

Base-line Survey Report (2007-08)

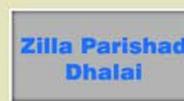
NAIP Publication No. 3

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**Livelihood Improvement and Empowerment of Rural Poor
through Sustainable Farming Systems in North-East India**



National Agricultural Innovation Project
Component-III
(Sustainable Rural Livelihood Security)



ICAR Research Complex for NEH Region
Umroi Road, Umiam-793 103, Meghalaya, India



Baseline Survey Report

(2007-08)

Sub-project

Livelihood Improvement and Empowerment of Rural Poor through Sustainable Farming Systems in North-East India

A collaborative project of ICAR RC, Umiam; CAU, Imphal; MU, Aizwal; SASRD, NU, Medziphema; ICRI, Gangtok; IWMI; ILRI; ZP, Dhalai; RRTC, Umran and their centers.

Published in January, 2014

NAIP Publication no. 3

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Designed and Printed at **print21**, Ambikagirinagar, R.G.Baruah Road, Guwahati - 781 024,
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Acknowledgement

This baseline survey report has received the whole-hearted support of many individuals. The cooperation of the different consortium partner institutions, consortium Co-PIs, the cluster leaders, political representatives, social workers, skilled workers and the pain staking effort of the research associates and contractual services to collect relevant information and filling up the questionnaire are gratefully acknowledged.

Our heartfelt appreciation also goes to all the members of the Consortia Monitoring Unit and also to Dr. D. N. Borthakur, Chairman, Consortia Advisory Committee for sparing their valuable time, effort, and the expertise in improving the quality of the information. The financial help from the World Bank and ICAR for sponsoring the North Eastern Hill Region with the National Agricultural Innovation Project (NAIP) on “Livelihood Improvement and Empowerment of Rural Poor through Sustainable Farming Systems in North-East-India” under Sustainable Rural Livelihood Security (SRLS) component is gracefully acknowledged.

The guidance and support of Dr. D. Rama Rao, National Director, NAIP and Dr. Bangali Babu, Ex-National Director, NAIP is acknowledged with deep sense of gratitude. Acknowledgement is also due to Dr. A. P. Srivastava, National Coordinator, NAIP, Component-III for his valuable suggestions and guidance in bringing out the base line report.

The authors are hopeful that this document will serve as guide book for the research planners and development workers to plan and execute various programmes for livelihood improvement of the people of the Planning Commission identified backward districts of the region and similar other agro-ecosystems of the country.

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1. Outline of the project

Title of the project: Livelihood Improvement and Empowerment of Rural Poor through Sustainable Farming Systems in North-East India
Project No.: NAIP (SRLS-S) III-16/2006 (ICAR, New Delhi)
Date of start: 01-04-2007
Date of closing: 31-03-2014

Objectives of the Sub-Project:

- Evaluation and validation of indigenous and improved farming system models for enhancing production in agro-ecosystems of disadvantageous areas of NEH region for sustainability, profitability and competitiveness.
- Addressing the constraints of deliverables to facilitate the community/people to harness optimum benefit from agriculture sector.
- Capacity building, skill up-gradation, information access and promotion of activity specific SHGs.
- Employment generation through agro-processing and value addition including storage, packaging, transportation and marketing of the produce.

About the NAIP (SRLS), Comp-III

The National Agricultural Policy and the Tenth Five Year Plan for the country placed high priority on raising agricultural productivity as a means to achieving rapid agricultural growth and reducing rural poverty. Stagnating/decelerating productivity in agricultural growth and declining total factor productivity in agriculture have cast doubts on the resilience of the rural sector in meeting the challenges of food security and market driven demand and supply in the competitive regime. To address these challenges and to generate additional income and employment for the rural poor, the role of agricultural research and development is critical. Another notable feature of agricultural transformation is the growing regional disparity in development. Disadvantaged regions did not gain much from the development efforts. In this direction, the Planning Commission of India identified 150 disadvantaged districts in the country to put extra emphasis for the development of these areas. The National Agricultural Innovation Project (NAIP) of ICAR is an attempt towards this direction. The Project on “Livelihood Improvement and Empowerment of Rural Poor through Sustainable Farming Systems in North-East India” under Component-III (Sustainable Rural Livelihood Security) of NAIP was launched on 6th August, 2007 (Fig. 1) for operating in the seven disadvantaged districts of NEH states *viz.* Arunachal Pradesh, Meghalaya, Mizoram, Manipur, Nagaland, Sikkim and Tripura under consortium mode. The seven disadvantaged districts



Fig. 1: Hon'ble Chief Minister, Meghalaya, Dr. D.D. Lapang and other dignitaries in the launching workshop of NAIP

in the NEH states chosen for the NAIP Project are South Garo Hills (Meghalaya), Upper Subansiri (Arunachal Pradesh), Mon (Nagaland), Saiha (Mizoram), Dhalai (Tripura), North Sikkim (Sikkim) and Tamenglong (Manipur). The programmes in the project include improved package of practices for enhancing crop, livestock and fish productivity, farming system approaches, water harvesting and multiple use of water, post-harvest processing, value addition,

subsidiary income generating activities and strengthening of SHGs for livelihood improvement of the poor farmers in an integrated manner. The data represented in this publication is based on those collected through pre-structured interview schedule during 2007-08.

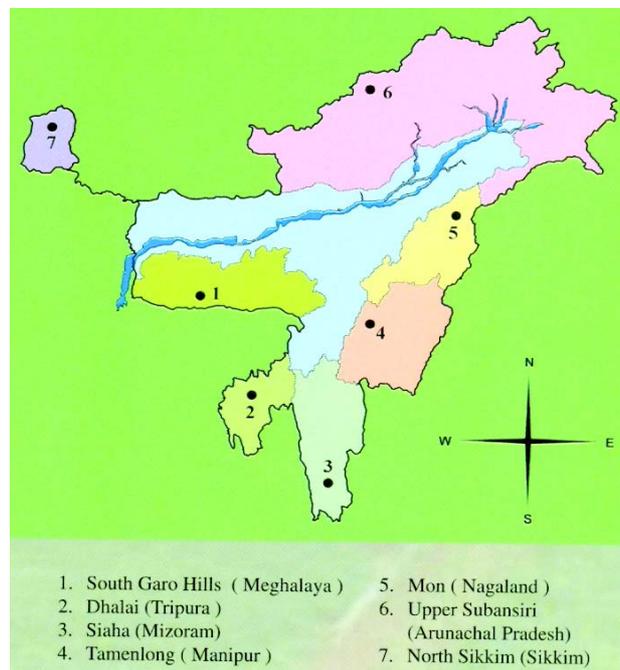


Fig 2: Operational area of the project

3. Overview of the North Eastern Region

The North Eastern Region (NER) of India comprises of the states of Arunachal Pradesh, Assam, Manipur, Nagaland, Mizoram, Sikkim and Tripura. The region stretches between 21°50' and 29°34' N latitude and 85°34' and 97°50' E longitude. The region has a population of 39 million (45 million in 2011) and geographical area of 26.2 million hectare, which is 3.85% and 8% of the population and area of the country, respectively. Assam is situated in the center and hill states (except Sikkim) are situated around it. Out of the total geographical area of the region, 28.3% has elevation more than 1200 m, 17.9% between 600 and 1200 m and about 10.8% between 300 m and 600 m above mean sea level. The hilly areas of the region are sparsely populated (63 people/km²) compared to the plains (369/km²). Assam has 68.2% of the total population against an area of 29.9% of the region. The region has about 72% area under hilly ecosystems. The region is characterized by fragility, marginality, excessive sloping land with rolling topography, rich biodiversity, unique ethnicity and socio-ecological set up. The NE region receives high rainfall and therefore clothed with diverse and dense vegetation. Beyond the transitional pre-glacial region, there appears the greater Himalayan region devoid of significant vegetative cover. Rocky surface, alpine vegetation and snowcapped peaks dominate the physical landscape of this area. The altitudinal pattern of north east varies from place to place. The plains mainly comprise of Brahmaputra and Barak valleys. The adjoining areas of Barak river are active flood plains with marshy lands that are subjected to extreme annual inundation. The Manipur basin has an area of 1,853 km². The Tripura plains have an area of 3500 m² and have land features of erosive nature.

The region has about 60% area under forest with Arunachal Pradesh having 80% of its area under different kinds of forest, while Assam has the minimum percentage of forest area (30%). The varied physiographical features and altitudinal differences give rise to varied types of climate ranging from near tropical to temperate and alpine. The annual rainfall in the region is received mainly from south-west monsoon from middle of May and continues till October. On an average, the region receives about 2450 mm of rainfall. The Cherrapunji-Mawsynram range receives rainfall as high as 11,500 mm, annually. The region



Fig 3: Political Map of the NEH region

shows great variation in temperature regime too. It varies from 15°C to 32°C in summer and 0 to 26°C in winter.

The NE region is very rich in biodiversity and the largest number of endemic species are available here than anywhere in the country. Out of the total 17000 flowering plants of the country, about 5000 species are found in the NE region. The distribution of various species has been restricted due to topographical features, deep valleys, slopes and river system. The agricultural practices of the region are broadly of two types, viz., (i) settled cultivation practiced in plains, valleys, foot hills and terraced slopes, and (ii) shifting cultivation in hilly areas of all the states except Sikkim. Agricultural operations are carried out up to 3600 m altitude and on slopes up to 60%. Cropping system in the region is predominantly rice based except Sikkim, where maize based systems are dominant. More than 80% of gross cropped area is under food grains and rice occupies 89.8% of the total food grain area and 93.2% of the total food grain production. The agriculture in the region is at subsistence level. Productivity of agricultural crops and animals are much lower than the national average. The region as a whole is having a deficit of 1.6 mt. of food grains (2007-08). The deficits in fruit, vegetable, meat and fish sectors are 21%, 27%, 51% and 55%, respectively. Cropping intensity in the region is 120%. Low cropping intensity is mainly due to lack of irrigation facilities and insufficient soil moisture during winter. For inducing sustainability in agriculture, the cropping intensity is required to be increased substantially through rain water harvesting during rainy season as well as creating more irrigation facilities and introducing new crops and land use systems.

The soils of the region are mostly rich in organic matter and nitrogen content, low to medium in phosphorus and medium to high in potassium. More than 85% of the soils of the region are acidic in nature having mild to severe acidity, which is attributed to the leaching of bases due to heavy rainfall. Application of well decomposed organic manures is important for P availability in these soils. The soils of the region can broadly classified in five orders viz., inceptisols, entisols, alfisols, ultisols and mollisols. Steep slopes, lack of irrigation facilities, use of low yielding local varieties, low fertility of the soil, less use of fertilizers, land tenure system and poor economic conditions of the farmers are major reasons for low agricultural productivity.

The region is rich in water resources, both the surface and groundwater. But poor management has done great damage than deriving any benefit of significance from this valuable natural wealth. The region receives about 510 km³ of water annually as rainfall and surface water resources have been estimated as 1487.65 km³ of water. The region has a ground water potential of 25.31 km³. Till date the region utilizes only 0.88 m ha m of water resource out of 42 million ha m potential. In spite of high potential, there is scarcity of even drinking water during winter months; envisage the urgent need for improving water harvesting measures. Most of the people of the region are non-vegetarian. Adoption of farming system approach involving cattle, pig, poultry and other livestock can compensate the requirement to a large extent. Fish is also in good demand in the region and most of the requirement is met through the import from outside the region.

There is good potential for horticulture and agroforestry in the region. The climatic conditions of the region are ideally suited for cultivation of fruits, vegetables, spices, multipurpose trees, orchids, flowers etc. The pineapple, orange, ginger and turmeric etc. of the region are known for their good quality. To exploit the full potential of these sectors, organized research and development works need to be undertaken.

Resource degradation, depleting forest cover and loss of biodiversity are the issues of greatest concern for sustainable development of agriculture in the region. Population growth has put enormous pressure on land, denying it the natural input of time and space to regenerate. Therefore, it would be prudent to adopt strategy and approach for optimal and sustainable use of natural resources in an integrated farming system approach.

1. Project sites and beneficiaries

The project sites are located in most backward districts of North Eastern States of India. The districts covered under this project are South Garo Hills in Meghalaya, North Sikkim of Sikkim, Saiha of Mizoram, Mon district of Nagaland, Upper Subansiri of Arunachal Pradesh, Dhalai district of Tripura and Tamenglong district of Manipur. Analysis covered farm household data from 7 NE states, 37 villages and 1636 farm households. The project sites in all the states of the NE Region were located in extremely backward region and the present agricultural practices were mainly characterized by subsistence farming. Farmers are absolutely resource poor and penetration of modern agro-technologies is almost negligible. Most of the sites are near the international borders e.g. Dhalai (Bangladesh), Mon (Burma), South Garo Hills (Bangladesh) and hardly have any communication and transport facilities (Fig. 4). The two sites selected in Mon are inhabited by the Konyak tribe and they still have a local king (called *Ang*) who looks after the administration of the village (Fig 5).



Fig 4: NAIP team with local farmers near the Bangladesh border in Dhalai



Fig 5: NAIP team with *Ang* (3rd from left) of Lungwa village (Mon)

Almost 100% populations are tribal (Fig.6) and ethnic tribes except Dhalai and South Garo Hills where 70% of the population are tribal. The other farm belongs to under privileged community. In general, these areas are starving for all round development, starting from basic facilities, amenities, infrastructure and food production. Prevailing agricultural practices are one amongst the primitive ones in the country and primary objective of farming is food production and sustenance. It is their natural way of farming, least dependence on any kind



Fig 6: Community discussion on important issues (Konyak tribe, Mon)

of external inputs and no standard measurement units are followed (or recorded) by the farmers. Therefore, it becomes very complex to quantify the resource use and output of prevailing farm practices. Following are the details of farm household surveyed under the present project (Table 1).

Table 1: Distribution of households surveyed

State	District	Village	No. of HH surveyed
Arunachal Pradesh	Upper Subansiri	Rete Lida	89
		Digbak	
		Kuporijo-I	
		Kuporijo-II	
		Kuporijo-III	
		Upper dugi	
		Lebar	
		PogaLida	
		LugiaLida	
		Lenyi	
		Belo	
		Riddi	
		Manipur	
Joungangtek			
LuwanglonKhullel			
LuwanglonKhunou			
Leishok			

		Reangkhong	
		Awangkhul	
		Noney	
Meghalaya	South Garo Hills	Chambiltolejang	31
		Dimagre	36
		DimaChikitchak	36
		Baigonkona	50
		Konkona	37
		Batabari	44
		Goosegaon	22
		Jadugre	20
		Mandanggre	15
		Defulipara	11
		Onajora	10
		Total	312
Mizoram	Saiha	Kawlchaw	17
		Theiva	25
		Theiva	98
		Mawbak	60
		Kawlchaw East	47
		Total	247
Nagaland	Mon	Ponyu Pensa	20
		Kanno Wangnao	20
		Yongin Wangsa	20
		Chingsa Shakam	20
		Longwa	50
		Total	130
Sikkim	North Sikkim	6 th Mile	2
		Kurung	8
		Lingko	9
		Lingtha	4
		Lingthem	16
		Lingzua	8
		Namprick	16
		Nung	7
		Passingdang	4
		Sangkalang	11
		Tingbong	25
		Total	110
Tripura	Dhalai	Chottasurma	22
		Chottasurma	112
		Lalchari&Halhuli	88
		Kuchainala	105
		Kuchainuala	36
		Lalchari	48
		Shibbari	88
		Chosurma, Halhuli, Marachara	36
		Total	535

Table 2: Summary of important baseline indicators of project sites (2007-08)

Average number of members in a household	8 (4-12)
Literacy Rate (%)	
Male	66.90
Female	46.94
Overall	59.52
Land holding pattern	About 75 % are smalland marginal farmers.
Occupational pattern (% of total no. of households)	
Agriculture (%)	90
Non-agriculture (%)	10
Annual income/family (Rs.)	46,000
Cropping intensity (%)	110
Sources of irrigation	95 % rain-fed
Migration	Nil
Employment (man-days/year)	
On-farm activities (Man-days involved in crop cultivation and labour hired in agriculture and allied activities)	166
Off-farm activities (Man-days involved in migration and subsidiary activities and labour hired in non-agriculture activities)	59
Percent disposal of produce to local buyers soon after the harvest (% of total produce)	48 %
Percent disposal of produce put for agro-processing locally (% of total disposal of produce)	Nil
Availability of micro-credit facility and use	Poor

5. Operational holdings

In the North Eastern hill region, population density is in generally low (except in Tripura) and large amount of lands remain uncultivated or fallow. Average operational holding size was comparatively more under Sikkim (3.9 ha) and Mizoram (2.36 ha) (Table 3). Average operational holding was minimum in Tripura (0.43 ha). Size of operational holdings was more fragmented in Tripura and Meghalaya and was dominated by marginal categories of farmers in comparison to the other states. Cultivation practice in the NE region is varying in nature over year to year due to continuous shifting of cultivating area. Most parts of their cultivable lands are not settled. The number of family members and availability of family labourers determines the amount of land to be cultivated because most of the agricultural operations are done manually. Ploughing, cultural operations, harvesting and threshing etc. all are performed manually. Social and women work map at Rangkhung village, Tamenglong, social and resource map of Lampong Sheanghah village, Mon and sketch of clusters of Dhalai as drawn during survey (PRA) has been depicted in Fig.7.

Table 3: Operational holdings size of farm households

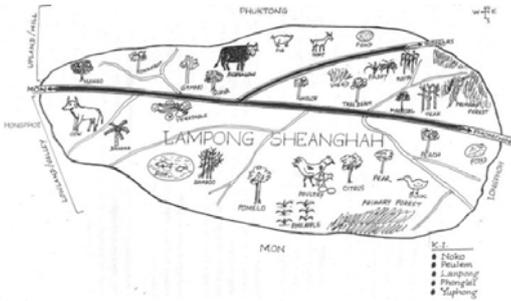
District	No of HH	Average operational holding size (ha)	Percentage of holding				
			Marginal (<1 ha)	Small (1-2 ha)	Semi-Medium (2-4 ha)	Medium (4-10 ha)	Large (>10 ha)
Upper Subansiri	89	1.61	22.47	32.07	37.85	5.07	2.60
Tamenglong	88	1.38	1.13	89.77	6.81	2.27	-
South Garo Hills	312	1.15	67.92	13.21	13.21	5.66	nil
Saiha	147	2.36	0.68	8.16	79.60	10.88	0.68
Mon	130	1.98	8.33	27.08	35.42	27.17	2.0
NorthSikkim	110	3.90	1.82	11.82	23.64	52.73	10.00
Dhalai	660	0.43	92.05	7.95	-	-	-



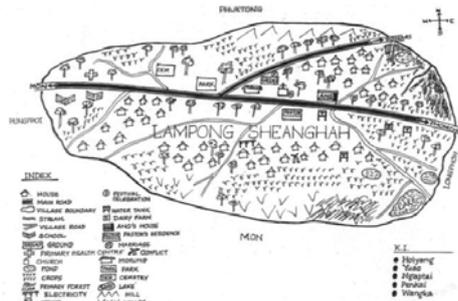
Resource/social map of Rangkhong village, Tamenglong, Manipur



Chart for work load of women in Rangkhong village, Tamenglong, Manipur



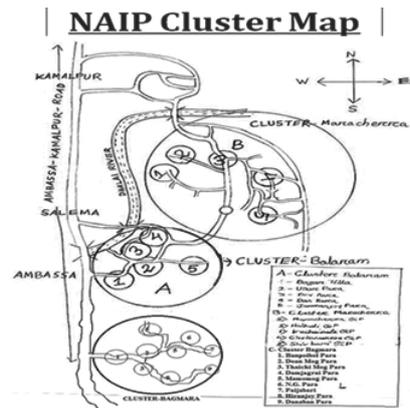
Agro ecosystem map of Lampong Sheanghah, Mon, Nagaland



Social Map of Lampong Sheanghah village of Mon, Nagaland



Resource map of Lampong Sheanghah, Mon, Nagaland



Sketch Sowing the Dhalai Cluster, Tripura

Fig 7: Glimpses of PRA activities in project sites

6. Types of land possession

The land situation in hilly tract of NE Region is comprised of 3 distinctly different types, such as *jhum* land, upland and lowland (Table 4). In Nagaland, the entire area under the project site has been reported to be under *jhum* practices. In other sites, the lands comprise of low, up and *jhum* lands. Uplands are considered as lands on which agriculture is practiced in non-irrigated fields that do not hold impounded surface water. Uplands of the northeast region (NER) of India are distinguished by certain socio-economic features and with very low level of urbanization and heavy dependence on agriculture. The upland agriculture has remained predominantly subsistence in nature with rural communities practicing shifting cultivation or *jhum* cultivation. Thus, upland is the land on the top of the hilly terrain or raised valley land with good drainage facilities, where the farmers use less / no fertilizer and irrigation (Fig.8).

Jhum cultivation which is also called shifting cultivation is one of the prevailing agricultural practices in North Eastern states since ages and considered to be causing severe land degradation. This *jhum* cultivation practices are also known as slash-and-burn method of cultivation, which destroy biodiversity in a great extent. Commonly under *jhum* cultivation



Fig 8: Paddy fields near the Bangladesh border in Dhalai

practices, forests are cut, cleaned and burned during the month of February-March. The land is prepared for sowing a number of crops manually. Mixed crops (as many as 3 crops)

Table 4: Types of land possession (% of farmers possess)

District	Valley land	Upland	<i>Jhum</i> land	Mixed
Upper Subansiri	11.24	35.68	30.55	22.53
Tamenglong	45.00	30.00	20.00	5.00
Saiha	8.33	84.72	6.94	3.47
South Garo Hills	45.52	21.47	17.44	15.57
Mon	-	-	100.00	-
North Sikkim	90.00	10.00	NA	NA
Dhalai	-	43.18	-	56.82



Fig 9: NAIP team with local farmers visiting a *jhum* field in Mon

are being followed and crops are sown either through direct seeded or dibbling method. Usually the *jhum* cultivation is practiced for an average 3-4 consecutive years, which is known as the *jhum* cycle. Then the land is kept fallow for regeneration of natural forest and natural fertility of the soil. If sufficient time is permitted as fallow period (more than 10 to 15 years) the forestland is regenerated and soil regains its fertility. However, the concern for *jhum* cultivation practices is the lowering of

fallow period which has reduced to 2-3 years due to high population pressure. In spite of being a naturally degradation enhancing cultivation practice, *jhum* still remains significant among the farmers in North Eastern Hill Region, particularly in remote areas. The reason being *jhum* cultivation is quite suitable for sloppy topographical condition and suitable to the resource poor socio-economic condition as it is less capital intensive. Basically *jhum* farmer are risk averter. Agriculture in this region is predominated by subsistence farming. Intensive agriculture is an uncertain activity in fragile ecosystem and therefore is risky, particularly when survival is at stake. It is the dominant factor for not changing the traditional farm practices even in the face of opportunities. The poor farmers are naturally risk averter and prefer to be safe and relatively certain even if there is a prospect of getting higher average return by taking a greater degree of risk. Thus improvement of shifting cultivation rather than alternative to shifting cultivation is envisaged for improving the livelihood of poor tribal farmers (Fig 9-11).



Fig 10: Shifting cultivation- a predominant practice in South Garo Hills



Fig 11: Women working in *jhum* field, Saiha

7. Leasing of land

In the study area, the land leasing system varied among the different states. A summary of the leasing system is given in the table below:

District	Land leasing system
Upper Subansiri	Land leasing system does not prevail in the surveyed villages, the farmers do not lease out their land nor do they take other farmers land on lease.
Tamenglong	Land leasing system does not prevail in the surveyed villages. However for practicing <i>jhum</i> cultivation, no rent is required to be paid except that every house hold has to pay 10% of their produce to the village church as customary practices.
South Garo Hills	Leasing in and leasing out of lands is a common practice.
Saiha	Land Leasing system does not prevail in the surveyed villages.
Mon	Leasing in and leasing out of lands is common practice and mode of payment is usually cash or kind. Community manages the land and hardly there is any conflict.
North Sikkim	Farmers used to lease out their lands to other farmers. Around 15 percent of the sampled farmers reported to have leased in their farmlands. The sharing system is known as 'Adya' system. Produced are shared between producer and land owner on 50:50 percent basis.
Dhalai	Very few farmers (<1 percent) were engaged in cultivation in leased lands. Leasing system is 1:1 sharing of output. Cost of inputs like fertilizers, chemicals etc. are also shared.

8. Soil testing

In general, the soil quality of farm lands was never tested in project sites and farmers use their natural wisdom to select crops to be grown.

9. Irrigation status

Upper Subansiri

Major irrigation sources are canal (86.52 percent farmers) and river water lifting (6.74 percent). The selected site of project is situated beside the Subansiri river; therefore lift irrigation is the major source of irrigation. Out of total cultivable area of 372 acre of the farmers, 32.46 percent area was covered under irrigation. Irrigation water is available for 7-8 months in a year.

Tamenglong

Lack of irrigation facilities is considered to be one of the crucial factors for low productivity of both kharif and rabi crops. No irrigation facilities are available in the field and cultivation is done entirely under rain-fed condition. However, there are some areas which have good potential for irrigation such as the hill streams.

South Garo Hills

Most of the lands are cultivated as rainfed. Only 19 percent land is covered under irrigation. Various sources of irrigations are river, stream, nala and pond or spring water. Availability of irrigation is around 5-6 months in year.

Saiha

Farmers do not have any irrigation facilities and farming is mostly under rain-fed condition. Stream water is diverted by using pipes (bamboo) to the fields. Only few farmers reported to have irrigation facilities (canal) in Mawbak village of Saiha District. Hilly undulating topography is the major limitation for creation of irrigation facilities in the district.



Fig 12: Traditional method of carrying water in bamboo vessel in Mon

Mon

Mostly cultivated as rain-fed and kharif is the main season of crop cultivation. Steep slopes and undulating topography is the main limitation in creation of irrigation facilities (Fig. 12).

North Sikkim

Around 22 percent of the farm lands were operated under irrigated condition and 78 percent were cultivated

under rain-fed condition. Most of the irrigation sources are the natural stream of the hills and the quality of water is good as perceived by the farmers. However, few farmers (19 percent) have reported that they do not have any idea about the quality of irrigation water used for crop cultivation. There is no practice of selling of irrigation water.

Dhalai

Most of cultivable lands are not covered under irrigation. However, there is potential for creation of minor irrigation facilities by tapping water resources of small rivers, nalas, tube wells, ground wells etc.

10. Cropping pattern

Upper Subansiri

Rice is the dominating crop in the cropping pattern of the farmers, which accounted for more than 50 percent of the total cropped area. Average yield of rice is very low (1.0 t/ha) and *jhum* farming is dominating farming system. *Jhum* cultivation starts during April-May and crops continue up to October. A number of crops such as rice, maize, ragi, cucumber, colocasia, ginger, yam, chilly etc. are grown on *jhum* fields. Average productivity of rice under *jhum* cultivation is less than 1 t/ha. Around 2-3 kg of rice seeds is used under *jhum* farming along with other crops. Similarly for ragi around 1-2 kg of seeds is used by farmers and average productivity is around 0.8 t/ha. Maize is an important crop under *jhum* farming system and average productivity has been observed to be 1.4 t/ha which is slightly higher than the rice productivity. Each farm family used to sow 3-5 kg of maize seed. Since the *jhum* practices involve mixed cropping in a piece of land, it becomes extremely complicated to estimate the area under individual crops and thus the production and productivity.

Tamenglong

Farmers in the selected sites of Tamenglong district of Manipur grow a number of crops in a piece of land (mixed farming) and also *jhum* farming system is prevalent (Fig.13). Major crops grown are as follows:



Fig 13: Banana plantation in the *jhum* fields in Tamenglong

Major crops during *kharif* season are rice, maize. In the rabi season, they grow potato, mustard. Major spice crops are ginger, turmeric, giant chilly. Vegetables grown in the area are pumpkin, brinjal, radish, pea, cow pea, cabbage. Among the fruit crops banana, orange, lemon, pineapples, mango, jack fruit.

South Garo Hills

Farmers in selected site of Meghalaya grow a number of crops in a piece of land (mixed farming) and also *jhum* farming system is prevalent. Rice and maize are the major cereal crops and cashewnut and arecanut are the major plantation crops grown by the farmers. Few farmers also grow citrus and rubber. Vegetables are grown in a very low scale. Nearly 24 percent of the cropped area is under cereals cultivation, followed by 28 percent under fruits and vegetables and nearly 20 percent is under plantation crops cultivation. Average area and percent allocation of different crops are reported below:

Crops/group of crops	Average area (ha/farm)	Percent share (%)
Rice	0.57	34
Spices	0.10	6
Cashew nut	0.32	19
Fruits	0.49	29
Vegetables and others (rubber etc.)	0.20	12

Saiha

During kharif season major crops grown are rice, maize.

Vegetables – Pumpkin, brinjal, bhindi, ash gourd, french bean, bitter gourd, sweet gourd, chilly and squash.

Fruits – Banana, Assam lemon, passion fruit, orange, pineapple and mango.

Spices – Ginger.

Average rice area is 0.57 ha/farm. Productivity of rice (*jhum*) is 1.63 t/ha.

Average productivity of maize is 1.88 t/ha.

Mon

Rice is the major crop and average cultivation area under rice is 0.18 ha per farm. Average yield of rice has been calculated to be 1.12 t/ha. Other important crops grown are maize, millet, tapioca and colocasia. All the crops are grown as mixed crop under *jhum* farming system. Alder is common among tree species in the forest. The community maintains alder forest for maintaining fertility of the soil.

Crops	Average area (ha)	Yield (t/ha)
Rice	0.18	1.12
Maize	0.46	1.74
Millet	0.47	1.36
Tapioca	0.44	1.88
Colocasia	0.34	1.66

North Sikkim

Major crops during *kharif* season are rice, maize, millets.

Major crops during *rabi* season are wheat, potato.

Major spice crops are cardamom and ginger.

Fruits crops grown are orange, banana and guava.

Crops	Average area (ha)	Yield (t/ha)
Rice	0.57	1.42
Maize	0.66	1.43
Wheat	0.29	-
Potato	0.38	1.78
Large Cardamom	-	0.235

Large Cardamom in North Sikkim

Sikkim is one of the leading producers of large cardamom. Large cardamom (Fig. 14) is the main cash crop of the farmers in the study area and they grow this high value crop extensively. Therefore, this separate section has been included to discuss about the present production system of large cardamom in the study area.

Average production per household has been calculated to be 122 kg ranging from a maximum of 500 kg to a minimum of 2 kg. Average farm gate price received was Rs. 125/kg. It was quite notable that majority of the farmers (69 percent) were harvesting his high value commodity from a large area (more than 2 ha). More than quarter of the farmers (26 percent) were collecting the large



Fig 14: Large cardamom plantation in North Sikkim (Dzongu Culster)

cardamom from an area of plantation in between 1-2 ha and rest (4 percent) of the farmers were having plantation of large cardamom in less than one hectare of area. These farmers grow mostly the cardamom as natural cultivation under natural sloppy land without taking any special care. Some of the preferred cultivars grown by the farmers are Ramsey, Golsey, Sawney and Ramla. The large cardamom plant was mostly propagated by using suckers, which were available locally. Farmers used to source the planting material of large cardamom from fellow farmers mostly within the villages. Most of the farmers are having 40-50 years of experience in cultivation of large cardamom in the study area.

Curing of fresh cardamom is done in traditional way through local made brick structure named Bhattis. This local made Bhattis are usually built within the field itself. But the primary processing through Bhattis are problematic in terms of keeping quality, retaining the flavour and marketability of this high value commodity for distance market. TERI has reported in a study that the fresh cardamom capsules generally contain 80-85% (wet basis) moisture. For long-duration storage for the market and also for bringing out the aroma of cardamom, the moisture content of fresh cardamom has to be brought down to less than 10 percent by drying the capsules. Most of the farmers still use the traditional cardamom curing system for drying large cardamom. Under this system, fresh cardamom capsules are dried in locally made chambers, known as bhattis, which are constructed out of rocks, stones, and bamboo. This traditional curing system, however, has several drawbacks. It produces excessive smoke and thus spoils the true flavor of cardamom. The cardamom capsules get covered by soot, are charred, and often unevenly dried. They also lose a high percentage of oil in the drying process. Farmer's reported that they do not have any idea about this modified Bhattis and therefore, they are all using the traditional Bhattis.

Around 75 percent of the farmers reported that they did not make any kind of grading before selling the cardamom capsule to the traders. Majority of the farmers (73 percent) used to sell the capsule directly to the traders and some farmers (27 percent) used to sell their produce through middleman. Improvement of road condition and also establishment of government cold storage would certainly boost the economy of these cardamom farmers. Farmers expressed their willingness to undertake training on various aspects of large cardamom cultivation such as nursery raising, field planting, management of plants, plant protection measures and improved ways of post-harvest handling and processing. Average expenditure on management of large cardamom field has been calculated to be around Rs. 10,000 per farm. Main component of this cost was involved in labour requirement. Average price received by the farmers were calculated to be Rs. 125 per kg and the price range was in between Rs. 80 to Rs. 145 depending on the quality of the produce.

Dhalai

Rice is the most dominating crops in the area. Few farmers grow other crops such as chilly, sugarcane and vegetables (brinjal, potato etc.) in a very small scale. Average area under rice cultivation is around 0.29 ha and productivity was around 3.2 t/ha. Arecanut is a

common plantation crop grown around the house premises. Some farmers integrate crops with aquaculture and livestock. But any improved crop/animal husbandry is hardly followed as a result; productivity is very low in spite of good potential. Across the site cultivation of local low yielding crops and raising of local non-descript livestock's are common feature of agriculture (Fig.15).



Fig 15: Integrated crop/livestock farming in Dhalai

11. Market information

Upper Subansiri

Most of the farmers are deficient in food production against their family needs in a year and they are heavily dependent on the supply from public distribution system. Farmers are usually not left with any marketable surplus of any agricultural commodities. However, fruits like orange and cash crops such as ginger and potato are grown for selling in the markets which fetch reasonable return. But, selling of fruits is difficult and very often they are compelled for distress selling due to remoteness of the place and low capacity (small size) of local market. Distance of local market from the village is around 6-7 km.

Tamenglong

About 50% of the harvested crops is consumed and remaining is marketed in the neighbouring villages or in distant markets such as Imphal. No post-harvest activities are followed in the area and as a result about 50% of the harvested crops is wasted due to improper post-harvest management. Inputs like fertilizers, insecticides, fungicides etc. are not used in these villages and they entirely depend on natural farming.

South Garo Hills

Mostly the produces are sold to local buyers, at weekly Haat (market) beside road-side or farmers used to bring their produce at Tura market which is the second commercial center of Meghalaya after Shillong. Considering the high demand, selling of cashew is not

a problem and usually it fetches good return. Cashew, rubber, ginger and arecanut are the major commodities having marketable surplus in the area. Almost all crops are grown without using any chemical fertilizers or pesticides; hence, the government is giving thrust to promote these products as organic to increase the value of these commodities.

Saiha

Market place is Saiha Bazaar, which is 45 km away from the village. Produce is sold in local market as well as in Saiha market. Mode of transaction in marketing of agricultural produce is cash. Very few farmers store their produce for selling at later stage (maximum period 6 months). Most of the farmers sold their produce (marketable surplus) immediately after harvesting. Farmers have expressed the need of warehousing and cold storage facilities from government.

Mon

There is as such no market place in and around the Lungwa village. The nearest market (locals call it a town) is Phom Ching (with only two shops) about (10 km from Lungwa village) for selling/buying the produce (Fig.16). The other village Lampong



Fig 16: NAIP team visiting a local town (Pomching) in Mon district

Sheanghah situated near the main road is about 10 km from district town Mon. The Lungwa village is having international border with Burma and the locals have to travel at least 40 km to reach the nearest town of Mon for basic materials.

North Sikkim

Nearest market where the products are sold is located around 14 km away from the village. Large cardamom is sold at Mangan market or to local buyers present in the villages. Most of the produce (Large

Cardamom) is sold out during November – December months. Storage is done for a maximum period of one month only. Large cardamom are stored by using domestic storage, gunny bag etc. Rice is stored in gunny bags or in wooden box maximum for a period of 2-6 months. Maize are stored in hanging position and stored for a period of 6-12 months. Most of the produce is sold within one week of the harvest. Majority of the farmers have reported low

Table 5: Marketable surplus commodities are large cardamom and ginger (cash crops)

Commodities	Average marketable surplus (kg)	Average price (Rs./kg)	Value (Rs.)	Percent growers
Large Cardamom	149	120	17595	90
Ginger	214	6.5	1440	10

yield and declining trend in yield of large cardamom. Some farmers have reported low receipt of price due to the quality deterioration affected by insect and pest attack. Farmers usually receive the market information through fellow farmers, telephone, taxi drivers or local buyers. Farmers have expressed the need of scientific storage structure so that they can store their high value commodities and cereals for a longer period of time.

Table 6: Post-harvest activities

Activities	Percent farmers
Cleaning	72
Grading	19
Cleaning & grading	2
No post-harvest activities	8

12. Input costs and returns

Upper Subansiri

Cost of seeds and labour is the major component in the cost of cultivation of crops. Since *jhum* is the dominating farming practice, uses of external inputs are almost nil and hence no cost involved. Farmers usually used their own seeds (stored from previous years' production) or exchanged from fellow farmers. Labour is used through exchange method i.e., farmers work in a fellow farmer's field and vice-versa. Labour is exchanged among them and usually no wage is paid. Major agricultural operations such as cleaning of jungles, land preparation, sowing and harvesting are carried out through this labour exchange and other operations are done by the family labourers. Family labour worked throughout the day in their *jhum* fields. Therefore, the market value of cost labour for agricultural operation was not available and also the cost of seeds was not imputed.

It has been estimated that, on an average each farm family is involved in 40-45 man-days (8 hours' work) of work for the agricultural operation. Similarly, rice cultivation under valley land involves 45-50 labour man-days per farm family. Imputed value of family labourers has been estimated to be Rs. 50/man-day. Out of total labour involved in agricultural operation for rice cultivation, 76 percent has been contributed by the family labourers and rests are fellow farmers. The cost of labour for rice cultivation has been imputed as Rs. 3275/- per farm household. Out of which cost of animal labour has been calculated to be Rs. 200/- per family.

For ragi cultivation, the contribution of family labourer has been estimated to be 63 percent and rest is contributed by fellow farmers. Family contributed around 14 man-days for cultivation of ragi and around 8 man-days were contributed by fellow farmers. The total cost of labour was imputed as Rs. 2394 per farm family including Rs. 200 as animal labour.

Tamenglong

Since *jhum* is the dominant farming practice for the people of the district, the use of external inputs is nil and hence, the cost of seeds and other farm inputs cannot be calculated. Farmers usually use their own seeds which are stored from the previous year's produce or by exchanging with other fellow farmers. However, for land preparation and other farm activities, it is done by the family members and also by exchanging labour with other fellow farmers. Fertilizers and chemicals are not used by the farmers and hence, agricultural productivity and return is very low.

South Garo Hills

Estimating the costs and returns of the crops grown by the farmers is quite difficult due to the prevailing practice of mixed cropping system. Area estimation often becomes complicated and many times visual assessments have to follow. However, based on the detail discussion with the farmers following costs and returns have been estimated for major crops. In calculation of total cost, value of family labour was included in it.

Crops	Yield (t/ha)	Total cost (Rs./ha)	Output/input or Benefit-cost ratio
Rice (valley)	2.8	14,660	1.43
Rice (upland)	1.8	12,440	1.15
Rice (<i>jhum</i>)	1.1	11,200	0.95
Ginger	6.5	33,210	1.65
Mixed crop*	Varies from 0.5 (chili) – 2.5 (sweet potato)	12,420	1.33
Pineapple	11240 no	15,625	1.55**
Cashew	5.5***	22,450	2.34**

* No of crops (5-6) are grown, usually on upland condition on raised bed (called bun)

** Benefit-cost ratio for plantation crops (e.g. pineapple, cashew etc.)

*** Yield in weight basis

Saiha

The farmers usually use their own seeds (mostly local varieties) in agriculture. The use of FYM is practiced to some extent. Agricultural productivity and return is very low.

Mon

Cost of seed and labour are the major cost components for cultivation under *jhum* practices prevailing in Nagaland. However, calculation of labour cost for individual crops is very complex and may be misleading as the same labourers are performing operation related to all crops simultaneously. Therefore, the cost of seed is the only cost that has been computed and reported. During *kharif* season farmers and all the farm families remains engaged throughout the day and throughout the season.

Crops	Quantity of seeds (kg)	Cost of seeds (Rs.)
Rice	7	105
Maize	21	220
Millet	15	150

North Sikkim

Paddy farmers use mostly the stored seeds. On an average, farmers used 23 kg rice seed in a season. Similarly on an average 12 kg of wheat seeds are used by the farmers in a season. Use of FYM is very common in cultivation practices of Sikkim. On an average, cost of FYM applied by farmers was around Rs. 1033/farm.

Crops	Average seed used (kg)	Cost of FYM used (Rs.)/farm
Rice	23	770
Wheat	12	1033
Maize	11	978
Millet	7	300
Ginger	55	865
Large cardamom	2000 suckers	
Potato	61	795

Dhalai

Rice is the major crop in the selected study area. Rice is grown in valley as well as in upland areas. Rice is cultivated through intensive cultivation as compared to other selected sites of the NE Region. Cost of seeds, fertilizer, irrigation, pesticides and labourer are the major components.

Item	Average quantity (kg/farmer)	Amount (Rs.)
Human labour (hired)	42	3360
Human labour (family)	52	4160
Animal labour	2	700
Seed	44.5	548
FYM	847	653
Fertilizers	52.43	879
Pesticides	52.43	579
Irrigation		284
Total		11163

13. Livestock ownership status

Upper Subansiri

Livestock is the integral part of the farming system of Arunachal Pradesh and several animals are reared which includes mithun, pig, goat, poultry and cattle. Almost all farmers were observed to rear some livestock and mithun and pig have been most dominating. Supply of meat and milk is the purpose of keeping animals by the farm families. Most of the farmers keep 3-4 mithuns and pigs each. However, all these animals are reared through very primitive practice and without any special care. Around 6 percent of the farmers were keeping cattle.

Tamenglong

Livestock forms an integral part of the farming system in Manipur. Buffalo, cow, poultry and pig are the major livestock reared by the farmers primarily for meat purpose. On an average, farmers earn about Rs. 500-3000/ year from livestock. Fish farming is done in a very limited way in the area. No scientific and systemic method is followed due to which the output is low (<600 kg/ha).

South Garo Hills

Among the livestock's, pig, cattle, poultry and goat are important. More than 60 percent of the farmers reared pig and more than half of the farmers were keeping poultry (most as backyard poultry). On an average, farmers were keeping 3-4 pig and 5-6 poultry. No of goat reared by the farmers were varied from 1-3 and some farmers were keeping cattle but mostly 1-2 numbers only. Livestock are kept mainly for meat purpose only. Availability

of water resources and local demand indicated possibility of duck in the farming system in the area.

Saiha

Major animals are pig, poultry and goat. Animals are mainly reared for mainly meat purpose. Every family possesses 2-4 nos. of pig and sells around 70 – 130 kg of pork with an average rate of Rs. 140/kg.

Animal	No of animals /HH	Meat production (kg/year)	Value (Rs./year)
Pig	2 – 4	70 – 130	12250
Poultry	5 – 30	10 – 20	1940

Mon

Pig, poultry, mithun (*Bos frontalis*) and cattle are the major livestock reared by the farmers mainly for meat purpose. Farmers in Nagaland keep a good number of animals and thus the animal density per farm is quite high. Open grazing of animals specially mithun (Fig.17) creates problem in cultivation of high value crops in absence of fencing.

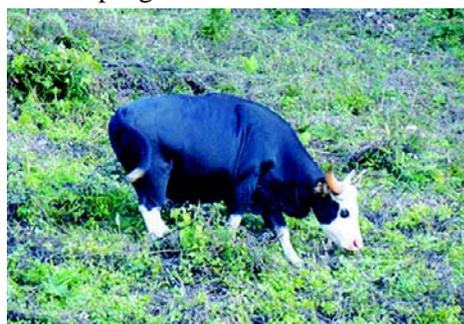


Fig 17: Mithun, a major component of livestock in Mon and Upper Subansiri

Animal	Average no per family
Pig	3-4
Poultry	12-14
Mithun	4-5
Cattle	1-2

North Sikkim

Major animals reared by the farmers in Sikkim are cow, goat, poultry and pig. Purpose of keeping animals is mainly meat. Cow is also kept for milk purpose by some people (Fig.18).

Animal	No of animals /HH	Meat production (kg/year)	Value (Rs./year)
Cow	1-4	185	8078
Goat	2-4	32	2927
Poultry	7-10	12	1266
Pig	2-3	80	4338

Dhalai

Cattle, poultry and goat are the major livestock reared by the farmers. Cattle are reared as draft animal and for milk whereas goats are reared for milk and meat purposes. On an average, every farm household rears 2-4 cattle and 3-4 no goats. A few farmers reared pigs. Some of the farms in dhalai had local poultry bird.



Fig 18: Traditional practice of rearing livestock by the farmers in North Sikkim



Fig 19: NAIP team visiting an abandoned fish pond in Saiha

Fig 20: A poorly managed fish pond in Tamenglong, Manipur

14. Aggregate family income

Upper Subansiri

Agriculture is in subsistence form in the farming system of the farmers though this is the primary occupation of most of the families. Major livelihood options are agriculture, livestock and off-farm income. Within agriculture, horticultural crops (orchard) are one of the major sources of income. Average annual income per family has been calculated to be as low as Rs. 40,115 /HH/year. Nearly 30 percent of income is contributed by crops and similar contributions come from livestock. However 14 percent of the farmers have indicated some other sources of income such as construction, business on stone and chips making and the average income has been reported to be Rs. 26,077 /person/annum which were providing employment to more than 40 man-days. Other subsidiary income sources such as wood cutting and collection, fishing, daily worker, contract business were observed to be major income provider and on an average provided more than Rs. 20,000/- annual income per person.

Source of income	Average income (Rs./HH/year)	Percent share
Agriculture	13,365	33.3
Orchards	8,900	22.2
Livestock	11,850	29.5
Wage earning	6,000	15.0
Total	40,115	100.0

Tamenglong

Agriculture, livestock and off farm income forms the major livelihood options for the people of this area. Within agriculture, horticultural crops (orchard) and in livestock, piggery and poultry are the major sources of income.

Income sources	Average income (Rs./HH/year)	Percent share
Agriculture	34,985	74.10
Livestock including fisheries	5,742	12.16
Others	6,488	13.74
Total	47,215	100.00

South Garo Hills

Agriculture is the primary occupation in the selected site. But, currently the off-farm income has been the major sources of income. Average income from agricultural crops has been calculated to be around Rs. 19,444/HH/year and the income from orchard and livestock were around Rs. 13,469 and Rs. 10,372 per family, respectively. Income from other sources such as wage earning, contractual work etc. was calculated to be Rs. 6,540 per family.

Income source	Average income (Rs./HH/year)	Percent share
Agriculture	19,444	39.02
Orchard (plantation)	13,469	27.03
Livestock	10,372	20.82
Others (off-farm)	6,540	13.13
Total	49,825	100.00

Saiha

Wage earning, agriculture, livestock management are the main source of livelihood for the people.

Source	Average income (Rs./HH/year)	Percent share
Agriculture	14,861	32.16
Livestock	8,578	18.55
Orchard	5,457	11.81
Wage earning	9,294	20.11
Others	8,025	17.37
Total	46,215	100.00

Income from alternative occupation (subsidiary) other than agriculture, such as business, shop owner, labor in construction work, contract business etc.

Subsidiary and other income source	Income (Rs./year)
Business, shop owner, labor in construction work, contract business etc.	15,654
Services	16,000
Total	31,654

Mon

Major livelihood options are agriculture, livestock rearing, wage earning and other off-farm income such as business, contractual work or service.

Income sources	Income (Rs./HH/year)	Percent share
Agriculture	25,248	51.93
Livestock	13,833	28.45
Other	9,534	19.62
Total	48,615	100.00

North Sikkim

Agriculture is the primary occupation of almost all people (95 percent) in the study area.

Source	Income (Rs./HH/year)	Percent share
Agriculture	17,235	40
Livestock	10,035	23
Wage earning	8,500	20
Others	7,283	17
Total	43,053	100

Income from alternative occupation (subsidiary) other than agriculture, such as business, shop owner, labor in construction work, contract business etc.

Subsidiary and other income source	Income (Rs./year)
Business, shop owner, labor in construction work, contract business	17,354
Service	22,479
Total	39,833

Dhalai

Agriculture and livestock forms the major sources of income for the people of the district. Within agriculture, rice and horticulture crops form the major source of income. In case of livestock, cow, poultry and piggery form the major sources. However, due to very low land holding and very low productivity of the soil, most of the farmers have turned to other off farm activities (working under Govt. sponsored schemes, daily wage earning etc.).

Income sources	Income (Rs./HH/year)	Percent share
Agriculture	18,224	38.77
Livestock including fisheries	9,951	21.18
Other	18,825	40.05
Total	47,000	100.00

15. Income and employment status

The overall average employment is 166 man-days/farmer/year including crop cultivation and labour hired in agriculture and allied activities (Fig 22). The average employment from agriculture is 54 man-days/ha/year, from livestock was 27 man-days/ha/year and from other activities employment was 41 man-days/ha/year, whereas, the average income from agriculture, livestock and other activities related to allied sector is Rs. 21,660/ha/year, Rs. 9,750/ha/year and Rs. 9,440/ha/year (Fig. 21). The average annual employment per house hold (HH) per year is 178 man-days in Upper Subansiri, 195 man-days in Tamenglong, 148 man-days in South Garo Hills, 184 man-days in Saiha, 168 man-days in Mon, 149 man-days in North Sikkim and 138 in Dhalai district (Fig 22).

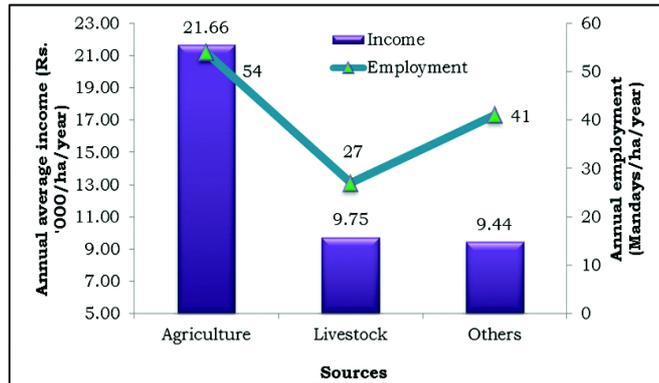


Fig 21: Average annual income and employment of the farmers at NAIP site (2007-08)

The average annual employment per house hold (HH) per year is 178 man-days in Upper Subansiri, 195 man-days in Tamenglong, 148 man-days in South Garo Hills, 184 man-days in Saiha, 168 man-days in Mon, 149 man-days in North Sikkim and 138 in Dhalai district (Fig 22).

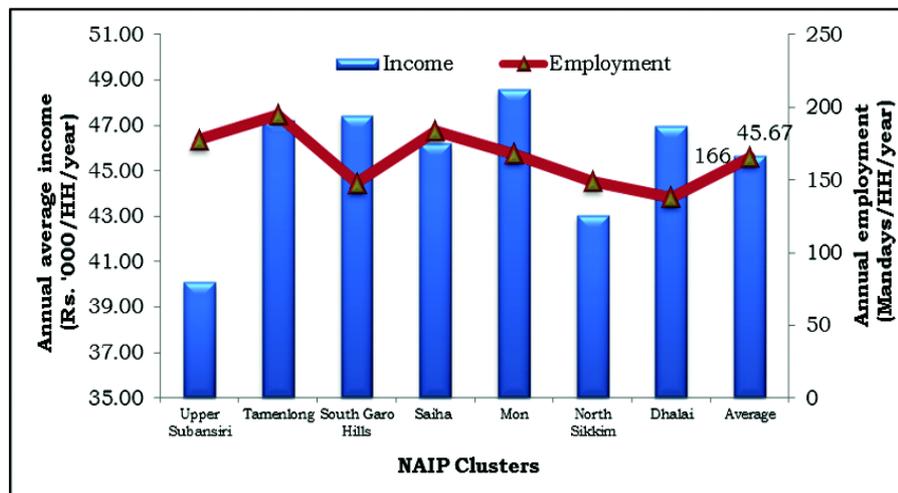


Fig 22: State wise average annual income and employment of the farmers of NAIP site (2007-08)

16. Migration status

Upper Subansiri

Migration was not prevalent in the project site.

Tamenglong

Migration was not prevalent in the project sites except to the nearby city (Imphal).

South Garo Hills

Out migration was not prevalent in the project site except to the nearby city (Tura).

Saiha

No migration information was available for the households of Mizoram.

Mon

No migration information was available for the people of Mon District.

North Sikkim

Around 5 percent of the households have reported that some of their family members have migrated to other places for their alternative livelihoods or service.

Dhalai

Migration was not prevalent in the project sites except to the nearby town or city.

17. Loan, micro-credit facility and insurance

Upper Subansiri

Most of the farmers are not availing the services like micro-credit, loan and insurance scheme available in the area. Contract farming was not present in the area.

Tamenglong

Presently the farmers in the villages avail neither loan and micro-credit facilities nor any insurance facilities. There is no form of contract farming prevailing in the area.

South Garo Hills

No farmers have reported to acquire loan facilities from institutional sources.

Saiha

Few SHGs have been established during 2005 and onwards to facilitate the micro-credit facilities. Some farmers have become members of those SHGs but the activities/services are in very nascent stage. The AMFU organization is active in Kawkchaw (E) village area since 1995. No information is available on insurance scheme popularized among the farmers.

Mon

No farmers have reported to acquire loan facilities from institutional sources.

North Sikkim

Around 5.5 percent of the respondents reported that they have obtained some kind of Institutional Loan. Distance of the bank from the selected villages range from 15-90 km. Most of the farmers (96 percent) do not avail the institutional credit facility from bank. Only around 4 percent of the farmers have reported to avail credit facility from banks and half of them have repaid the loan fully. Farmers are least aware about any kind of crop insurance scheme or contract farming prevailing in the area. However, many among the farmers (6 percent of total households) have reported to be members of some society or SHGs operating in the study area.

Dhalai

No farmers have reported to acquire loan facilities from institutional sources. Across the district, farmers get loan/credits from their relatives, neighbours or local money lenders.

18. Constraints in crop production

Sl. Reasons of low productivity No.	Rank						
	AP	MN	ML	MZ	NL	SK	TR
1. Non-availability of sufficient water	1st	1st	3rd	1st	1st	1st	1st
2. Acidity	-	-	9th	-	-	-	6th
3. Varieties	5th	-	1st	-	2nd	2nd	5th
4. Absence or low dose of fertilizer/ manure application	-	-	2nd	2nd	3rd	3rd	4th
5. Weed infestation	-	2nd	8th	3rd	4th	4th	3rd
6. Wide spread of insects and disease	2nd	3rd	4th	4th	-	-	-
7. Malpractices especially for pesticides	-	-	-	-	-	-	-
8. Paucity of fund	3rd	4th	5th		5th	-	-
9. High price of inputs	-	5th	6th	5th	-	-	-
10. Non availability of machinery	4th	6th	7th	6th	-	-	2nd

(MN-Manipur, ML-Meghalaya, MZ-Mizoram, TR-Tripura, NL-Nagaland, AP-Arunachal Pradesh, SK-Sikkim)

19. General constraints in agricultural development

Agricultural sector in north eastern states is experiencing the transition phase, slowly shifting out from traditionally low-income agriculture, but yet to reach the stage of pre-conditions for take-off into self-sustaining growth. Capacity building and empowering with technical knowledge should be given top priority for the human resource development in this region. The traditional family farmers resist change towards modern technologies and it is necessary to analyze whether their behavior is stubborn and irrational (e.g., low adoption rate for high yielding variety seeds for rice cultivation) or they are acting rationally within the context of their particular economic environment, and the agro-technologies should be appropriated accordingly to increase the adoption level of these innovations. Creating credible database is extremely important, otherwise any analysis or planning may prove to be ineffective and futile. The volume of marketed surplus from agricultural production must be increased and value addition for high value crops such as, ginger, citrus, large cardamom, strawberry, pineapple, passion fruits etc. should be done at least at primary level.

General constraints in the project site

- ❖ Lack of market information as well as marketing facilities
- ❖ Rain-fed agriculture and mono-cropping.
- ❖ In-accessible and remote areas
- ❖ Slash and burn method of cultivation
- ❖ Difficult terrain and steep slopes
- ❖ Poor quality of roads and infrastructure
- ❖ Very poor information and communication facilities
- ❖ Poor electrification and lack of alternate energy sources
- ❖ Lack of mechanization and over dependence on human labour
- ❖ Free livestock grazing
- ❖ Poor socioeconomic development and social unrest
- ❖ Lack of seed and input availability
- ❖ Lack of processing and value addition
- ❖ Lack of public water supply and irrigation
- ❖ Porous international borders

The uncertainty at product market is also equally important which arises due to market imperfection in this hilly region. Highly undulated topography and lack of easy transportation linkages are the major impediments for free mobility of marketed surplus. Several factors (Fig. 23) can be attributed for this imperfect marketing situation for this region, such as, i) mostly the farmers produce at subsistence level where marketable surplus for the individual

farm is very meager, ii) the opportunity of developing entrepreneurship in market services is very limited due to this low marketable surplus, iii) the transportation cost is too high and the product from this region hardly fetch the competitive price in mainland market. But the region has enormous potential for the products like, off-season vegetables, ginger, pineapple, citrus etc., which urgently demands more focus. Value addition certainly will fetch good return from these crops. The region needs proper public support mechanism to procure and market these products.



Poor accessibility



Slash and burn agriculture



Free livestock grazing



Remote areas with international border



Use animal for ploughing



Field preparation by manual labour

Fig 23: Glimpses of developmental limitations

Hill agricultural farming in the North-East Region of India is severely constrained by high risk and uncertainty arising out from various factors. Under prevailing conditions the expectation of steady and assured income from agriculture is quite limited; hence, the hill farming fails to attract considerable private investment. Moreover, the farmers in this region have very low investment capacity as well as low risk bearing ability. So, the prevailing risk and uncertainty situation compels them to operate at low-input and low-output subsistence farming with low volume of marketable surplus. The agricultural situation in this region is highly heterogeneous; variability is extremely high even within few kilometers of area. Thus, generalization of the scenario is not possible and the development of agricultural database is utmost important for policy framework. The potentiality of horticultural crops is well known and widely discussed for these hilly states and also has drawn policy attention. But the concern is that mostly horticultural crops, in these states are grown as homestead farming and not in a commercial mode. Suitable methodologies followed by wide database needs to be developed to estimate the yield and cost of production of these crops which will be highly useful for policy makers to formulate right policy to protect the interest of farmers as well as smooth functioning of all stakeholders like, entrepreneurs, private investors, bankers and also for crop insurance implementing agencies.

Despite having resources and potential in terms of live animals, the pork supply in north east fails to grow at a desired pace due to several factors which include both supply side as well as demand side constraints. The most important constraint can be attributed to the non-availability of adequate feed for pig at reasonable prices. The price of concentrate feed which can increase the body weight substantially is neither available nor affordable to the resource poor farmers in these states. Pigs are reared as an integral part of their farming system without any special care. Though green fodder is abundant in these states, dry fodder is either not available or costly for the farmers. Another important constraint is the low share crossbred pig in the total pig population in these states. In most of the states, the pigs belong to the indigenous group and therefore, annual average yield is also very low. The promising areas like expansion of meat production, increasing fish output, growing off-season vegetables, fruits, spices and condiments and promoting organic products should be given priority. Small scale processing and value addition can provide livelihood opportunities to small and marginal farmers.

The Northeastern region is suitable for growing a number of high value crops and cultivation of these crops are likely to increase farm income and likely to keep the farming profession remunerative. In hilly tract of Meghalaya, the scope for expansion of area under cultivation is limited. Besides, immobility of labour force, inadequate marketing support and existing land tenure system aggravate the problem of expansion of areas under these crops. Therefore, farmers are observed to be growing a number of high value crops but with very low level of marketable surplus. Under this circumstance, the formation of SHGs to increase the volume of production is a good and timely option to improve the farm production as well as income.

Annexure-I

Baseline Survey Questionnaire for NAIP project
 on
 Livelihood Improvement and Empowerment of Rural Poor through
 Sustainable Farming System in North East-India
 (Farm Household Profile)

A. LOCATION Date: _____/_____/_____

Cluster _____ Zone _____ District _____

Taluka/Tehsil _____ Village _____

Investigator _____

Name of Farmer with address _____

B. FARM INVENTORY

- 1. Land Holding (please mention unit as bigha/ha/acre)**
- 1.1 Your land holding _____ (bigha/ha/acre)
- 1.2 What kind of land you possess? Put (✓)
 (Cultivated/Fallow/waste/any other)
- a) Valley land/Low land area _____
- b) Upland area _____
- c) *Jhum*land area _____
- 1.3 Do you take land on lease? _____ (Yes/No)
- 1.4 Do you lease out your land? _____ (Yes/No)
- 1.5 What are your leasing system prevailing in your area?
- 1.6 Details of the system and price costing?
- 1.7 Provide the following details (area in ha, rent in Rs)

	Irrigated	Rent/ha	Rain-fed	Rent/ha	Total land
a. Owned					
b. Leased in land					
c. Leased out land					
d. Fallow land					
e. Cultivated land (a+b)-(c+d)					
f. Waste land					
Total					

2. Soil Health

- 2.1 Has your soil ever been tested? _____ (Yes/No)
- 2.2 From where the soil is being tested? _____
- 2.3 How much it would cost for soil testing? Rs. _____
- 2.4 Are you fully satisfied with the current system of soil testing? _____ (Yes/No)
- 2.5 Did you treat your soil according to the soil health? _____ (Yes/No)
- 2.6 Categorized your soil a given below:
(Fertile/non-fertile/degraded/other)

3. Present Irrigation Facilities

- 3.1 How do you irrigate your land? (Please specify different sources) _____
- 3.2 Your perception about the quality of irrigated water? _____
- 3.3 Whether you avail water for irrigation regularly or intermittently? _____

1 This questionnaire is modified based on the Farm Household Profile provided by M&E System for NAIP, ICAR New Delhi as prepared by Consulting Engineer Services (India) Pvt. Ltd.

- 3.4 If regularly, please specify the source of the water availability for irrigation? _____

Source	Tick	Area irrigated	Quality of water (Satisfactory/Unsatisfactory)
Canal Ha	<input type="checkbox"/>	ha	
Tube well Ha	<input type="checkbox"/>	ha	
Ponds/Tanks	<input type="checkbox"/>	ha	
Spring/Bauri	<input type="checkbox"/>	ha	
Drip	<input type="checkbox"/>	ha	
Others (specify)	<input type="checkbox"/>	ha	

- 3.5 Whether you sell water to other farmers? _____ (Yes/No)
- 3.6 What is the volume of discharge per hour? _____
- 3.7 Do you have any mechanical or any modern irrigation system? _____ (Yes/No)
- 3.8 If yes, please specify?

Irrigation System/Unit	Cost in (Rs.)			
	Investment Cost	Maintenance Cost	Running Cost	Total Cost
Drip				
Micro-sprinklers				
Sprinklers				
Others (Specify)				

- 3.9 Present duration availability of water for irrigation (month) _____

5. Post-Harvest Activities

- 5.1 Do you know quality parameters of your produce?
- 5.2 Do you undertake any cleaning/grading of your produce before selling?
- 5.3 Any other addition processing before sending to the market
- 5.4 Do you take your produce to the agro-processing unit like mills/oil expellers/oil distribution plants?

Sl No	Produce	Processing unit	Distance from the village	Unit price for processing	Remarks/ Suggestion

5.5 Have you got any suggestion to improve quality of the produce vis-à-vis income?
If yes, please specify _____

6. Marketing Practices (prevailing)

- 6.1 Where do you sell your produce? _____
Local Buyer/nearest APMC/agents at large mandis/Middlemen/Sahookar/Fellow farmers/Others (specify)
Distance of first selling point (km) _____
- 6.2 Provide the following for last two years?

Year 2005-2006

Produce	Buyer	Time of Sale **	Storage Time	Benefits/Remarks

Year 2006-2007

Produce	Buyer	Time of Sale **	Storage Time	Benefits/Remarks

** Immediately after harvest/After sometime

- 6.3 Do you sell your produce to only one or two regular buyers? (Yes/No) _____
- 6.4 Do you sell your produce at random to anybody _____(Yes/No)
- 6.5 How do you get return of your produce from buyers? (Cash/Kind) _____

7. Market Information

7.1 How do you get information about selling prices of the commodities?

Name of source of information: _____

7.2 How better you make the information useful for yourself?

7.3 How can the information system be improved?

8. Storage

8.1 What are the existing modes of storage for the produce?

- Domestic storage (storage binds/stacks, etc.)
- Commercial storage (Cold storage/ware house)
- Others specify

Please provide details:

Produce	Storage Type	Approx. days/months for storage	Charges for storage	Constrains	Suggestion for improvement

8.2 Do you borrow any money on the ware house receipt? (Yes/No) _____

9. Input Cost (On-Farm Activities)

9.1 Input on Crop & Horticultural Activities:

Crop	Seed		FYM		Seed Treatment		Fertilizer		Pesticides		Irrigation		Total Cost Rs.
	Qty (kg)	Value (Rs.)	Qty (kg)	Value (Rs.)	Qty (kg)	Value (Rs.)	Qty (kg)	Value (Rs.)	Qty (kg)	Value (Rs.)	Qty (kg)	Value (Rs.)	

Kharif

Rabi

Crop	Seed		FYM		Seed Treatment		Fertilizer		Pesticides		Irrigation		Total Cost Rs.
	Qty (kg)	Value (Rs.)	Qty (kg)	Value (Rs.)	Qty (kg)	Value (Rs.)	Qty (kg)	Value (Rs.)	Qty (kg)	Value (Rs.)	Qty (kg)	Value (Rs.)	

Summer (Zaid)

Horticultural Crops

9.2 Input on Labour Cost

Crop	Family Labor		Hired Labor		Owned Animal Labor		Owned Animal Labor		Others		Total Cost Rs.
	Man-days	Unit Price	Man-days	Unit Price	Man-days	Unit Price	Man-days	Unit Price	Man-days	Unit Price	

Kharif

Rabi

Summer (Zaid)

Horticultural Crops

10. Livestock

10.1. Describe type of animal you keep?

10.2 What are the sources of animal feed? (Own fodder/grains/free grazing/stall feeding)

10.3 What are the uses of different animals?

Provide details of uses of different animals:

Animal	No	Use of animal (Please tick)			Expenses (Rs.)				Total Input Cost (Rs.)
		Milk	Draft	Meat	Forage	Concentrate	Veterinary	Labour	

10.4 Income from milch/meat animals

Animal Source	Milk				Meat				Total
	Yield (L)	Consumption (L)	Selling (L)	Unit Price (Rs./L)	Yield (Kg or Nos)	Consumption (L)	Selling (L)	Unit Price (Rs./L)	Value (Rs.)

10.5 Income from draft animals (last year)

Animal	Selling			Renting			
	Nos.	Approx. Selling price (Rs.)	Total (Rs.)	Nos.	Animals/days	Unit Price (Rs.)	Total (Rs.)

10.6 Income from poultry

Particulars	Production Per year	Rate (Rs.)	Value	Consumed in home	Sold in market	Remarks
Meat						
Egg(100 no)						

10.7 Income from calf/baby animals

No. of baby animals retained _____

No. of baby animals sold _____ Unit Price _____

11. Cost of Production of Fisheries (Fresh Water)

Cost			Name of fish	
Total Area (ha)				
Lease rent (Rs.)				
Pond preparation (Rs.)				
Seed for Fish Feed				
Labor Cost	Family			
	Hired			
	Total			
Interest Cost	Long term capital			
	Working Capital			
Depreciation				
Total Value ((Rs.)				

11.1 Channel of Disposal and Income (Fresh Water)

Where do you sell? On what price?

Selling point	Variety	Quantity (Kg)	Price (Rs./Kg)	Value (Rs.)
Retailer				
Wholesaler/ Commission Agent Outstation Commission Agent				
Cooperatives				
Others				

12. Income from Capture Fisheries Activities

Value (Rs.)

Variety	Cost				Revenue			Income	
	Boat Hire	Gears	Family Labor	Total input	Fish catch (kg)	Market price (Rs./kg)	Total income (Rs.)	Net income (Rs.)	Family income (Rs.)

17.2 What are the possible solutions by which you can increase the yield of crops?

--	--	--	--	--	--	--	--	--	--

(Non availability of sufficient water-1, Lowering of input price-2, Canal Rehabilitation-3, Introduction of water saving technology-4, Availability of machinery-5, Control of weeds-6, Access to quality inputs-7, Access to crop loan-8, Better extension service-9, others (specify)-10)

17.3 What are the possible sources by which you can procure the necessary crop inputs? Seed Fertilizer

Chemicals/Weedicides/Pesticides/Herbicides

Farm equipments/tools/Electricity accessories

17.4 Reasons for not using new crop varieties/and non-replacement of seeds

Lack of proper advice-1

Poor extension and farmer linkages-2

Low level of adaptability-3

Paucity of fund-4

17.5 Do you have any problem in procuring crop inputs? (Yes/No) _____

18. Migration Status

18.1 Whether any family member has migrated for better livelihood? (Yes/No) _____

If yes, specify the following

Name	Type	Type of work Unskilled/Semi- skilled/Skilled	Period of migration (months per year)	Average Earning (Rs.)

19. Social Organization for Empowerment and Income Security

19.1 Is there any existing organization in your locality? (Yes/No) _____

If yes, list out the institutions/organizations as below:

Name of Organization	Year of establishment	Members			Activity	Annual Budget	Sources of Income			
		Male	Female	Total			Own cont.	Govt. cont. If any	Other	Total

20. Availability of Services?

20.1 Is there any service available in your locality?

If yes, please fill up the details:

a. Agriculture

Services	Agency involved	Frequency of availability	Quality in terms (Unsatisfactory/Good/Very Good)
Agricultural extension activities			
a. Introduction of improved crop variety			
b. Introduction of cultural practices			
c. Introduction of new technologies			
d. Capacity building			
e. Others (specify)			

b. Loan and micro credit facilities

Type of loans/ Credit	From				Distance (Km)	Mode of payment	
	Bank	Local Institution	Money lenders	Relatives/ others		Regular/ Irregular	

20.2 Whether the respondent has taken any loan?

If yes, please specify for what purpose

(Production/Consumption/for both)

20.3 Whether the loan amount has properly been utilized?

(Yes/No)

20.4 Whether he is hard pressed with the loan amount?

(Yes/No)

20.5 Whether he is facing any kind of difficulty for repayment of the loan

If yes, please specify the reason as to why he is facing difficulty

(Yes/No)

21. Insurance

21.1 Whether the respondent is availing the facilities of insurance?

(Yes/No)

If yes, elaborate as under

Item	Period (Month/Year)	Amount of premium (Amount) (Month/Quarterly/Yearly)	Sum insured	Subsidy, if any	Remarks
Crop					
Livestock					
Farm Machinery					
Vehicle					
Life Insurance					
Others (specify)					

22. Contract Farming

- 22.1 Are you engaged in any form of contract farming? (Yes/No)
- 22.2 Are you comfortable with the type of present contract farming? (Yes/No)
- 22.3 Is there any Memorandum of Understanding (MoU) signed between you and the contract (Yes/No)
- 22.4 Whether the existing system is profitable to both of you? (Yes/No)
 If yes, interpret socio-economic status in percentage _____
 (Less than 25%, between 25%-50%, 50%-70% and above 75 %)

C. GENERAL FAMILY INFORMATION

1. Total Family Size

Males _____ Females _____ Children (< 18 years) **M** _____ **F** _____

2. Family details (including children and those who are outside village but have stake in the land holding)

Sl. No	Name of Family Member	Sex	Age	Relation to Respondent	Primary Profession (PP)	Income from PP	Secondary Profession (SP)	Income from SP	Member of any society	If yes name of society
1	Respondent			Self						
2										
3										
4										
5										
6										
7										
8										
9										
10										

Profession: Agriculture: Animal Husbandry; Shop owner*; Rural Artisan; Laborer; Service*; Small scale industry*; Others (specify)

3. Permanent Family Inventory

- a) House Kutcha/Pucca
- b) Drinking water Supply water/Open well water/Hand pump (Please tick)
 Quality of water: Good/Satisfaction/Bad (Please tick)
- c) Sanitation Flush toilet/Temporary Toilet/Open field
- d) Electricity Electrified/Not Electrified
- e) Cooking gas Available/Not Available

- f) Vehicles Nos. _____ Type _____
- g) TV (Yes/No) h. Radio (Yes/No)
- i) Separate cattle shed (Yes/No)
- J) Telephone: (I) Landline (Yes/No) (II) Mobile (Yes/No)
- k) Any other _____

4. Family Expenditure Pattern

a. On Food and Beverage (Monthly)

Sl. No.	Items	Qty (Kg/Lt/Units)	Purchase/ Home Produced	Approx. cost (Rs.)	Availability at village/ Nearest town (with Km)
	Cereal				
1	Rice				
2	Wheat				
3	Maize				
4	Finger millet				
5	Barnyard Millet				
6					
	Pulse				
7					
	Oil/Fat				
8	Milk				
9	Tea leaves				
10	Vegetables				
11	Fruits				
12	Salt				
13	Spices				
14	Liquor/other beverages				
15	Pan/Beddi/ Cigarettes / Masalas				
16	Others (specify)				

b. Other Expenditure (Yearly)

Sl. No.	Items	Expenditure /year (Rs)
1	Education	
2	Medical/Health	
3	Maintenance of vehicles (POL/repairing)	
4	Cloths (including woolens/shoes etc.)	
5	Maintenance of other HH equipments	
6	Maintenance of house/cattle sheds etc.)s	
7	Electricity Bills	
8	Social Functions	
9	Any other	

5. Assessment of Credit and Inputs Needs by the Family

- 5.1 What are the major needs of the family?
- 5.2 Which is the most critical period of the year?
- 5.3 Which is the most critical inputs the family is missing?
- 5.4 Which is the relative importance of credit with respect to all other missing inputs for the selected/proposed venture to enhance income?
- 5.5 What is the maximum volume the family can handle properly?
- 5.6 What is the amount of credit the family immediately need for what it has a well thought viable plan? What should be the timing of credit?
- 5.7 Does the credit planning ensure that will not be used to meet some other emergencies?

6. Environment

Please try to think back to the situation two decades ago. Would you say that the quality of the environment in your community has changed?

Particulars	Better (4)	About the same (3)	Worse (2)	Don't know (1)
Agricultural Production				
Grasses in the pastures				
Trees in & around the village				
Drinking water quality				
Water logging Situation				