) On whose name credit is given? कसको नाम मा धाक उधार छ?

(i) Male पुरुष ☐

(ii) Both दुवै ☐

(iii) Female स्त्री ☐

(c) From where credit is taken? कहॉबाट धाक उधार लिएको?

(i) Formal institution रीतिपूर्ण अनियमित ☐

(ii) Both दुवैं ☐

(iii) Informal institution अभिप्राय अनियमित ☐

(d) Purpose. अभिप्राय / उद्वेश्य

(i) Personal व्यक्तिगत ☐

(ii) Both दुवै ☐

(iii) Commercial व्यापार सम्बन्धी ☐

Reason for not getting credit on their name? के कारण ले उनीहरुको नाममा ऊधार मिल्दैन?

Q3. (a) Whether they get any opportunity to receive the services from extension agencies like Department of Agriculture Extension (DAE)/Department of Live-stock Services (DLF) to develop technical skill? के उनीहरुलाई यस्तो मौका मिल्छ कि विस्तार एजेन्सीहरु जस्तो की Department of Agriculture/DLF यस्ले उनीहरुको तकनीकी कार्य क्षमता को विकास गर्न सकोस्?

No ठिक छ ☐ Yes ठिक छ ☐

(b) In case No, then reason/In case Yes, then the benefits.

यदि ठिक छैन व्यसको कारण/यदि ठिक छ व्यसको फाइदाहरु।

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Q4. (a) Whether they are aware about? के उनीहरु जागरुक छन्?

(i) Cost effective new technology
कम लागत को नयॉ तकनीक — No ठिक छैन ☐ Yes ठिक छ ☐

(ii) Government Policy
सरकार को निती — No ठिक छैन ☐ Yes ठिक छ ☐

(b) If Yes, for (i) above, whether they apply in their farms?
यदि (i) ठिक छ, के तपाईहरु अफनो खेतमा लागु गर्नु हुन्छ?

_____

If No for (i) above, then reason.
यदि (i) ठिक छैन, भने लागु नगर्ने को कारण बताऊ?

_____

(c) If No for (ii) above, then reason.
यदि (ii) ठिक छैन, भने लागु नगर्ने को कारण बताऊ?

_____

Q5. What is their education level? तपाईहरु को शिक्षा को स्तर के हो?

Primary पहिलो ☐ Middle माझको ☐ Matric दशवी ☐ Secondary दोश्रो क्रमको ☐ Graduate स्नातक ☐ Illiterate निरक्षर ☐

Q6. Whether women are member of any cooperative or informal association which created opportunities for saving, taking loans, discussions and participation of women in any social events like agricultural fairs? के कृषक महिलाहरु कुनै सरकारी वा गैर सरकारी संस्था जो की महिलाहरु को उधार लिने, बचत को तरीका र यसको महत्व र सामाजिक कार्यक्रम जस्तो कृषि मेलामा भाग लिनु को जानकारी दिने को सदस्य छ?

No ठिक छैन ☐ Yes ठिक छ ☐

If Yes, then explain which all? यदि ठिक छ, भने लागु नगर्नु को कारण बताऊ?

If NO, explain reason? यदि ठिक छैन, भने लागु नगर्ने को कारण बताऊ?

Q7. Given a chance along with farming, what type of activity would they prefer to perform? यदि तपइलाई मौका पाउनु भयो भने कस्तो खालको काम गर्नु हुन्छ?

Poultry कुखुरा पालन ☐ Fish Farming माछा पालन ☐ Cow/Sheep/Goat/Yak पशु पालन ☐ Silkworms/Honeybees रेशमको खेती/मौरी को खेती ☐

Others अन्य ☐

Reason कारण हरु: _____

6. FEMALE FARMER'S VIEWS ON FARMING/ FAMILY ROLES, INTEGRATED FARMING

Sr No क्रमिक अंक	Please Tick mark✓ in the box on the scale 1 to 10									
		Strongly feel Negative बिल्कुल होइन								Strongly feel Positive बिल्कुल हो
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	Given a chance, would you like to do anything different except agriculture? यदि तपाइलाई मौका पाउनु भयो भने खेती बाडी को अतिरिक्त अरु क्या काम गर्नु चाहानु हुन्छ?										
2	Will you be happy if you are not required to do the farming job?यदि तपाई खेती बाडी को काम नगर्नु परेयो भने, के तपाई आपुलाई भाग्यवान सम्झनु हुन्छ?										
3	Are you proud of your contribution to farm work? के तपाई आपुले आपैलाई खेती बाडी मा योगदान गर्दा गर्व महशुश गर्नु हुन्छ?										
4	Would you like to move towards urban and developed areas? के तपार्ह शहरमा गएर बस्तु चाहनु हुन्छ?										
5	Would you accompany your husband in case he gets a government job? यदि तपाईको श्रीमान ले सरकारी नोकरी पाउछ भने, के तपाई उनीसंग जानु हुन्छ?										

6	Would you like to absorb the future generation in agriculture? के तपाई आपनो भावी पिछिलाई खेतीबाडी गराउनु मन पराउनु हुन्छ?	Boys बेटा										
		Girls बेटी										
7	Do you feel happy about looking after the responsibilities at home as well as in agriculture? के तपाई घरको साथमा खेतीबाडी गर्नु चाहानु हुन्छ?											
8	Would you like to opt for any entrepreneurial activity to increase your income? के तपाई खेती गर्ने को साथमा अपनो आय बढाउनु को लागि केही अन्य व्यवसायिक काम गर्ने चाहानु हुन्छ?											
9	Do you have some knowledge about the plant disease and their prevention? के तपाई ळाई बिरुवाको रोग र उनको रोकथाम को लागि के ही जानकारी छ?											
10	Do you have some knowledge about the animal disease and their prevention? के तपाईहरु ळाइ पशु हरु को बिमारी र रोकथाम बारेमा जानकारी छ, जो कि पुरुषलाई थाहा छैन?											
11	Do you have some knowledge about feeding/nursing for domestic animals? के तपाईहरुलाई पालेको पशु हरुको खाने पिउने र देखभाल को जानकारी छ?											
12	Do you think that you should own animal or property? के तपाइलाई लाग्छ कि पशुहरुको मालिक को हक अधिकार महिलासित हुनु पर्छ?											
13.	Are you in favour of handing over the property to Daughter- in law के तपाईहरु/आपनो सम्पति को हक बुहारीलाई दिने अधिकार मन पराउनु हुन्छ?											
14	Are you satisfied with the income you get from the farm work? तपाईहरु यो खेतीबाडी देखि पैसा पोउनो के तपाईहरु संतुष्ट हुनु हुन्छ?											

Q8. In case husband gets a government job, what would you prefer? के तपाईको पतिले सरकारी नोकरी पउछ भने तपाई के गर्न पसन्द गर्नु हुन्छ?

Not accompany the husband
घरमा बस्नु ☐ To accompany the husband
पतिको संग नोकरी को ठाउँमा जानु ☐

Reasons कारणहरु:

_____

Q9. According to them, the future generation should be absorbed. तापाईहरुको विचारमा भावी पिढिहरुलाई के गर्नु पर्छ?

Boys : बेटा : Should not be absorbed in agriculture & should go to city for job शहरमा नोकरी गर्नु ☐ Should be absorb in agriculture खेतीबाडी गर्नु ☐

Reasons कारणहरुः

Girls : बेटी : Should not be absorbed in agriculture & should go to city for job शहरमा नोकरी गर्नु ☐ Should be absorb in agriculture खेतीबाडी गर्नु ☐

Reasons कारणहरुः

Q10. Who looks after these responsibilities at home? घरमा यो सबै काम कसले हेर्छ?

Children नानीहरुको	: Nurturing देखभाल	- Male पुरुष	☐	Both दुवै	☐	Female महिला	☐
	Health स्वास्थ्य को ख्याल	- Male पुरुष	☐	Both दुवै	☐	Female महिला	☐
	Education पढाई लेखाई	- Male पुरुष	☐	Both दुवै	☐	Female महिला	☐
Rituals (traditional like marriages or new like birthdays) रितिरिवाज (पुरानो ज्यों शादी ब्याह अथवा नयॉ ज्यों जन्मदिन)		- Male पुरुष	☐	Both दुवै	☐	Female महिला	☐

Q11. What type of entrepreneurial activity would they like to do, which would help in increase in their income? Here I mean to say, for example, with rearing of Yak/Sheep, they can make products like woollen thread or woollen/leather garments and carpets, shoes etc. From their hair, skins, hides and Yak's horns they can make various handi-craft items by spinning, weaving and handicrafting. With milch animals they can go for milk marketing, such as sale through milk booths in localities of rich and poor, with low and high fat content, milk products like youghurt, ice cream, ghee, lassi etc. With cow dung and poultry litter, they can go for organic fertilizer and mini Gober gas plant. Poultry products like boiled eggs and baking items (cake, biscuits, bread, buns) is good option. They sell sprouted whole grains in sealed packets. (Very much in demand because of nutritional value).

खेतीबाडी को साथ साथै तपाई आपनो आम्दानी बढाउनु को लागि अरु कस्तो किसिमको व्यावसायिक काम गर्नु चाहानु हुन्छ? उदाहरण स्वरुपः– भेडा अनि चौरीको पालनको साथ–साथ ऊनी धागो बनाऊनु, ऊनी को लुगा, गलैचा, उनीहरुको छालाबाट – छालाको सामानहरु, सिंगहरु र हड्डीबाट सजावटको सामानहरु इत्यादि। दुधालु पशुहरुको साथमा काम ज्यादा र कमी (Fat) वसा भएको दुध दहीको बिक्री, आइसक्रीम, घ्यू, लस्सी आदी बनाएर बेचनु। जानवर को गोबर, कुखराको मलबाट, घर र खेतीबाट जैविक रुपमा नष्ट हुने पदार्थबाट जैब पचाय यन्त्र लगाउनु जो चै भने सबै चीजबाट LPG जस्तो Gas र उर्वराको अलग गर्छ। कुखुरा पालानको पदार्थ – जस्तो उमालेको अण्डाहरु, पकाएको चीजहरु जस्तो केक, बिस्कुट, ब्रेड र बण्ड आदि बनाएर बेच्नु। या खेतबाट निस्कने दानाहरुको अकुंरित प्याकेट बनाएर पनि बेच्नु सक्छ। पौष्टिक आहर व साथ–साथ यसको बजारमा मांग पनि धेरै छ। शहतुत को बिरुवा लगाएर रेशमको बिड़ा पालन र फलोंको बिरुवाहरु मा मौरी पालन का काम पनि आय बढाउछ।

कारणहरु_____

Q12. Do you know of plant diseases, their cure and prevention that men generally do not know? के तपाईलाई बोटबिरुवाको बिमारी थाहा छ र उनको रोकथामबाटे जानकारी छ जुन चैं पुरुषलाई थाहा छैन?

No ठिक छैन ☐ Yes ठिक छ ☐

If Yes, then What and How much? यदि ठिक छ, के र कत्ति ?

Q13. Do you know of domestic animal diseases, their cure and prevention that men generally do not know? के तपाईलाई पशुहरुको बिमारी थाहा छ र उनको रोकथाम बारे जानकारी छ जुन चै पुरुषलाई थाहा छैन?

No ठिक छैन ☐ Yes ठिक छ ☐

If Yes, then What and How much? यदि ठिक छ, के र कत्ति ?

Q14. Do you know of any nurturing details for plants (for better productivity) that men generally do not know? के तपाईलाई बोट बिरुवाको राम्रो उपजको लागि उनीहरुको हरचाहको अरु उपाय थाहा छ?

No ठिक छैन ☐ Yes ठिक छ ☐

If Yes, then What and How much? यदि ठिक छ, के र कत्ति ?

Q15. Do you know of any feeding/nurturing details for domestic animals that men generally do not know? के तपाइलाई आपनो पाल्तु पशुहरुको खाना र राम्रो हेरचाहको कुनै राम्रो उपाय थाहा छ जसले हामी उसको स्वास्थय र दुध खुवाउछौ जुन चै पुरुषको थाहा छैन।

No ठिक छैन ☐ Yes ठिक छ ☐

If Yes, then What and How much? यदि ठिक छ, के र कत्ति ?

Q16. Whether they feel proud in owning an animal and property?
के तपाई पशु या संपति को मालिक अधिकार पऊदा खेरि गर्व महशुस गर्नुहुन्छ?

No ठिक छैन ☐ Yes ठिक छ ☐

Reasons कारणहरुः

Q17. In case they own any property, what are their views about transfer of the same to their Son or Daughter-in-law? यदि तपाइसित कोही सम्पति छ भने, तपाईत्यस संपति कसको नाममा गर्न चाहानु हुन्छ?

Son बेटा ☐ Both दुवै ☐ Daughter-in-law पराउनु (बहू) ☐

Their views and reason for that. उनको विचार र विचार को कारण :

APPENDIX 2

Profile of the Research Scholar

Mrs Nidhi Dwivedy is a Research Scholar in the Department of Management Studies at Sikkim Manipal Institute of Technology, Majitar Rangpo, Sikkim, India. She had been a meritorious student throughout her school life. She did her Bachelor's degree in Commerce and Master's degree in Arts (Economics) from Punjabi University, Patiala. She accomplished her M.Phil. from Himachal Pradesh University, Shimla and B.Ed. from Annamalai University. She has served as PGT Economics in various schools. She has worked as Lecturer in Habeeba Junior College for Girls, Toli Chowki, Hyderabad (AP). She has taught Statistics and Quantitative Methods in SVSD College, Bhatoli (Himachal Pradesh) and ICFAI University, Sikkim as visiting faculty. She was also responsible to take Research Methodology classes for Faculty Development at Sikkim Manipal University & Sikkim Manipal Institute of Technology as visiting faculty. Presently the scholar is pursuing full time research work. She has in her credit sixteen publications in double blind peer reviewed refereed international journals. She can be reached at nidhidwivedy@gmail.com and nidhidwivedy@yahoo.com

APPENDIX 3
Profile of the Supervisor

Dr. N. Upadhyay is a Professor in the Department of Management Studies at Sikkim Manipal Institute of Technology, Majitar Rangpo, Sikkim, India. His profile includes the following:-

PROFILE SUMMARY

- **ACADEMICS: B.Sc,(HONS), P.G.D.B.M (IR)**, **MBA (HR &Prod) M.A (Sociology & Public Adm), LLB (Professional) LLM (Lab, Env),** Ph.D (Industrial/ Lab)
- **Experience**: Overall **40** years of work experience in, **Indian Air Force**, Technical & Educational Institution Such as (IIT/REGISTRAR/REGIONAL DIRECTOR).
- **Development Consultant: UNDP Sol Exchange (Community Dev (Rural / Urban),**
- As an administrator- Regional Director, and teacher (Sr. Professor) in reputed academic institution.

ACADEMIC &PROFESSIONAL ACHIEVEMENT

- **B.Sc**. (Hons) Chemistry , 1970 , **B.U**
- **P.G.D.B.M & IR),** 1978, **N.U**
- **M.A**. (Public Admin) **,** 1979, **N.U**
- **M.A**. (Sociology)**,** 1982 , K.U
- **MBA** (HRD & Production), 1983, N.U
- **LLB , (Gen/Ind)** 1984, K.U
- **LLM**, (Industrial &Labour) 1994, U.U
- **Ph.D.** 2001 ,B.U

PROJECT ACTIVITIES

- DBM - Study on Union-Management Relations at SEN RALEIGH CYCLE FACTORY, Asansol – 1978
- DBM : Report on the Chanda Cement Factory (ACC) Maharastra- 1978
- MBA: Project report on Industrial Relations at BEL, Bangalore 1981.
- MBA dissertation : Recruitment and Selection in Indian Armed Forces with special reference to IAF
- Exposure Visit To Bhrat Earth Movers Ltd (GoI)
- LLM dissertation - Legal lacuna in speedy disposal of Industrial Disputes with special reference to Supreme Court Cases.
- Ph.D. -Settlement of Industrial Disputes in Public Sector Undertaking with Special reference to Steel Industry

DETAILED JOB PROFILE (PROFESSIONAL)

- IIM Shillong ; Aug-Oct 09; Visiting Faculty
- National Institute of Rural Development (NERC) & ERC; 29 Jul o3- June,1997; Director(NE Regional Center) andEastern Regional Centre- Patna)

- North Eastern Regional Institute of Science & Technology, Itanagar, Arunachal Pradesh ; June,1997 – 28 Jul 2003; Professor of Sociology and Management &Registrar as additional Responsibility
- B.E. College(Deemed University), Howrah; Sept.,1994 - May,1997; Registrar and part time teaching B. Tech. program social sciences
- IIT Kharagpur; Sept,1988 - Aug.,1994; AR/ DR/Part time Teaching, MBM and M.Tech(HRD)
- Self Employment; June-Aug -1988; Management/Legal Consultancy

RESEARCH /PROJECT STUDIES

- *Co-investigator in* ***theInternational Research Project on people Centered Land use Development in the shifting Agriculture (JHUM) affected Buffer zone of Namdapha National Park in Arunachal, Pradesh sponsored by MC Arther Foundation, USA. & UNESCO.***
- **Upadhyay.N, Maithani, Thaplyal**: Study on Self employment opportunities in Tripura.
- ***Upadhyay. N & J. Chaudhury: Performance of "SGSY": A Process Study in Tripura: Sponsored by Ministry of Rural Development, Govt. of India***.
- **Upadhyay.N & Chaoudhury J : Social Mobilisation, Employment and Empowerment through " Self Help Group" Tripura State Report : Sponsored by Ministry of Rural Development, Govt. of India.2004-05**
- ***Upadhyay. N & K. Haloi : Perspective planning of Dirang Valley Watershed project 2005-6***
- Upadhyay. N. & Devi T.M : Communitisation Process in Nagaland for governance through effective participation.2006-7
- ***Upadhyay N & Shrivastav. S. C : Perspective Plan for BRGF for NE Region (South Garo Hills) Meghalay***
- Poverty Eradication in NE Region (2007-08) Sponsored by North East Council, Min of Doner, GoI.
- ***Impact study of Special SGSY on Mushroom at Assam (2007-08)***
- Impact study of PURA project at Sonitpur District of Assam.(2007-08)
- ***Preparation of District Plan for 16 District (C-DAP) of Assam***
- **Preparation of 9- Dist. Plans under Backward Region Grant Fund.**

DEVELOPMENT CONSULTANCY IMPACT STUDY/PROJECT REVIEW

- Integrated Waste Land Development Project (Review) in Thaubal District, Manipur sponsored by Ministry of Rural Development (D oLR) , March,04)
- Integrated Waste Land Development Project in Imphal West District of Manipur, sponsored by Ministry of Rural Development (DoLR), March,04)
- Integrated Waste Land Development Project in Ukhrul District, Manipur sponsored by Ministry of Rural Development (DoLR), October, 2004
- Integrated Waste Land Development Project in Kamrup District, Assam sponsored by Ministry of Rural Development (DoLR), Nov 05

- Integrated Waste Land Development Project in Kohima District of Nagaland sponsored by Ministry of Rural Development (DoLR), August, 2005
- Integrated Waste Land Development Project in Okha District of Nagaland sponsored by Ministry of Rural Development (DoLR), December 2005.
- Integrated Waste Land Development Project in Mokukchung District of Nagaland sponsored by Ministry of Rural Development (DoLR), March 2006.
- Integrated Waste Land Development Project in Longleng District of Nagaland sponsored by Ministry of Rural Development (DoLR), March 2006
- Integrated Waste Land Development Project in Matia (DistKamrup) sponsored by Ministry of Rural Development (DoLR), March 06.
- Monitoring & Evaluation of Horticulture Project sponsored by DoLR ,GoI under Serene and New Serene under Siang Dist of Arunachal Pradesh during Feb 2008
- Monitoring & Evaluation of Horticulture Project sponsored by DoLR ,GoI at Raibalo, Higio, etc under KurumkumeDist of Arunachal Pradesh during Feb 2008
- Monitoring & Evaluation of Horticulture Project sponsored by DoLR ,GoI at Dolungmukh under Upper Subansiri district Dist of Arunachal Pradesh during Feb 2008
- Monitoring IWDP project at SEPA in East KamengDist under TEDT Jan 09
- Monitoring IWDP project at Gumla awing in West KamengDist under TEDTNov 08
- Evaluation of IWDP at West Tripura , 2008
- Evaluation of the Provisioning of Urban Amenities in Rural Areas (PURA) project in Sonitpurdistrict,Assam
- Evaluation of Special project (SGSY) for mushroom for self employment sponsored by MoRD, 2008-09
- Evaluation and quick study of the SGSY(SP) sponsored by MoRD, to Govt of Bihar at Munger& Bhagalpur Dist. Apr 2009.

1. **STUDENT (UG) PROJECT GUIDED : 69, PG : 12**
2. **PhD Students under Guidance: Registered -6, [Ongoing].**

OTHER EXTRA CURRICULAR ACTIVITIES

- Popular article "**MOTHER OUR MOTHER, EVERY ONE'S MOTHER**" Published in the Arunachal Times.
- Represented Bengal in All India Children & Youth festival held in the year 1972 at ***Lucknow***. Stood ***second*** all India Debate(World Peace through Education)
- Attended All India Regular Army attachment Advanced leadership Camp -1966 Tenth Garwal Rifles at NE Sector.
- Represented - Regional Air Force Team (Football).
- Durga Puja- a manifestation of shaktism: Published in the Arunachal Times,25.9.98
- NCC "C" Certificate Holder
- Group Leader SCOUTS. At IAF Kanpur. Actively Involved during 1991
- **Best Trainer Award 2005 at NIRD**

POPULAR ARTICLES/REVIEW OF PAPERS/FOREWORD/PHD EXPERT REVIEW

- Upadhyay: Arunachal - A visit to nature beyond time published in Arunachal Times.
- Popular Article Published on "DURGA THE EMBLEM OF SHAKTI"
- Popular article "MOTHER OUR MOTHER, EVERY ONE'S MOTHER" Published in the Arunachal Times.
- The Arunachal - Nature Beyond Time Published in Arunachal Times
- Radio talk on Consumer protection Act, Labour unrest & remedy.
- Review " A Sociological Analysis of North Eastern Region Community Resource Management Project for Upland Areas"

PROFESSIONAL MEMBERSHIP

- Life Member - Indian Society of Technical Education
- -do- - National Institute of Personnel Management
- -do- - Forum Of Scientists, Technologist & Engineers
- -do- - Indian Commerce congress
- -do- - Academy of Social Sciences
- -do- - NE Council for Social Science Research
- -do- - Indian Institute of Public Administration
- Life Member - Indian Ex Servicemen League

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Mrs. Nidhi Dwivedy

In recognition of your outstanding research paper

" Access Of Farming Females To Productive Resources In Sikkim: A Pillar For Promoting Their Empowerment "

published in **IJSST** (International Journal of Social Science Tomorrow)

in May, 2012.

Dr.Biswajit Das
Editor- in -Chief