



Doubling Farmers' Income: Issues and Strategies for Assam

NABARD

Institute of Livelihood Research and Training

Report

Doubling Farmers' Incomes – Issues and Strategies for Assam

Submitted to

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Submitted by

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Abbreviations

ADO	Agriculture Development Officer
ARIAS	Assam Rural Infrastructure and Agricultural Services
ASA	Action for Social Advancement
ASAMB	Assam State Agriculture Marketing Board
ASRLMS	Assam State Rural Livelihood Mission Society
BC	Business Correspondence
BKSL	BASIX Krishi Samruddhi Limited
CML	Centre for Microfinance and Livelihoods
CMSGUY	Chief Minister's Samagra Gramya Unnayan Yojana
CSOs	Civil Society Organizations
CSTRI	Central Silk Board’s Research Institute
DDP	District Domestic Product
DEAR	Department of Economic Analysis and Research
DEDS	Dairy Entrepreneurship Development Scheme
DICC	District Industries and Commerce Centre
EDCs	Eco Development Committees
FCI	Food Corporation of India
FGD	Focus Group Discussions
FPOs	Farmer Producer Organizations
GDP	Gross Domestic Product
GINFED	Ginger Growers Cooperative Marketing Federation Limited
HHs	Households
HYV	High-Yielding Variety
ICAR	Indian Council of Agricultural Research
IGS	Indian Grameen Services
ILRT	Institute of Livelihood Research and Training
IRRI	International Rice Research Institute
JFMCs	Joint Forest Management Committees
JSLPS	Jharkhand State Livelihood Promotion Society
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MT	Metric Ton

NABARD	National Bank for Agriculture & Rural Development
NGO	Non-Governmental Organization
NLM	National Livestock Mission
NTFPs	Non-Timber Forest Products
OBC	Other Backward Class
PGs	Producer Groups
PRA	Participatory Rural Appraisal
PRIs	Panchayati Raj Institutions
RGVN	Rashtriya Grameen Vikash Nidhi
ROI	Return on Investment
SC	Schedule Caste
SeSTA	Seven Sisters Development Assistance
SHGs	Self-Help Groups
SRI	System of Rice Intensification
SRLM	State Rural Livelihood Mission
ST	Schedule Tribe
TRIFED	Tribal Cooperative Marketing Development Federation

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Executive Summary

The monthly income per agricultural household during the agricultural year July 2012 – June 2013 was Rs.6,426 and the average monthly consumption expenditure per agricultural household during the same period was Rs. 6,223 -NSSO.

While the population of the country has increased multi-fold over a period of time, so has the demand from agriculture and allied sectors. However, unfortunately the rate of increase of farmers' income has not been at par with the growth in the country. This has resulted in severe distress of farming communities across the country. A country wherein, small and marginal farmers constitute almost 80% of the total farming community, the situation becomes more challenging as these farmers severely lack the wherewithal to improve their situation by themselves. The NSSO data of 70th Round of survey only confirms the magnitude of this problem which states that the monthly income per agricultural household during the agricultural year July 2012 – June 2013 was Rs. 6,426 and the average monthly consumption expenditure per agricultural household during the same period was Rs. 6,223. It definitely suggests an alarming situation and needs to be dealt with appropriately.

The gravity of the situation was realized by the government, and the Hon'ble Prime Minister Sri Narendra Modi himself took cognizance of the situation and set the goal of doubling farmers' income by 2022. Unless efforts are undertaken on a mission mode, the severity of the problem cannot be addressed. Simultaneously, the task of doubling farmers' income is huge and requires robust planning and strategy.

Assam is the gateway to the north-eastern states of India. While the state has a vast reservoir of natural resources, the utilization has been constrained due to many reasons. The state has enough scope in terms of improving livelihoods of the farmers through farm, off-farm, and non-farm activities. Many reports have highlighted and even this study has found that the scope of increasing farmers income through off-farm activities are more as the existing production has not been able to fully meet the local demand.

Agriculture is of primary importance to Assam engaging about half of the total working population and generating roughly one-third of the state's gross domestic product. Rice accounts for more than two-thirds of the sown area. Tea, jute and sugarcane are also widely cultivated as important cash crops. Other crops include oilseeds, pulses (legumes, such as peas, beans, or lentils), corn (maize), sugarcane, rape (an oil-yielding plant, the leaves of which are used for fodder), mustard, potatoes, and fruits. Most rural families have access to agricultural land with about half a bigha[1] of homestead land adjoining their houses.

[1] 3.5 Bigha = 1 Acre http://www.nedfi.com/node/193

Areca nut, betel leaf, black pepper, Assam lemon are generally grown in the homestead land and the surplus is usually sold to supplement the existing income of the households. The production from homestead garden has not been able to reach its potential due to low level of awareness and lack of scientific orchard management. Factors such as improper spacing, manuring, irrigation, lack of replacement of old plants with new ones, and inadequate plant protection have been the main reasons towards low productivity in homestead gardens.

The present situation of demand supply promises good potential of interventions for allied and off-farm activities in the state. The state produces only 10 percent the supply of meat against the demand (pig meat constitutes 40% of the meat demand). Supply of fish is deficient by 42,000 MT. Per capita milk consumption is also very low, 74 ml per day against the prescribed quantity of 208 ml per day.

Sericulture is a traditional a combination of farm and off-farm activity at a household level, but remains under-utilized at a commercial level.

Agri-aalied and off-farm activities have vast potential to contribute to double farmers' income as the state has a significant gap in demand and supply in dairy, fisheries and piggery.

While there are challenges in terms of existing livelihood practices of the farming communities, the external factors viz. impact of climate change has also been affecting the overall livelihoods scenario in the rural areas. The growing impact of climate change is visible in the state of Assam with every passing year. Assam has unique physiography and climate vis a vis its location in the North Eastern Himalayas with Brahmaputra river flowing through the State, and the state subjected to recurrent floods. The stake holder consultations for Assam State Action Plan on Climate Change (2015-2020) concluded that continued warming of the atmosphere and ensuing changes in precipitation pattern is impacting the State's water resources, agriculture, forest , its unique biodiversity and the habitats where people live[2]. There are districts viz. Dhemaji which suffer from inundation almost every year. There are areas viz. southern part of Nagaon district, and the adjoining part of Karbi Anglong which fall under rain-shadow areas resulting in drought like situations.

For the course of the study, the selected districts represent four diverse agro-climatic zones in the state. Bongaigaon- Lower Brahmaputra Valley, Dhemaji-North Bank Plain, Nagaon-Central Brahmaputra Valley, Karbi Anglong-Hills. Considering the diversity of geography and social class it was considered imperative to review the situation at a community, village and district level.

[2] *Assam State Action Plan on Climate Change (2015-2020).*
http://www.moef.gov.in/sites/default/files/Final%20draft%20ASAPCC%20document.pdf

Karbi Anglong, a hill district dominated by tribal population (mostly Karbi) presents very different opportunities and challenges of farmers' livelihoods practices. In the hilly area (which is 85% of the total geographical area), Jhum cultivation (shifting cultivation) is practiced by the tribal farmers. While Jhum cultivation has its negative impact on environment, on the other hand, the agriculture produce is completely free of chemical fertilizers and pesticides and the resulting produce is completely organic.

Ginger produced from Karbi Anglong has generated a high demand overseas, and the Ginger Growers Cooperative Marketing Federation Limited (GINFED) has paved way for the farmers to receive a better market price. Pineapple produced in the district is renowned for its high quality. However, farmers have yet to find a way to access better markets for better prices for their produce. Sugarcane cultivation and jaggery production is gaining ground in the district, even amongst the natives (in addition to the migrant population from Bihar and U.P.), but the income realized is subject to the price paid by the traders. While farmers from some of the villages cultivate sticky rice (Joha rice[3]- *Oryza sativa*), due to the absence of appropriate markets (which is mostly overseas) the production and opportunity to earn is restrained.

While Jhum cultivation practiced by a large section of tribal population of the Karbi Anglong district has a negative environmental impact, on the other hand the produce is completely organic.

The district produces the largest quantity of Eri-silk in the state but the silk rearing farmers are still at the lowest rung of the value chain. They are confined to producing cocoon and are selling to traders who pay one third of the price than that of silk yarn. Pig rearing is prevalent among the tribal farmers with small unit size, resulting in low returns from the activity. Broom grass *(Thysanolaena maxima)* is an important forest-based commodity which has contributed to the income of the tribal households from the hilly region. In this case also, farmers are confined at the primary level of the collection while value added prices are realized by the traders. The collected broom grass is supplied to Rajasthan where broomsticks are made and sold back to the region with value added price.

In spite of diverse resources and many opportunities, farmers are not able to reap the benefits, due to political disturbances in the region, which plays a major role.

Dhemaji is one of the most remote districts of Assam where every year farmers' livelihoods are affected by flood. Adding to the woes, the road connectivity is also poor. Mono-cropping is still largely practiced due to farmers inaccessibility to modern scientific tools and methods. Tribal constitute almost half of the total district population. Piggery is one of the

[3] *Joha rice is only grown in the Northeast region of India. A special class of scented rice, it is completely different from the famous Basmati rice. It has a delicate texture and rich in anti-oxidant compounds. According to research done at Assam Down Town University, when the constituents of Joha rice were extracted with ethanol, it was found to contain proteins, phenolic compounds, flavonoids, carbohydrates and volatile oils. The rice has high level of acetyl and pyrroline, which gives it the sweet aroma. It also has more multivitamins than any other variety of rice.*

major income generating allied activity for tribal population in the region.

Tribal households are also engaged in rearing Muga and Eri silk but remain at the primary level of the vale chain i.e. cocoon production. Lack of irrigation facility is a major constraint in exploring multi season cropping.

Nagaon is one of the oldest districts of Assam. Unlike Karbi Anglong and Dhemaji, the tribal population is only 4%. The social class of the district is also very different resulting in varied agriculture practices. The district has a large Muslim population who are primarily engaged in Fisheries and Jute cultivation. The district has a Jute mill - Assam Cooperative Jute Mill - but the procurement of jute directly from farmers is not prevalent. Farmers sell Jute to the middlemen who earn almost double the amount at which they procure from the farmers. The district is called the fish capital of North-East. Weaving at household level is for self-use only but the district has many handloom cottage industries which produce variety of Mekhla-chador and Gamocha[4] in large volumes. Production of Mekhla-Chador and Gamocha at household level cannot compete with the products of these cottage industries due to volume of production and diversity of design.

Handicraft is also practiced in the rural area of the district. Rural families make toys and other decorative items from the aquatic plant Kuhila (*Aeschynomene indica or Aeschynomene aspera*) which possesses local market.

Lack of irrigation, poor electricity supply and poor road connectivity are some infrastructure barriers in the district which affect the prospects of increasing farmers' income.

Bongaigaon district has even lesser tribal population than Nagaon, which stands at 2.5% of the total population[5]. This district also has major population of Muslim community. Poultry and goatary are the major off-farm activities in the district. Cattle population is high in the district but high lactating crossbred cows are just 3.3% hence milk production is very low. The district produces variety of vegetables and has been exporting to the neighbouring country Bhutan. Due to indiscriminate use of pesticides, Bhutan has banned vegetable imports from Bongaigaon. Bamboo is largely grown in the district but farmers currently use the commodity for fencing or minor construction work on their own farm or homestead land at present.

There are demonstrated examples of potential to increase farmers' income through available resources viz. aggregation of high quality ginger by GINFED. However, many more opportunities need to be created viz. value chain interventions on Joha rice, pineapple and Ericulture.

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[4] *There are two main pieces of cloth that are draped around the body. The bottom portion, draped from the waist downwards, is called the mekhela (Assamese: মেখলা). It is in the form of a sarong, a very wide cylinder of cloth that is folded into pleats to fit around the waist and tucked in. The folds are to the right, as opposed to the pleats in the Nivi style of the saree, which are folded to the left. Strings are never used to tie the mekhela around the waist, though an underskirt with a string is often used.The top portion of the two-piece dress, called the chador, is a long length of cloth that has one end tucked into the upper portion of the mekhela and the rest draped over and around the rest of the body.* https://en.wikipedia.org/wiki/Mekhela_chador

*The **Gamosa** (Assamese: গামোচা)is an article of great significance for the people of Assam. It is generally a white rectangular piece of cloth with primarily a red border on three sides and red woven motifs on the fourth (in addition to red, other colors are also used). Although cotton yarn is the most common material for making/weaving gamosas, there are special occasion ones made from Pat silk.* https://en.wikipedia.org/wiki/Gamosa

[5] *http://www.censusindia.co.in/district/bongaigaon-district-assam-319*

Jute is an important cash crop in Bongaigaon for the farmers but they receive sub-optimal price from local traders as the quality of jute is not very good and influence of middlemen is very high in the present market.

It was understood that increasing income through farm-based livelihoods has its own limitations. The agriculture landholding of farmers is fixed. The only way, is to increase the productivity of cultivated commodities, which, in turn would increase production. This intervention requires a longer term intensive plan viz. improve irrigation facilities. Moreover, the existing agriculture market system has not been very efficient in terms of timely procurement of commodities with adequate and fair prices to the farmers. Improving the road connectivity and condition is also equally important to help the farmers' access alternate markets. Appropriate marketing facilities needs to be ensured for realizing fair prices of produce.

Jute is a cash crop for the farmers of Nagaon and Bongaigaon but the farmers' knowledge about the ideal package of practices resulting into low productivity, is limited. Moreover, strong influence of middlemen in the supply chain of Jute reduces their opportunity to earn better.

Acknowledging the limitations in the opportunities to immediately address the farmers' income through agriculture, the study findings suggest a large scope of increasing the income through allied and off-farm activities. The combinations of livelihoods interventions for increasing the existing incomes proposed for tribal households are, a combination of piggery (which is largely the fattening of piglets), fisheries and silk yarn production; for Muslims households, a combination of fisheries and dairy; and for OBC and General households, a combination of fisheries and dairy.

The non-farm sector beholds potential for increasing farmers' income through value chain interventions for tribal households in sericulture. By ensuring support from the Department of Sericulture, the farmers can produce silk yarn and sell it for almost three times the price than that of cocoons. Moreover, with the support of upgraded looms from the Directorate of Handloom and Textiles, the production of silk fabric can earn additional income for the households. While rearing of silk worms and yarn production may be restricted largely to the tribal community, the scope of earning an additional income through weaving is an open option irrespective of social classes.

It is also realized that while sector specific interventions have potential to double the farmers' income, there are associated subjects which need equal attention. One of the fundamental areas of attention, is the role of government in doubling farmers' income. The government needs to capacitate and facilitate agencies such as the Assam State Agriculture Marketing Board (ASAMB) with financial and human resources in order to enable the agency to ensure adequate market connectivity for higher production levels that would result out of farmer collectives.

The government also needs to capacitate its line departments in the efficient provision of extension services to the farmers.

Line departments must take up the establishment of pig breeding farms, poultry farms, and hatcheries for fish within the proximity of the farmers who are producers of the commodity. Simultaneously, raising awareness of these proposed facilities to the farmers is imperative.

Financial inclusion, especially in the context of credit linkage and banking of farmers in remote rural parts of the four districts has been a mounting challenge. Some micro-finance institutions have built a good rural loan portfolio but have their own limitations in addressing the needs of the larger population. Regional Rural Banks (RRBs) should conceive appropriate credit-linkage strategies to increase outreach to the rural population. The Assam State Rural Livelihood Mission Society (ASRLMS) has been entrusted with the mandate of financial inclusion in the state and serves as a good opportunity for convergence with the RRBs too as there is immense scope and potential for financial inclusion. Another crucial cross-cutting intervention could be the promotion of rural producer collectives in the state. The approach has given dividends to the farmers in other parts of the country and ever since the AMUL model, the new age Farmer Producer Companies (FPC) have already begun displaying positive impacts. FPC in Nagaon district has started showing encouraging results.

Farmers find themselves starved of working capital due to poor credit linkage. While micro-finance institutions have addressed the need to some extent, the larger financial inclusion can only be taken up by the Regional Rural Banks.

Government policies need to be supportive to encourage models such as GINFED to increase its outreach to a larger base of farmers. Additionally, the government needs to be cognizant about encouraging youth engagement in farming activities, which has a potential to address unemployment amongst youth within the state. Relevant government policies addressing this need are required. It is imperative for governance systems to attract investment in value addition activities viz. fruit and vegetable processing. It will not only help the farmers to avail better prices, but will also ensure employment.

Chapter I

Background and Context

1.1 Status of farmers' income in India and Assam

Development in the agriculture sector in India has largely focused on increasing the production and productivity of crops. During last 50 years, the food production has multiplied by 3.7 times but over the years, the income of farmers remained low as compared to the income from non-agriculture work[6].This resulted into farmers' distress.

Agriculture expert and NITI Aayog member Ramesh Chand points out in a recent study, the real income of farmers has been declining during 2011-12 to 2015-16. He attributes that to the below normal monsoons for two consecutive years (2014-15 and 2015-16), poor output and low prices.

In a recent study agriculture expert and NITI Aayog member Ramesh Chand points out that, the real income of farmers has been declining during the 2011-12 to 2015-16 period. He attributes that to below normal monsoons for two consecutive years (2014-15 and 2015-16), poor outputs and low price realizations.

The National Sample Survey Office, in its 70th Round of survey report released in April 2016 had estimated the average monthly income per agricultural households during the agricultural year July 2012- June 2013 to be Rs. 6,426. The average monthly consumption expenditure per agricultural household during the same time was Rs. 6,223. Therefore, it is a critical situation for Indian farmers[7].

In Assam, negative growth rate -0.34% is observed in farmers' income. Proportion of total income is highest from agriculture followed by wage labour/salary (21%), livestock (12%) and least from non-farm activities (4%)[8].

Table 1: Income of households from farm, off-farm, non-farm, and wage labour

	Income from farming	Income from livestock	Income from non-farm	Income from wages/salary	Total Income
Assam	50,521 (63%)	9,553 (12%)	3,078 (4%)	17,176 (21%)	80,328

(Data from 70th round of National Sample Survey (NSS) conducted in January to December 2013)

Source: *Farmers Income in India: Evidence from Secondary data; A Study submitted to Ministry of Agriculture by Thiagu Ranganathan, Assistant Professor*

[6] *Extracts of the Discussion of Group V on Doubling Farmers' Income Stakeholder Consultation- agricoop.nic.in/.../Revised%20Doubling%20Farmers%27%20Income_Kharif%20Con.*

[7] *Why Modi's dream of doubling farmers income by 2022 is a daunting task Joe C Mathew New Delhi Last Updated: April 21, 2017 | 15:45 IST - http://www.businesstoday.in/opinion/perspective/why-modis-dream-of-doubling-farmers-income-by-2022-is-a-daunting-task/story/250495.html*

[8] *Farmers Income in India: Evidence from Secondary data A Study submitted to Ministry of Agriculture by Thiagu Ranganathan, Assistant Professor Agriculture Economic Research Unit (AERU); Institute of Economic Growth (IEG), New Delhi-; http://www.iegindia.org/ardl/Farmer_Incomes_Thiagu_Ranganathan.pdf*

Agriculture Economic Research Unit (AERU); Institute of Economic Growth (IEG), New Delhi.

Table 2: Growth rates of different income components and total income of farm households

	Income from farming	Income from livestock	Income from non-farm	Income from wages/salary	Total Income
Assam	0.7%	9.47%	-7.77%	-3.99%	-0.34%

Source: *Farmers Income in India: Evidence from Secondary data; A Study submitted to Ministry of Agriculture by Thiagu Ranganathan, Assistant Professor Agriculture Economic Research Unit (AERU); Institute of Economic Growth (IEG), New Delhi. Data from 70th round of National Sample Survey (NSS) conducted in January to December 2013*

1.2 Geographical scope

Realizing the need to pay special attention to the plight of farmers, the goal is set by the Hon'ble Prime Minister Narendra Modi to double the farmers' income by 2022.

Apropos to this announcement by Government of India and considering the urgent need to capture the state specific issues and strategies NABARD has decided to conduct research studies in six states Assam, Maharashtra, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal.

The Institute of Livelihood Research and Training (ILRT) was granted the research study for Assam. The districts were selected for the study with reference to the proportion of small and marginal farmers and representations from different Agro-climatic zones which are:

Table 3: Selected Agro-climatic zones for the study

Sr. No.	Agro-climatic zones	Districts
1	Lower Brahmaputra Valley Zone	Bongaigaon
2	North Bank Plain Zone	Dhemaji
3	Central Brahmaputra Valley Zone	Nagaon
4	Hills Zone	Karbi Anglong

Timeline of study: Six months

1.3 Scope of the study

1.3.1 Objectives

A. Farmer level objectives

i. To estimate the current income level of farmers in the state and its composition (in various Agro-climatic zones, holding size-wise, social class wise, etc.).

ii. To understand constraints faced by the farming community (including the distress situations, their frequency) that are limiting opportunities to income enhancement of the farmers.

iii. To study the constraints, possibilities and supports required for diversification of activities at farmer level, especially towards allied, off farm and non-farm activities.

iv. Estimation of farm economics and financial requirement (including bank loan) to double farm income (by 2022) and strategies to meet their financial requirement, if any.

v. The extent of assistance from Central/State/PRIs being received by the farming community and hindrances in getting the benefits, if any.

vi. Supports / facilities / policy etc. required that could enable to double income by 2022 (farmer's view).

Macro level objectives

i. Evolve a state specific strategy for doubling the income of farmers taking into account farmers' needs and the constraints faced in the state.

ii. Suggest broad sector specific interventions (especially on irrigation, soil health, warehousing, cold-chains, value addition, marketing, allied activities, non-farm/off farm sectors, wage employment, etc.) to be implemented with appropriate phasing.

iii. Study the trend in investment in major sectors (especially infrastructure), and suggest investment requirements, year wise phasing and expected outcomes.

iv. Major development partners in the state, suggestive partnership, stake holders, channel partners in the endeavour and their extent, involvement suggested and convergence required.

v. Road map / action plan with implementing agency/stakeholder for each intervention.

Chapter Summary

Production oriented development in agriculture has been the norm in India for the past 5 decades. This approach has resulted in the surge in food production by 3.7 times. In spite of this, the farmers' income has been consistently declining.

The National Sample Survey Office, in its 70th round of survey report had estimated the average monthly income per agricultural households during the agricultural year July 2012- June 2013 to be Rs. 6,426. The average monthly consumption expenditure per agricultural household during the same time was Rs. 6,223. Therefore, it is a critical situation for Indian farmers.

A negative growth rate of farmers' income has been recorded in Assam. In light of the urgency for attention towards farmers' income', the goal to 'double farmers' income by 2022 was set by the Hon'ble Prime Minister Narendra Modi.

Apropos to this announcement by the Government of India, and considering the urgent need to capture the state specific issues and strategies, NABARD has decided to conduct research studies in six states; Assam, Maharashtra, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. Out of which, the study for Assam was granted to the Institute of Livelihood Research and Training.

As a preliminary component of the study, the Institute of Livelihood Research and Training, along with NABARD decided on choosing four districts that represent the four Agro-climatic zones of the state of Assam, while the remainder of the sample was derived from intensive consultation with several stakeholders. At the outset of the study, NABARD had also derived objectives that addressed both, macro level objectives which included the revisiting of policy, and micro level objectives, which dealt with farmers directly.

Chapter II

Methodology

2.1 Review of literature

Doubling Farmers Income, Rationale, Strategy Prospects and Action Plan; Ramesh Chand; NITI Policy Paper No.1/2017; March 2017

In the past couple of decades, India's focus has largely presided in the increase of production and productivity of agricultural produce through innovation in technology, subsidies on fertilizers, pesticides, and irrigation, and price support from government agencies. This resulted in the high production and productivity rate during the Green Revolution in the past half century. Production of agricultural produce increased by 3.7 times, while the population increased by 2.55 times. This in turn, resulted in India not just being self-sufficient with regards to agricultural produce, but also became a net exporter. However, these national and state level policies did not factor in the income component of farmers. While the production may have risen, the income rate of farmers could increase at a very low pace. This disparity in production and income has resulted into severe farmer distress. Income earned from agriculture was not adequate to keep as many as 53% HHs out of poverty, who operated on less than 0.63 hectare of land holding.

Income earned from agriculture was not adequate to keep as many as 53% HHs out of poverty who operated on less than 0.63 hectare of land holding.

In light of this, the Hon'ble Prime Minister, Narendra Modi identified the need to double farmers' income by 2022. The study states that in order for farmers' income to be doubled, from the baseline year of 2015-16, the growth rate in farmers' income would have to be 10.4 per cent every year until the goal year of 2022.

The baseline year for increasing farmer' income is 2015-16. The study highlights the importance of the differentiation between real and nominal income of farmers. As the goal of the Doubling Farmers' Income is to double real income and not nominal income, strategies must remain cautiously cognizant of this factor. The real income is the income that will be factored in after adjustment for inflation. The study highlights that doubling farmers income should not be viewed as same as doubling of farm output.

Inflation in agriculture prices also leads to increase in real farm income if agriculture prices received by farmers' increases at a faster rate relative to the prices paid by the farmers i.e. when terms of trade for agriculture improves.

According to Situational Analysis Survey for the year 2012-13, the average annual income of a farm household from farm as well as non-farm sources was Rs.77,112. 60% of total income of an agriculture household was derived from farm activities (cultivation and farming of animals) and 40% from non-farm sources (wage, salary, non-farm business etc.)

The paper on doubling farmers' income recommends taking strong measures to harness all possible growth in farmers' income within as well as outside agriculture income. The major sources of growth operating within agriculture sector are:

i. Increase in agriculture productivity

ii. Improvement in total factor productivity (TFP)

iii. Diversification towards high value crops

iv. Increase in crop intensity

The sources outside mainstream agriculture include:

v. Improving terms of trade for farmers

vi. Shifting cultivation to non-farm and subsidiary activities.

While these are the crucial components to focus upon in order to double farmers' income, they are also the major hurdles that will challenge the undertaking of doubling farmers' income. The study mentions that the overall income from irrigated areas is Rs.56,510, while rain fed areas is Rs.35,352. This underlines the crucial role of irrigation in doubling farmers' income.

Additionally, factors such as insurance are a thorough challenge in the agricultural space. It is estimated that 85% of farmers in India do not benefit from insurance schemes provisioned by the government. The insurance and extension services space would require a massive overhaul in order to ensure that farmer' real income is doubled by the year 2022.

Insurance is one of the thorough challenges in the agricultural space. It is estimated that 85% of farmers in India do not benefit from insurance schemes provisioned by the government.

The extension services by the government must be cognizant of reducing input costs while simultaneously creating appropriate procurement of agricultural produce in order to double farmers' income.

Increase in agriculture productivity: Considering the fact that over the years, there are rising demands of land for non-agricultural uses, it is not possible to increase area under cultivation. Therefore, improving productivity per unit of land is the only possible solution to increase overall agriculture output. Aggregate productivity of crop sector increased at the rate of 3.1% per year during 2000-01 to 2013-14. If this rate of growth in productivity is maintained, it will result in 16.7% increase in total farm income in seven years from the base year 2015-16.

Livestock comprise of 30% of the income gained by farmers from the agriculture sector. Sector has experienced growth rate of 4.5% during 2000-01 to 2013-14. Maintaining the same growth rate in livestock sector in the coming years will raise total farm income by 10.8% in seven years. The contribution of increase in productivity/production of crop and livestock taken together adds up to 27.5% increase in farm income in seven years.

Improvement in total factor productivity (TFP): TFP is the portion of output which results due to research and development and not related to cost of inputs viz. SRI, precision farming etc. It is an important source of output growth which directly contributes to cost saving and thus increase in income. The TFP during 2004-2012 has witnessed 2.62% growth. The implication of 2.62% annual growth in TFP is that farmers' income will also increase at the same rate. If TFP grows at the same rate after 2015-16 then it will lead to 26.3% increase in farmers' income by 2022-23.

Diversification towards high value crops: The staple crops (cereals, pulses, oilseeds) occupy 77% of the total or gross cropped area but contribute only 41% of the total output of the crop sector. Almost same value of output was contributed by High Value Crop (HVC) which just occupied 19% of the total gross cropped area during 2013-14. Shifting 1 hectare area from staple crops to commercial HVC has the potential to increase gross returns up to Rs.1,01,608 per hectare. Between 2004-05 to 2013-14, area under HVCs in the country increased by 9.16 million hectare at an annual growth rate of 3.31%. If past trend in crop diversification continues in future, it has potential to raise output of crop sector by 1 % each year. This can translate into 5% increase in farmers' income by 2022-23.

Increase in crop intensity: Land use statistics shows that in the country, the second crop is taken only on 38.9% of the net sown area. This implies that more than 60% of the agriculture land in the country remains unused for half of the productive period. Lack of access to water is said to be the main reason for low crop intensity.

After 2000-01, the crop intensity in the country has increased by 0.7% per year. Large scope exists to increase crop intensity in most of the states. Increase in crop intensity at the same rate as observed in the recent past has the potential to raise farmers' income by 3.4% in seven years.

Improving terms of trade for farmers: There are some evidence of the effect of online marketing by farmers using Unified Market Platform (UMP) created by ReMS (joint venture between govt. of Karnataka and NCDEX Spot Exchange Ltd.) in Karnataka shows big benefit to the farmers. The ReMS initiative is similar to e-NAM (National Agriculture Market Portal) initiative of Govt. of India. The UMP in Karnataka was created in 2014 and it started its operation from agricultural year 2014-15.

After introduction of online trading and UMP model prices in mandis in Karnataka, it witnessed much higher increase than the increase in wholesale prices of the same commodity in the country. The increase in real term varies from 1% to 43%. The average increase for the 10 commodities for which data is available was 38% in nominal term and 13% in real terms. The Karnataka experiences shows that small reforms in the system of marketing can make a big difference to the prices received by farmers. It is important to point out not all provisions of United Market Platform are fully operational. A 13% raise in crop prices translate to 9.1% increase in farmers' income.

Shifting cultivation to non-farm and subsidiary activities: In rural areas, agriculture sector engages 64% of the total workforce and contributes 39% of total rural net domestic product. This shows overdependence of workforce on agriculture with significant underemployment.

The estimated worker productivity in agriculture sector is Rs.62,235 as compared to the worker productivity of Rs.1,71,587 in non-farm sectors during 2011-12. Thus, non-farm sector provides 2.76 times more productive employment than agriculture sector in rural areas.

According to NSSO, workforce in agriculture sector in rural areas declined by about 34 million between 2004-05 to 2011-12, showing an annual decline at the rate of 2.04%. If the same trend continues, then workforce share in agriculture will fall to 55% of total rural workforce by 2022-23. If the number of cultivators keeps on declining at the same rate as experienced during 2004-05 to 2011-12, it will reduce their number by 13.4% between 2015-16 and 2022-23. This implied that the available farm income will be distributed among 13.4% less farmers.

In rural areas, agriculture sector engages 64% of the total workforce and contributes 39% of total rural Net Domestic Product.

The empirical evidence shows that if same level of progress in various sources of growth, as experienced in previous 10-15 years, is maintained, it can achieve up to 75% increase in per farmers income by 2022-23 over the base year of 2015-16 with better price realization. This still falls short of doubling the income by 25%. Thus, to double the farmers' income by 2022, the progress in various sources of growth has to be accelerated by 33%. The details are:

- Crop productivity is required to increase by 4.1% and livestock value added by 6% per year to double farmers' income by 2022.
- Total Factor Productivity (TFP) growth, which is mainly contributed by agriculture R&D, extension services, new knowledge, efficient practices like precision farming, is required to follow annual increase of 3%.
- Indian farmers should raise area under two crops to 53% from present 40% recorded in recent years.

- Area under High Value Crops is required to follow an increase of 4.4% each year.
- Market reforms are required to enable farmers to get 17% higher prices than base level in real terms. This requires 2.26% increase in prices received by farmers in real terms.
- Finally, total number of cultivators is required to come down by 2.4% each year.

The study also showcases the vitality of farmer producer organizations as a collective for farmers to gain collective strength towards marketing abilities with increased bargaining power. This intervention indicates immense benefits, especially to small and marginal farmers who are a majority of the country's agricultural sector producers.

Baseline Survey of Minority Concentrated districts: District Report Bongaigaon, Study Commissioned by Ministry of Minority Affairs Government of India

Study conducted by: Omeo Kumar Das Institute of Social Change and Development, Guwahati Commissioned by the Ministry of Minority Affairs, This baseline survey was planned for 90 minority concentrated districts (MCDs) identified by the Government of India across the country, and the Indian Council of Social Science Research (ICSSR), New Delhi coordinates the entire survey.(http://icssr.org/Bongaigaon.pdf accessed on 8.7.17))

The study report gives an overview of Bongaigaon district with reference to agrarian socio-economic status. The report highlights the comparative status of Muslim community in the district. Assam is among the four states with large Muslim population where according to the Committee the situation is grave. Muslim population in Bongaigon is 50.22% (Census 2011). 43 percent of the total rural population in the district belongs to Muslim, the share of the community in the work force is only 37 percent which indicates that 73 percent of the Muslims are without any work. The share of female workers in the total rural female population in Bongaigaon is 21 percent while the same for Muslims is only 10 percent.

The economy of Bongaigaon district is basically agrarian in nature with about 80 percent of the population dependent on agriculture. Paddy is the major crop. Other important crops include oil seeds, pulses, cash crop like jute, vegetables etc. The district has high potential for growth of citrus fruits, pineapple, Areca nut *(Areca catechu),* and medicinal and aromatic plants besides rubber plantation. However, the horticulture & plantation crops are generally not grown on commercial scale in the district. The Agro-climatic condition of the district is suitable for sericulture. The district has large reservoir of water resources and has good scope of fisheries. The district has a total of six registered beel fisheries cooperatives.

"Problems of Rural Farmer: A Case Study Based on the Lowphulabori Village under the Raha Block Development Area of Nagaon District, Assam" Parag Das Asstt. Professor, Dept of Geography Raha College, Raha, Nagaon

(IOSR Journal of Humanities and Social Science (IOSR-JHSS) Volume 20, Issue 1, Ver. IV (Jan. 2015), PP 40-43 e-ISSN: 2279-0837, p-ISSN: 2279-0845. www.iosrjournals.org)

Nagaon is one of the flood prone districts of Assam. It is important to understand the impact of this natural calamity on farmers' income. The paper mentions that the farmer's income and the effects of floods in the surveyed area is negatively related. One percent increment of flood can decrease the farmer's income by Rs.115. The paper highlights- lack of mechanisation, scarcity of high yielding variety inputs, lack of capital formation, flood and drought, poor agricultural marketing facilities, lack of knowledge about demandable crops or more appropriately the absence of commercialization of agriculture sector are the main problems of the rural farmers in the area.

Baseline Survey of Minority Concentrated districts: District Report Nagaon, Study Commissioned by Ministry of Minority Affairs Government of India

Study conducted by: Omeo Kumar Das Institute of Social Change and Development, Guwahati Commissioned by the Ministry of Minority Affairs, This baseline survey was planned for 90 minority concentrated districts (MCDs) identified by the Government of India across the country, and the Indian Council of Social Science Research (ICSSR), New Delhi coordinates the entire survey. (http://icssr.org/Bongaigaon.pdf accessed on 8.7.17).

The study report highlights the overall socio-economic situation of agrarian communities in Nagaon. Like Bongaigaon, Nagaon is also one of the Muslim dominated districts of Assam (55.36% of total population, Census 2011). Women work participation rate in rural area is insignificant with only 1.7 per cent Muslim female engaged in secondary income earning activities.

The Central Assam District of Nagaon is one of the largest districts of Assam. The district has been the meeting ground of diverse ethnic groups, cultural streams since time immemorial. Horticulture is one of the strongest features of the economy of Nagaon district because of its conducive Agro-climatic and soil conditions. The district has definite advantages in producing potato, banana, chillies, Areca nut, coconut etc. Bamboo is grown in large scale across the district.

Livestock (goatary, poultry, duck rearing, and piggery) provides supplementary income to the large number of rural households. Fisheries is another major allied livelihood activity for the rural households. In addition to these, sericulture and jute are also important livelihood activities in the district.

The studies reflect a low participation of women farmers in the remunerative livelihood activities, however, it is strikingly lower for the Muslim women in Nagaon and Bongaigaon.

Nagaon District: Inventory of Agriculture 2015 Published by: The Director, ICAR-Agricultural Technology Application Research Institute, Umiam (Barapani), Meghalaya-793103

(http://www.icarzcu3.gov.in/Dist_Agri_Inventory/Nagaon.pdf)

The document provides a detailed overview of the agriculture and allied activities in the district. Small and marginal farmers constitute the largest share of farming families in the district. Agriculture is the backbone of the districts economy providing livelihood to about 78% of the total population. The agro-climatic features are very supportive for horticulture. Sericulture and jute are important livelihood activities. Sericulture is practiced in 1,185 villages of the district. Fisheries is another important allied activity in the district.

The study reflects low participation of women farmers in the remunerative livelihood activities; however, it is strikingly lower for the Muslim women in Nagaon and Bongaigaon.

As the district is flood prone, every year farmers are affected by crop submergence.

Report of Committee on Doubling Farmers' Income: Volume I

"March of Agriculture since Independence and Growth Trends" Historical Analysis and Examination of Agricultural Production and Farmers' Income: August 2017

Document prepared by the Committee on Doubling Farmers' Income, Department of Agriculture, Cooperation and Farmers' Welfare, Ministry of Agriculture & Farmers' Welfare-

The report gives an overview of the growth trends in farmers' income since independence, and analyse growth in associated support infrastructure (roads, electricity, irrigation, market yards, etc.). Agriculture continues to be the source of livelihood for the majority of Indian population. The share of the agriculture is 11.28% (2004/2005 to 2014/2016) The growth of the livestock sector is at a sustainable rate among all sub-sectors. Thus, the livestock sector is likely to emerge as engine of growth for the agricultural sector and can be relied upon for risk mitigation and minimizing the losses to the farmers.

The smallholders (including marginal farmer also) dominate Indian agriculture Marketing is another prime factor in assessing the agricultural situation in India. The major problem faced by farmers is where to sell their produce in the market so that they can get remunerative prices.

While majority of sale is being done through local private and mandi in almost all of the crops and only few are being sold through government and cooperatives. Examining the overall value chain management is crucial to get the farmers complete benefits of enhanced output.

This report also highlights that there exists huge yield gaps in agricultural sector. A study by Planning Commission reveals that the gap existed between the best scientific practices and the best field practices and second, between the best field practices to the average farmer practices. These gaps are caused by a number of environmental factors.

Livestock is perceived as an engine of growth for the farmers considering the scope in terms of gap in demand-supply in the state.

Despite many technological breakthroughs, especially in rice and wheat crops, the crop yield realized at farmers' field remain considerably lower than the demonstration yields. The average state yield in all the producing states are much lower than the experiment station yield; The issue can be addressed by expanding irrigation, use of improved seeds in sowing and better credit access. Credit is another basic need for farm operation. As per 2012-2013 data, the households of Assam, Jharkhand, Chhattisgarh and Bihar have poor access to credit. The shares of indebted households with credit access in these states are 17%, 29%, 37% and 42% against the all-India average of 52%. Average outstanding amounts in these states are also less i.e. Rs.3,400, Rs.5,700, Rs.10,200 and Rs.16,300 respectively.

Climate Change and variability is one of the most important matters of concern in terms of livelihood and income of farmers. The imminent threat of climate change on agriculture and thus income and livelihood of farmers has been widely recognized by scholars across the globe. As per the indicator there are 150 districts which topped the vulnerability index of Climate Change where Karbi Anglong ranked high on vulnerability status.

Report of the committee on Doubling Farmers Income: Volume II
"Status of Farmers Income: Strategies for Accelerated Growth" Interlinkages between input costs and diversification, capital formation and income: Study Commissioned by the Ministry of Agriculture and Farmers Welfare, August, 2017

The study addresses the core concern of rural poverty, which is, despite the increase in agricultural production in India, rural poverty still stands at one of its highest rates in history. The study mentions that the contribution of agriculture in the national GDP may have reduced, however, that is largely due to other sectors increasing in its contribution, especially the service sector.

In the present scenario, 22.5% of the farmers across India are categorized as 'below poverty line'. From July 2012 until June 2013, the report depicts average annual household income of farmers as low as Rs.6,426. The study was conducted in over 4,000 villages in India, across the geography of the country. India is also a net exporter of several agricultural goods, but its rural population still suffers from impoverished lifestyles. Data was collated and analysed from all states which were categorized in five zones: North, South, East, West, and Central.

The study has also underlined the drastic need of a shift in policy from a production oriented approach, as has been in the past few decades, to a real income oriented approach amongst the rural population of India. In order to augment the income oriented approach, the study also advocates for a market and demand based approach as opposed to typically supply based approach. The study has coined this as 'fork to farm' approach, instead of 'farm to fork' push. This does not go to say that the administration aims at driving a blinkered approach towards income oriented policy solely. However, it does intend on supplementing production rate of farmers with market linkages to ensure not just a good yield, but also an appropriate price for their produce.

The study has also found evidence supporting the fact that only increased income gives rise to reduction in poverty, and consequently, higher production rate. It has mentioned that increasing production has nuanced points such as landholding and post production losses, which do not extract farmers out of the drudgery that they face today.

Alongside the market linkages, the study also highlighted the need for market mechanisms, and market based interventions such as processing chains, produce marketing linkages, and storage and transport facilities. It is stated that without the direct market connectivity of farmers, there will not be an increase in real household income.

The landless, smallholders, and marginal landholders have been given special importance in this study, as it indicates that it is amongst this community especially that poverty is at its nadir, and has been compounded in the past few decades. As of 2011, there were 144.30 million landless agricultural labour. The study has also worked on expanding the definition of a farmer, which is not limited to just people who gain their income from farm and off-farm activities.

For the duration of the study, people residing in rural areas with any amount of land, or an income of at least Rs.3,000 from any farm or off-farm oriented activity is categorised under the definition of a farmer.

The study also underscores the need of transfer of modern science and technology to farmers which is of primary importance for farmers to ensure production security and reduced input cost. This would work on increasing real income of the farmers, as a reduced input cost of production would yield to a greater rate of savings and real income. It also highlights the need for farmers to adopt climate, and resource friendly sustainable practices, as lack of attention to the aforementioned has been one of the leading reasons of distress in past decade.

Lastly, the study has strongly alluded to the diversification of livelihood vocations by rural populations in India. This recommendation has also been region and skill specific, wherein the population with the particular skill, amenability, and regional conduciveness must diversify their livelihood pattern accordingly to off-farm and non-farm activities, which will be a shift, but a better way of augmenting income. The role of private business involvement is also stated as crucial in the study.

Impact of Flood and Siltation on Socio-Economy: A Case Study of Dhemaji Revenue Circle, District Dhemaji, Assam; Mandira Bura Gohain (Assistant Professor, Department of Anthropology, North Lakhimpur College (Autonomous) & Monimugdha Bhuyan (Assistant Professor, Department of Anthropology, North Lakhimpur College Autonomous)

Global Journal of HUMAN-SOCIAL SCIENCE: Dept. of History, Archaeology & Anthropology Volume 15 Issue 1 Version 1.0 Year 2015 Type: Double Blind Peer Reviewed International Research Journal Publisher: Global Journals Inc.

(USA) Online ISSN: 2249-460x & Print ISSN: 0975-587X (https://globaljournals.org/GJHSS_Volume15/3-Impact-of-Flood-and-Siltation.pdf accessed on 1.9.2017)

The paper investigates the causes of flood and siltation, its socio-economic impact, the adaptive measures taken up by the communities and the recommendations to avoid the situations.

Agriculture is the main source of Dhemaji district of Assam. Half of the population of the Dhemaji live in rural areas and directly depend on the agriculture. The unpredictable and abnormal floods which cause siltation seriously abrupt human settlement and activities

The Jiadhal river basin in Dhemaji district has a challenge in term of long and recurring flood hazard. Flood in the Jiadhal basin characterized by the extremely large magnitude, high frequency and extensive devastation. The main causes of flood in the sub basin are: i) High intensity of rainfall with average annual monsoon rainfall ii) Deforestation in the upper catchment iii) Highly meandering nature of the river in the plain

The paper provides list of villages, blocks and circles affected by flood and siltation.

Displacement of several households is considered as a severely negative socio-economic impact as a result of the recurring floods in Dhemaji district.

The socio-economic impact of flood and siltation on the Jiadhal riverine people are: i) Displacement: ii) Loss of Agricultural land and home: Farmer can cultivate only two to three crops in a calendar year with subsistence homestead gardening. iii) Psychological effect iv) Poor transportation system v) Problem of education vi) Medical problem.

Displacement of several households is considered as a severe socio-economic impact as a result of the recurring floods in Dhemaji district.

The adaptive measures taken up by the communities: i) Most of the houses raised the lowest floor above the possible flood level ii) Shifting of the houses out the flood prone areas iii) Guard wall by bamboo on the sides of the river to minimize the effect of the erosion as well as siltation iv) Construction of raised platform v) Change in the crop calendar vi) Installation of flood early warning system with the help of local agency like NGO vii) Mass education.

Recommendations made by the study: i) Sustainable embankment construction and its proper maintenances ii) Flood plain zoning is essential to minimize the vulnerability of flood iii) Flood forecasting

iv) The flood level during the rainy season attain endangering heights with silting of the river bed, so large scale afforestation particularly in the increase infiltration of the surface water to ground the reducing sediment load to the stream v) Heavy guard wall on the both the side of the river should be erected so that the effect of flood could be minimized.

ASTEC (2011). Recommendations for State of Assam's Strategy and Action Plan on Climate Change. 37p. First Draft. Assam Science Technology and Environment Council, Guwahati, Assam (India)

The report mentions about the impending vulnerability of the state due to climate change. It gives a snapshot of the impact of Climate Change in different parts of Assam.

In the intense drought-like conditions that prevailed in as many as 15 districts of Assam during the summer monsoon months of the year 2006 owing mainly to below normal (nearly 40%) rainfall in the region, more than 75% of the 26 million people associated with livelihoods related to agriculture in these districts were affected and the state suffered a loss of more than 100 crores due to crop failure and other peripheral effects.

The recent spell of drought during October 2008 to July 2009 also has severely affected agriculture and production of hydropower in Assam and its neighbouring states. Some of the major flash flood episodes took place in Goalpara (2004), Bordekorai (Sonitpur, 2004), Dhemaji (Jiadhal, 2007), Lakhimpur (Ranganadi, 2008), North Kamrup (Puthimari, 2008), and Dhemaji (Nanadi, 2009). These flash floods have caused hundreds of deaths, huge economic loss and colossal damage to infrastructure and public and private property. Such extreme events, many of which go unrecorded due to lack of an adequate hydro meteorological gauging network, may be indicators of a changing climate in this region. Over exploitation of the ground water resources in this fluorosis affected zone may also lead to increased proliferation of fluoride contamination. The southern part of Nagaon district in central Assam valley and adjoining parts of Karbi Anglong form a rain-shadow zone where annual rainfall is as low as 800-1200 mm. Water scarcity is a potential constraint for the people living in these areas. Absence of effective irrigation systems or water harvesting practices adds to the vulnerability of the people. Lumding, located centrally in this zone shows a decline in rainfall at a rate of 2.15 mm per year. As a result, water crisis might aggravate in this region in the coming years.

Census of India 2011 Assam; Series 19, Part XII-A, District Census Handbook Dhemaji,

The handbook provides detailed information about demography, geography, economic activity.

Dhemaji is a flood prone district in Assam. More than 85% population is dependent on agriculture. Forest is only around 16% of the total geographical area therefore forest-based livelihood activities are limited. The economy of Dhemaji is generally agro-based. Sericulture, fishing and driftwood business are practiced in smaller scale. All the varieties of banana are abundantly found in the district.

The production of banana is common to all households. Besides banana, mangoes, jackfruit, papaya, orange, pineapple, Areca nut, coconut etc. are also available in the district. All these fruits are seasonal but banana is found throughout the year

The percentage of ST population to total population in the district is 47.4.

District Census Handbook 2011 (Part A and B) – Karbi Anglong

Karbi Anglong is the largest district in Assam in terms of geography. However, the district has recently been split into East and West Karbi Anglong. In the district of Karbi Anglong inward migration is very low. However, within the district, a larger number of people from the hills and plains converge in valley areas like Jamuna (region with highest population and density). The Karbi tribe, and the Naga tribe are the tribal population that are largest in number. Rainfall in the district (1,000mm approx.) is relatively lower to that of other districts in Assam, however, it is highly concentrated during a particular time of the year, which results in several chronic challenges for agriculture within the district. Heavy concentrated rains result in a large number of wash away crops. As the district is almost entirely comprised of hills, flooding is not a major problem here. In spite of the challenges with rainfall, it is still the only form of irrigation that is used by the farmers. The government has planned on building irrigation infrastructure within the district in the next decade. Very few winter crops are produced in surplus due to heavy concentrated rains, and low water availability during the summer results in the inability of farmers to cultivate crops and vegetables, especially due to the usage of traditional farming methods. Traditionally, the tribal communities cultivate paddy (*Oryza sativa*), mustard *(Brassica juncea)*, cotton *(Gossypium arboretum)*, and local vegetables. However, the methods are largely traditional too, resulting in low crop yield. Bamboo is inherently connected with the tribal community, due to its abundant presence in forest areas. As the district is a hilly region, cultivation of agriculture is nomadic, and so is the livelihood pattern of the communities. Hence, Jhum cultivation is the primary method of agriculture in Karbi Anglong. This does have adverse effects on the climate as well.

In light of the impact of Climate Change viz. floods and drought in several parts of Assam, it is high time that the farmers are supported to adopt climate resilient practices.

80% of the population of Karbi Anglong is involved in agriculture as the primary mode of income. Aside from agriculture, the population of Karbi Anglong earn their income as wage laborers in Cement factories and mining units. The district is rich in limestone, coal, mica, granite, and china clay. The mining of these resources provides wage labour for the local communities. As a large part of the district is under forest cover, bamboo and timber provide a large scope for livelihood activities.

Bamboo craft has always been traditionally practiced by the Karbi community. Additionally, bamboo is used as raw material for making paper. Hindustan Paper Mill possess a paper processing unit in the district. Rice, black and green gram, tea, cotton, oil seed, mesta, potatoes, and millets are the recent vegetables, cereals, and pulses produced by the farmers traditionally.

However, farmers are now beginning to invest in the production of brinjal, okra, cabbage, cauliflower, papaya, onion, and sweet potato. Additionally, horticultural produce has also significantly increased in the past few years, however, in spite of the relative increase in production, most of the produce has not been able to achieve surplus status. Banana, Mango, Litchi, Jackfruit, Assam Lemon, Pineapple, and Areca nut are produced in Karbi Anglong too.

However, the farmers are still producing fruits and vegetables largely for self-consumption. Goatary, piggery, and poultry are carried out as secondary activities in most villages. Sericulture is a traditional vocation for the tribal community in Karbi Anglong. The tribal communities are known for cultivating silk cocoons. Eri, Muga, and Mulberry cocoons are the main types of cocoons produced here. Alongside the production of silk cocoons, weaving with the use of handlooms is also a traditional practice in the district. However, as the vocation is growing in scale and demand in external markets, the indigenous tribal community still perceives it as tradition, and not a commercial vocation. Fisheries has potential to increase in production, as the district is in deficit with regards to fish production. Most of the fish within the district is brought in from neighbouring districts of Assam. Cottage manufacturing units also exist within the state. Wood products, cork, food and beverage processing and small-scale manufacturing units exist within the district. Credit linkages, and demand were not very high previously. However, in spite of the fledgling the growth of livelihood activities, there is a substantial demand in credit. Prior to the penetration of banks, other financial institutions, through which credit linkages were possible, barter system was the only means of exchange conducted. It is still practiced as a traditional novelty during some festivals. However, with the growth of several co-operatives, penetration of banks and other financial institutions, small-scale businesses, and more livelihood activities, the demand for credit has grown substantially.

While tribal population in Karbi Anglong and Dhemaji is half the total population of the districts, their population is less than 5% of the total population in the districts of Nagaon and Bongaigaon.

2.2 Universe of Study

The study is analytical and descriptive in nature which warrants both qualitative and quantitative data and facts related to existing livelihood situation of the farming communities of different categories, status of agriculture and allied sector, off-farm and non-farm sectors, efforts made for the development of different sectors, status of livelihood capital viz. natural, physical, financial, human and social, growth trends, impact on the livelihoods of the farmers. The universe of the study is the four Agro-climatic zone of Assam.

2.3 Unit of Observation

As the focus of the proposed study is farming communities therefore, farmers of different categories including women, Farmers Producer Organizations (FPOs), SHGs, Gram Panchayat, NGOs involved in development of agriculture and allied sectors, Government officials of relevant Department/Agencies involved at policy, programming and field implementation levels, Officials of other relevant Programmes such as MGNREGA, State Rural Livelihood Mission (SRLM), Skill Development Mission, NABARD, Banks, etc. were also be consulted and interviewed under the study.

2.4 Sampling Procedure and coverage

The study focuses on study of the farming communities of all categories including women. The study refers to different Agro-climatic conditions including annual rainfall and availability of water for irrigation, soil type, socio-economic condition of the farming communities, vicinity with forest areas etc. Therefore, in order to ensure adequate representation of the state multistage sampling technique that involves purposive sampling technique and stratified random sampling technique were applied for sample selection.

2.4.1 Key features of samples covered for study

The districts for the study were selected based on the predetermined criteria, which were representations of four different Agro-climatic zones in Assam.

Lower Brahmaputra valley – Bongaigaon

Bongaigaon was chosen because the population spread is very different as compared to other districts. Schedule Tribe is just 2.5% of the total population and Muslim population is more than 50%. Bongaigaon also has good rail and road connectivity with the other parts of India therefore there is a good scope for generating income by integrating the markets with the communities.

North Bank Plain – Dhemaji

Dhemaji was chosen because it is a flood prone district and it is important to understand the overall situation of the small and marginal farmers affected by such natural calamities. Therefore, an appropriate plan for diversification of livelihood activities can be developed for improving the farmers' income.

Central Brahmaputra Valley - Nagaon

Nagaon was chosen because of diversity of communities with concentration of minorities population. Therefore, it was considered useful to study the diversity of livelihood activities practiced by different communities.

Hills - Karbi Anglong

Karbi Anglong was chosen because it is a hilly area and agriculture at hilly regions is done in a subsistence level, therefore it is important to understand how incomes of farmers in this region can be improved. The district has 56.3% tribal population. The agriculture practices vary as per geographical area viz. in the hill area the farmers practice Jhum cultivation (shifting cultivation).

2.5 Sampling frame

S. No	Districts	Blocks	Villages	Sample Block	Sample Village	Sample Farmers
1	Bongaigaon	5	568	3	10	200
2	Dhemaji	5	1,322	3	10	200
3	Nagaon	18	1,396	3	10	200
4	Karbi Anglong	11	2,928	3	10	200
				12	40	800

Further classification and selection of blocks and villages were primarily based on the landholding and diversity of livelihoods within the district. This information was sourced after engaging with the district officials from the government. The study team conducted detailed and in-depth interviews with several government departments such as Assam State Rural Livelihood Mission (SRLM), agriculture, forest, fisheries, handloom and textile etc. Additionally, the study team also interacted with several local NGOs viz. Seven Sisters Development Assistance (SeSTA-http://www.sesta.org.in/#2), Centre for Microfinance and Livelihoods (http://cmlnortheast.com/), Bosco Reach out etc. that have extensive work experience in the region. This helped the study team zoom in on the blocks and villages which were selected for the study.

The study team was also able to solicit data from the district level officials to help identify the blocks and villages in a better manner. The study team went on to conduct field visits in all the selected blocks and villages to validate the data and information sourced from the government departments. This helped the study team to get a thorough understanding of the district, and also helped in the selection of the blocks and villages.

2.5.1 Matrix for selection of blocks in study districts

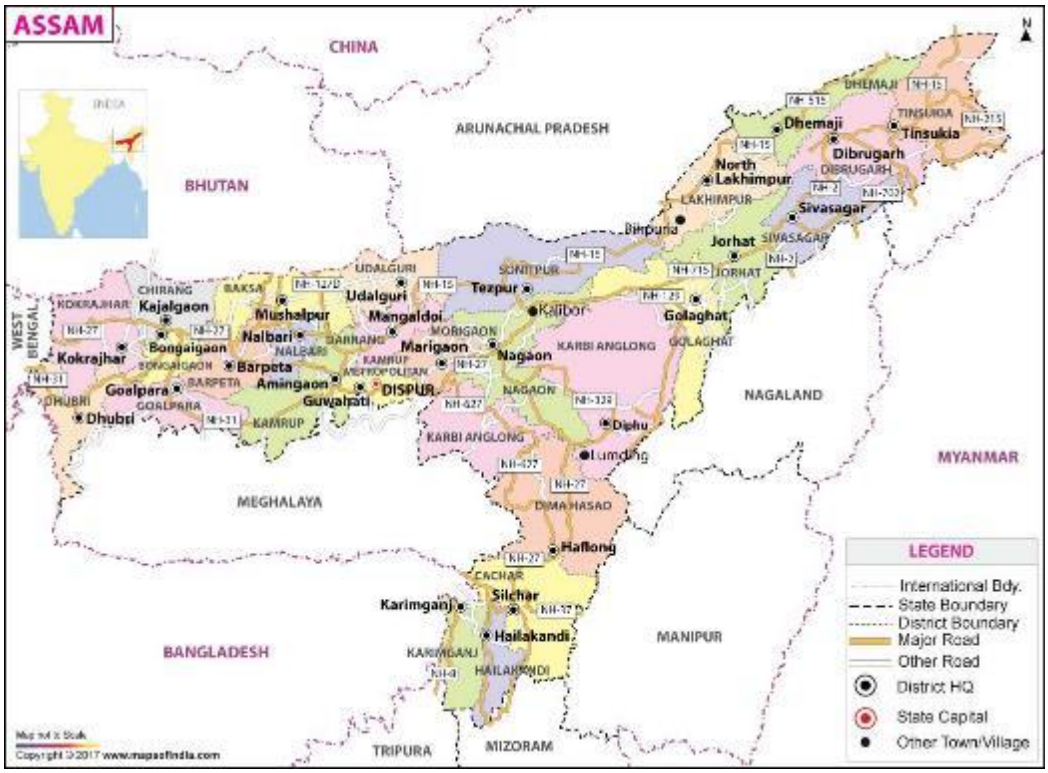

Table 4: Matrix for Bongaigaon

Blocks	Agriculture				Piggery	Fisheries	NTFP	Handloom and Handicraft	Small & marginal farmers	Presence of SRLM	Prone to natural disaster	Presence of minorities
	Paddy	Vegetables	Fruits	Spices								
Boitamari	√	√	√	√	√	√	√		√		√	√
Srijangram	√	√	√	√	√	√	√	√	√	√	√	√
Manikpur	√	√	√	√		√	√	√	√			√

Table 5: Matrix for Nagaon

Blocks	Agriculture				Piggery	Fisheries	NTFP	Handloom and Handicraft	Small & marginal farmers	Presence of SRLM	Prone to natural disaster	Presence of minorities
	Paddy	Vegetables	Fruits	Spices								
Batadrabha	√	√		√	√	√		√	√	√	√	√
Kaliabohr	√	√	√	√		√	√	√	√		√	√
Raha	√	√	√	√	√	√		√	√	√	√	√

Table 6: Matrix for Dhemaji

Blocks	Agriculture				Piggery	Fisheries	NTFP	Handloom and Handicraft	Small & marginal farmers	Presence of SRLM	Prone to natural disaster	Presence of minorities
	Paddy	Vegetables	Fruits	Spices								
Dhemaji	√	√		√	√	√	√	√	√	√		√
Murkongsalek	√	√	√	√	√			√	√	√	√	√
Machkhowa	√	√	√	√		√	√	√	√		√	√

Table 7: Matrix for Karbi Anglong

Blocks	Agriculture				Piggery	Fisheries	NTFP	Handloom and Handicraft	Small & marginal farmers	Presence of SRLM	Prone to natural disaster	Presence of minorities
	Paddy	Vegetables	Fruits	Spices								
Lumbajaong	√	√		√	√			√	√	√		√
Langsomepi	√	√	√	√		√		√	√	√		√
Rongkhang	√	√	√	√	√			√	√	√		√

2.6 Use of PRA and other tools in the study

2.6.1 Focus Group Discussions (FGD)

A total of 24 FGDs with communities were undertaken by the core research team members[9] at village level in each of the selected districts of the study. The team conducted FGDs in two villages of each of the three blocks in a district (i.e. six villages in a district).

2.6.2 Transect Walks

The core research team members also conducted 24 transect walks in the villages to understand the existing livelihood practices in farm, off-farm and non-farm sectors which helped to visualize the resources, existing practices in farm (agriculture and horticulture commodities), off-farm (piggery, fisheries, sericulture) and non-farm (handloom, bamboo crafts, processing etc.).

2.6.3 Stakeholders' interviews

Participatory research tools (FGD, transect walks etc.) and a consultative approach was consciously adopted to map the sample area.

The core research team interacted with different stakeholders' viz. officials of government departments, NGOs, traders etc. to understand the existing livelihood practices, challenges, and opportunities related to the commodities. Agriculture Department, Horticulture Department, Forest Department, Fisheries Department, Animal Husbandry Department, Spices Board, Assam Rural Infrastructure and Agricultural Services (ARIAS) Society, Seven Sisters Development Assistance (SeSTA), Centre for Microfinance and Livelihoods, Grameen Sahara, Rashtriya Grameen Vikash Nidhi and North East Small Finance Bank.

2.6.4 Market observation

The core research team also observed markets to draw learning in terms of assessing opportunities for potential interventions for the rural poor producers. Wholesale fish and vegetable markets were observed at Guwahati to understand the supply chain of the commodities. Fish wholesale market at Ujjan Bazar Guwahati, Vegetable and food-grain wholesale market at Machkowa bazar Guwahati were visited.

2.6.5 Household level data collection

A detailed questionnaire to capture the ongoing livelihood practices, challenges and expectations of the communities to understand the possibilities of doubling the farmers' income was also developed. The questionnaire was translated into Assamese language. Four Field Investigators were selected from each district to administer the questionnaire at households in the villages.

[9] Core Research Team Members- Dr. S S Tabrez Nasar, Avinash Kumar, Wanda Mary Lamare, Nikhil Arlikatti and Gitali Thakur

The field investigators were selected based on their prior experience of conducting such surveys for similar projects. Training was provided to the field investigators on administering questionnaires. Household level data are collected for 800 households (200 households per district from three blocks of a district).

2.6.6 Inception Workshop

With an overall objective of soliciting perspectives of multiple stakeholders about present status of farmers' income and based on their experiences explore possible ways to double the farmers income through farm, off-farm and non-farm activities an Inception Workshop was organized by ILRT in June 2017. Stakeholders from various government departments such as, agriculture department, fisheries department, and the Assam State Agricultural Marketing Board participated in the workshop. The workshop was also attended by representatives from NABARD Assam Regional Office. In addition to government officials, there were participants from NGOs such as Diya Foundation, Rashtriya Grameen Vikash Nidhi (RGVN), SeSTA, and Bosco Reach Out. One farmer from Bongaigaon also participated as a stakeholder and provided rich perspective on the nature of challenges, and potential opportunities to double the farmers' income.

Inception Workshop: Farmer sharing his experience

Inception Workshop Group Photograph

Chapter Summary

An extensive review of a large portion of the literature available on the matter of doubling farmers' income was conducted. Literature on governance structure, commodities of cultivation, and government data were also reviewed.

The selection of the sample for the study was deliberated upon, and the districts chosen were also further explored for their livelihood activity potential and diversity. The districts were also explored for diversity of communities, distress situation, livelihood practices, and the landholding of farmers. These were the three main criteria in identifying the sample group.

Appropriate tools of Participatory Rural Appraisal (PRA) were used in the study. The sample was selected after FGDs, and stakeholder meetings. Transect walks helped understand better the context of the field. Stakeholders' discussions were also included during the course of an Inception Workshop. The consultation of stakeholders included district, block and state level government departments, NGOs working in the region, financial institutions working in the region, and commodities based small businesses.

Chapter III

State and district overview

This section of the report covers information from secondary sources as well as information collected through primary sources viz. through PRA, stakeholder interviews and interview conducted at the household level.

3.1 State overview[10]

Assam is known as India's gateway to Northeast India. It is situated south of the eastern Himalayas along the Brahmaputra and Barak River valleys. Assam covers an area of 78,438 km2 (30,285 sq. miles). The state shares its borders with Arunachal Pradesh, Nagaland, Manipur, Mizoram, Meghalaya, Tripura and West Bengal. The state shares international borders with Bangladesh and the Kingdom of Bhutan.

Assam is also the third-largest producer of petroleum and natural gas in the country and has ample reserves of limestone. With its five national parks and 18 wildlife sanctuaries, the state is a biodiversity hotspot. Other potential areas of investment include power and energy, mineral-based industries, tourism and crude oil refining. Assam has six Agro-climatic zones: i) Upper Brahmaputra Valley Zone, ii) Lower Brahmaputra Valley Zone, iii) North Bank Plains Zone, iv) Central Brahmaputra Valley Zone, v) Barak Valley Zone and vi) Hills Zone.

Assam consists of hill and plain districts. The climate of the hills is generally salubrious while that of the plains is comparatively warm in summer but cool in winter. Accordingly, the climate of Assam is characterised by alternate cool and warm periods with a highly humidity. From the climatic point of view the year in Assam can broadly be divided in two, the cold season and the rainy season. However, there are two other short seasons namely spring and autumn representing the transition between cold and rainy seasons and that between rainy and cold seasons respectively. There is a slight variation of climate from region to region within the State. For instance, the climate of the region covering Kamrup, Nalbari and Barpeta in west-central Assam is characterised by plentiful rains and foggy winter. The cold season in this region is from December to February and this is followed by the sand-storms and thunderstorms from March to May. The rainy season, as in rest of Assam begins in late June and continues up to late September. The average rainfall of the state is 2,818 mm. October and November constitute the post-monsoon period.

[10] http://online.assam.gov.in/web/guest/assamgazetter?webContentId=172953

In western Assam comprising the districts of Goalpara, Bongaigaon, Kokrajhar and Dhubri, the climate is intermediate between that of the North Bengal Plains and the west-central Assam Valley. The climate of the Barak Valley districts is characterized by abundant rainfall, moderate temperatures and high humidity. The year may be divided into four seasons and the cold season is identical with Goalpara and Kamrup. The climate of the east central Assam comprising Darrang, Sonitpur, Marigaon and Nagaon is characterised by the absence of a dry hot summer season, the highest temperature being experienced during the period of south west monsoon along with abundant rains and a humid atmosphere throughout the year. The climate of the eastern Assam districts (Golaghat, Jorhat, Sibsagar, Tinsukia, Dibrugarh, Dhemaji and Lakhimpur)is somewhat identical to Darrang and Nagaon with temperature remaining slightly lower than in the latter

Assam is predominantly a fish-eating state with 90 per cent of its population consuming fish. However, the state is still dependent on Andhra Pradesh and West Bengal for fish supply of 42 thousand MT per annum.

3.2 Sector/sub-sector/commodities overview

Agriculture is of primary importance to the state of Assam, engaging about half of the total working population and generating roughly one-third of the state's gross product. Rice accounts for more than two-thirds of the sown area. Tea and jute, widely cultivated in the Brahmaputra valley, are important cash crops. Assam grows a large portion of the country's tea. Other crops include oilseeds, pulses (legumes, such as peas, beans, or lentils), corn (maize), sugarcane, rape (an oil-yielding plant, the leaves of which are used for fodder), mustard, potatoes, and fruits. Through improved cultivation methods, some farms yield more than one crop per year.

While average yield of rice has significantly improved over the years, the average yield of most of the crops in Assam is lower than that of the country. It clearly indicates the need to skill the farmers with upgraded package of practices of cultivation of respective crops. Moreover, access to irrigation also needs to be improved.

Table 8: Average yield of major crops in India and in Assam

Crops	Average yield of Assam (kg/ha)	Average yield India (kg/ha)
Rice	2,135	2,390
Maize	1,652	2,557
Wheat	1,257	2,872
Pulses	642	744
Oilseed	628	1,037
Sugarcane	35,987	69,859
Jute &Mesta*	1,908	2,550

Source: Agriculture Statistical Year Book of India 2016, Ministry of Statistics and Program Implementation http://www.mospi.gov.in/statistical-year-book-india/2016/177 accessed on 21.12.2017

* In trade and industry, jute and mesta crop together known as raw jute as their uses are almost same

Livestock and dairy farming have shown moderate growth since the late 20th century, which is largely promoted by the government. Nevertheless, those activities remain small contributors to the state's economy. Sericulture (rearing of silk worms), on the other hand, is well established, and Assam is a major producer of silk.

In the forestry sector, Sal (*Shorea robusta*) and other tropical hardwoods are highly valued.

Aquaculture has been a major focus of agricultural development since the mid-1990s, and yields have increased. In spite of this overall fish yield has continued to fall short of domestic demand[11].

Total meat production in the state of Assam is estimated at 36.63 thousand tons. Pig meat is the highest contributor in total meat production in the state and its share is 39.88 per cent. On the other hand, Assam is not self-sufficient in meat production. The total annual meat production of the state is 37 thousand tons against its requirement of 347 thousand tons, and annual supply deficit of meat in the state is 310 thousand tons.[12]

Fish production in Assam has increased by 54 per cent in the past nine years, says a report of the Union Ministry of Agriculture and Farmers' Welfare.

The annual report of 2016-17, published by the Department of Animal Husbandry, Dairy and Fisheries of the ministry, state that fish production has increased to 2.94 lakh tonnes in 2016-17 from 1.90 lakh tonnes in 2007-08[13].

Assam is predominantly a fish-eating state with 90 per cent of its population consuming fish. The increased fish production, however, is yet to meet the demand which is 3.36 lakh tonnes a year. To meet the gap, the state depends on imports from leading fish producing states such as Andhra Pradesh.

As per Economic Survey 2015-16, per capita /per day milk consumption in Assam is only 74 ml contrary to the recommended norms of Indian Council Medical Research which is 208 ml per person per day. Indigenous cattle still contribute to large share of the state's total milk production with 54.41 per cent of the entire milk production. Contribution of crossbreed milk to the entire milk production is 28.18 per cent.

Assam's share of India's total milk production was less than 1 per cent (0.57 per cent) during the year 2014-15.

[11] https://www.britannica.com/place/Assam

[12] Impact of piggery training on the income level and profit of pig farmersA case study in Kamrup district of Assam (India); Hemchandra Saikia*, R.K. Saud , D.N. Kalita and Subhas Kalita; Indian J. Agric. Res., 51(6)2017 : 619-622; Print ISSN:0367-8245 / Online ISSN:0976-058X; http://www.arccjournals.com/uploads/Final-attachment-published-A-4898.pdf

[13] The Telegraph, 31.01.2018; **https://www.telegraphindia.com/states/north-east/54-increase-in-fishproduction-in-assam-196294**

Sericulture has been practised in the State from time immemorial, and the State possesses a proud tradition of producing Muga, Eri, and Mulberry silk. Muga culture is a practice that is indigenous to the state of Assam, and the state consequently is the world's largest producer of Muga silk. Though Assam produces all the three varieties of silk, yet major emphases have been given in production of Muga and Eri silk which are popularly a Vanya Silk. Assam Contributes 95% and 65% of country's total Muga and Eri production respectively[14].

Most rural families have access to agricultural land with half a bigha of homestead. Majority of rural households are marginal and small farmers. Most of the households in Assam own homestead land adjoined to their house. The homestead is well fenced, and mostly have a source of irrigation. In areas where inundation is not a problem, the homestead is covered with plantation crops like Areca nut and Betel vine (*Piper betle*), or black pepper (*Piper nigrum*). Assam is an important producer of betel leaf and Areca nut. Awareness and practice of scientific orchard management-proper spacing, irrigation, manuring, plant protection, and other cultural operations are not adopted by the farmers in the state, this results in low productivity and income from existing plantations. Besides, with the increase in the age of the plantation, there is a natural decline in productivity per plant due to lack of systematic replacement of old plants with newer ones. All these constraints have led to low and declining income per unit area from homestead garden.

Section Summary

Assam is gateway to the north-eastern states. The area and people have ancient historical background. While the state has vast natural resources but the utilization has been constrained due to many reasons. The state has enough scope in terms of improving livelihoods of the farmers through farm, off-farm and non-farm activities. While paddy is the predominant crop, jute and sugarcane are cultivated as cash crops. Piggery, dairy, and fish production is less than the local demand. Sericulture is a traditional non-farm activity at household level but not utilized at commercial level. The homestead garden also contributes to the livelihood basket of the farmers. Horticultural crops and spices (Areca nut, betel leaf, black pepper, ginger, turmeric, pineapple, Assam Lemon etc.) are majorly grown in the homestead garden.

[14] https://sericulture.assam.gov.in/how-to/know-about-silk-and-its-production-in-assam

3.3 Trends in Investment in Assam

Assam government has launched the Chief Minister Samagra Gramya Unnayan Yojana (CMSGUY) for holistic development of the villages within a short span of five years by making huge investments in rural areas across the state. The scheme is aimed at bringing the revolutionary changes in the villages of the state by doubling the farmer's income. The planned average investment is about Rs.1.20 crore per Revenue village. The total requirement for the Mission is Rs.30,000 crores over a period of five years. Ten percent of the total proposed investment will be in the form of community resources such as land, man days, etc. and the remaining ninety percent will be from the State resources. Different mission under the scheme are: 1) Fishery Mission; 2) Milk Mission; 3) Organic Mission; 4) Land Management and Conservation Mission; 5) Sericulture, Khadi and Cottage Industry Mission; 6) Road and Broadband connectivity; 7) Semi-Processing, Processing and Market Linkages; 8) "Youth-Yoga-Sports" Mission; and 9) e-Gram Mission by developing Village Knowledge Centres by strengthening traditional Namghar and other community institutions.

The National Bank for Agriculture and Rural Development (NABARD) has launched an insurance scheme to encourage dairy farming in Assam. The proposals have come out in the recently-published Area Development Scheme for 2018-'23 by the bank. The insurance scheme will be implemented under the National Livestock Mission. Under the scheme, the Centre and the state government will contribute 30 per cent each, and a farmer's contribution will be 40 per cent of the premium. For a farmer belonging to Scheduled Caste (SC) or Scheduled Tribe (ST), the government's share will be 80 per cent and the farmer's 20 per cent. For development of dairy farming in Assam, NABARD has prepared a plan with an investment of Rs. 241 crore. It covers 29 districts of the state where highest amount invested is Rs 24.6 crore in central Assam's Biswanath district (The Telegraph, March 8, 2018).

The state irrigation plan of Assam under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) comprises of District Irrigation Plan of all the 27 districts (before bifurcation on 2015) has been approved by State Level Sanctioning Committee (SLSC) in February, 2017. The Annual Action Plan under PMKSY for Rs. 4,000 Crores has been approved by SLSC for the financial year 2017-'18.

The Prime Minister laid the foundation stone of Indian Agricultural Research Institute (IARI) in Gogamukh (Dhemaji), Assam, it can be expected that it will impact the entire region in a positive way and agriculture needs will be developed in line with the requirements of the 21st century. Farmers will get benefitted from the changing technology as well (Press Information Bureau Government of India Special Service and Features, 22 August 2017).

Assam Chief Minister Sarbananda Sonowal in January 2018 launched Pradhan Mantri Sahaj Bijli Har Ghar Yojana 'Saubhagya' in a programme held at Sonaram High School playground to provide electricity connections to over 24.1 lakh families in rural and urban areas by December 2018. The scheme aims at providing last mile electricity connectivity to all rural and urban households.

Livelihood basket is a way to exhibit diversity of existing livelihood activities and income as per social class. The increase in income can also be easily observed through the modified livelihood basket.

India signed a USD 200 million loan agreement with World Bank to facilitate investment in the agricultural sector and increase productivity in Assam, benefiting over 5 lakh farm households. The loan from the International Bank for Reconstruction and Development (IBRD), has a 7-year grace period, and a maturity of 16.5 years. The project will support the Government of Assam to facilitate agri-business investments, increase agriculture productivity and market access, and enable small farm holders produce crops that are resilient to recurrent floods or droughts in the state," the finance ministry said in a statement. It will be implemented in over 16 districts of Assam and over 5 lakh farming households will directly benefit from the project.

The areas highlighted in the study report requiring investment to increase farmers' income are mostly covered in the recent schemes and investments planned for the state.

The Livelihood Basket

Based on the sample data collected at farmers households level (200 HHs in each district), the livelihood activities taken up by different social class and the income realized is compiled. The compiled data which is the livelihood basket of the farmers are presented as income from farm, allied, off-farm, non-farm, and wage labour activities. The purpose of segregating the income through different sources was to highlight the present existing income from farm, off-farm, non-farm, and wage labour as well as corresponding possible livelihood interventions for increasing the farmers' income.

While the livelihood basket is based on the sample data, it has provided useful insights of livelihood practices and income for different geography and for different social class. It shall definitely help in planning interventions contextual to specific social class and geography.

Context building of livelihood basket from household survey:

One of the objectives of study was to estimate the current income level of farmers in the state and its composition (in various agro-climatic zones, holding size-wise, social class wise, etc.). The household survey questionnaire was developed suiting this objective. The field testing of questionnaire confirmed the approach taken to meet the stated objective.

The selection of sample households was on a random basis. Different social classes were represented in the collected data.

During the training of field investigators the importance of collecting social class wise income level data was emphasized. The core research team focussed on this aspect during the focus group discussion (FGD) with the communities. The data from household survey and the findings from FGD helped to build the context in terms of current income level of the households.

Once the data was collected, the data entry operator was also apprised of the importance of tabulation of income data as per social class. The data was tabulated accordingly.

Data analysis of income from different livelihood activities for each social class was undertaken. At first the income from different areas viz. agriculture, allied and non-farm activities were calculated. The expenses were then calculated for different activities and the net income was determined.

Once the livelihood basket was developed as per different social class the next step was to build the proposed livelihood basket with the suggested interventions. While suggesting interventions, it was planned that the interventions should be able to build on the existing livelihood activities in most of the cases. New activities were suggested only when it had the local context viz. yarn making from Eri cocoon. Dairy is an existing activity and the suggestion in the proposed livelihood basket is to introduce two crossbred cows per households for General, OBC and Muslim communities. Piggery is also an existing activity mostly for the tribal (and for SC in Dhemaji), the suggestion is fattening of 15 piglets which can result into net income of Rs.45,000 from the activity. In case of farm based activity, promotion of SRI is considered to improve the income. Fisheries is an existing activity for Muslim, SC, OBC and General communities, the suggestion is to build the capacity of fish farmers to adopt skills of pond based culture fisheries which can increase the productivity. In other words, there was a realization that the farmers cannot move away too far from their existing vocations and while emphasis on improving existing vocations was suggested as a prime strategy, in some cases vocations with extremely high potential was also suggested.

There was a realization that the farmers cannot move away too far from their existing vocations and while emphasis on improving existing vocations was suggested as a prime strategy, in some cases vocations with extremely high potential was also suggested.

3.4 Karbi Anglong

3.4.1 District Overview

Karbi Anglong is the largest district in the state of Assam. It is situated in the central part of the state. It is bounded by Golaghat district in the east, Meghalaya and Morigaon district in the west, Nagaon and Golaghat district in the north, and the N.C.Hills district and Nagaland in the south. The population of the district is predominantly tribal wherein Karbis are the tribes with the largest population. Other tribal ethnic groups of this district are Bodos, Kukis, Dimasas, Hmars, Garos, Rengma Nagas, Tiwas, Man (Tai Speaking's). Besides, a large number of non-tribals also reside together in this district. The district of Karbi Anglong has witnessed political disturbances for many years which has had its impact on the overall development of the region. The total population as per Census 2011 is 9, 56,313. 88.18% of the population is rural. 56.33 % of total population is tribal. While it is the largest district of the state but population density is only 93 per square km.

Total area of the district is 10,434 sq. km and 99.6% of the total area is rural area. 47.17% of the total geographical area is under forest.[15] Due to variation in the topography, this hill zone experiences different climates in different parts. The winter commences in October, and continues until February. During summer, the atmosphere becomes humid. The temperature ranges from 6 degrees to 12 degrees in the winter, and 23 degrees to 32 degrees Celsius in the summer.

The average rainfall is about 1200 mm[16]. The district is predominantly an agricultural district. Different types of agricultural crops are cultivated, amongst which paddy is the main crop. Except for the valleys, the farmers in the district follow the Jhum system of cultivation.

The district can be broadly divided into two physiographic units' viz. hills and plains. 85 percent of the district is covered by the hills[17].

3.4.2 Sector/sub-sector/commodities overview

The people of this district generally follow single cropping systems. Double, or multiple cropping systems are seldom. Rape and mustard, maize, sugarcane, seasame, wheat, jute, arhar, cotton, black gram, peas, and green gram are other agriculture crops cultivated in the district. Mustard is often used for oil extraction wherein farmers that cultivate the crop, do so for processing the crop into oil for self-consumption and sale. Mustard is processed at local level, in villages too. Major area of production of the

[15] *http://karbianglong.gov.in/*
[16] *http://dcmsme.gov.in/dips/Ind-Profile-Karbi-Anglong.pdf*
[17] *http://karbianglong.gov.in/main-web/forest.htm*

agriculture crops in the district falls under a rain fed condition, 97% of the total area of paddy production is rain fed.

As the farming practices are characterized by rain fed farming, and drip-irrigation practice has not yet adopted by the farmers, the potential for off-season vegetable cultivation is yet to be explored.

Potato (*Solanum tuberosum*), cauliflower (*Brassica oleracea var. botrytis*), cabbage (*Brassica oleracea var. capitate*) brinjal (*Solanum melongena*), tapioca (*Manihot esculenta*), yam (*Dioscorea alata*), sweet potato (*Ipomoea batatas*), tomato (*Solanum lycopersicum*), bottle gourd (*Lagenaria siceraria*), onion (*Allium cepa*), radish (*Raphanus raphanistrum subsp. Sativus*) are the major vegetables cultivated in the district.

Pineapple (*Ananas comosus)*, banana *(Musa)*, Assam lemon (*Citrus limon (L.)* Litchi (*Litchi chinensis,*), guava *(Psidium guajava)*, jackfruit*(Artocarpus heterophyllus)* and mango *(Mangifera indica)*are also cultivated in some parts of the district.

Areca nut *(Areca catechu)* is another major plant cultivated in homestead garden after pineapple and banana. Coconut *(Cocos nucifera)* is also cultivated in homestead garden. Areca nut holds a traditional place in tribal and Assamese tradition; several farmers cultivate Areca nut for self-consumption. However, Areca nut cultivation generally exceeds the consumption requirement of households in Karbi Anglong. Hence, it is sold as a surplus. Coconut production has been in relatively lower quantities as it does not typically feature in the local diet or consumption trend.

In spices, ginger *(Zingiber officinale)* is cultivated in largest area (38%) followed by black pepper *(Piper nigrum)* (6%), garlic *(Allium sativum)* (4%), chillies *(Capsicum annuum)*.

While GINFED was able to link 6,000 farmers for enhanced market price of ginger, the organization's prospects is now dwindling due to political disturbances.

A special intervention on Ginger supply chain in Karbi Anglong: Karbi Anglong produces over 20,000 MT ginger annually. Earlier, farmers used to sell ginger at mere Rs.3-4 per kg to local traders. Understanding the helplessness of the farmers the then Deputy Commissioner of Karbi Anglong facilitated formation of Ginger Growers Cooperative Marketing Federation Limited (GINFED) in 2007 under the Rashtriya Sam Vikas Yojna (RSKVY) with 3,500 farmers. GINFED started procuring ginger at Rs.8 per kg from the farmers to sell at Azadpur mandi (New Delhi) at Rs.13 per kg. Lack of infrastructure and capital led to erratic procurement patterns. Karbi Anglong Agri Products Ltd, a firm based at Joporajan, and supported by the Ginger Growers' Co-operative Federation (GINFED) had recently signed a memorandum of settlement with an export firm, Nahor Organic Products, for shipping dry ginger to Spain and London. Karbi Anglong ginger has recently been accorded geographical indication (GI) tag along with Tezpur litchi by the GI Registry of India, thereby boosting the commercial prospects of the two farm products of the state.

By 2015 around 6,000 farmers got associated with GINFED. In spite of the good work, GINFED struggled to continue playing its role due to many political disturbances[18].

Sugarcane: Sugarcane is cultivated in around 10,000 hectare. However, there are no sugar mills in the region. One sugar mill used to conduct operations in Kampur at Nagaon. However, as the mill was not remunerative enough for farmers, it was shut down.

In the absence of sugar mills in Karbi Anglong, farmers process jaggery from sugarcane. The highest quantity of jaggery is produced in Karbi Anglong district (29.64 thousand tonnes) followed by Nagaon district (21.52 thousand tonnes), Dima Hasao district (12.2 thousand tonnes) and Sonitpur district (9.2 thousand tonnes). In general, jaggery is marketed through middle men resulting in poor returns to the farmers[19]. Jaggery does possess a good demand, it is purchased by traders from upper Assam. They process it for making alcohol. Jaggery is made locally and sent to Golaghat, Jorhat etc. Traders purchase jaggery at Rs.35-45 per kg.

Rubber Plantation: The total area covered under rubber plantation in Karbi Anglong district, at present, is around 1,121.11 hectares. The Assam Plantation Crop Development Corporation and the Soil Conservation Department together cover 982.7 hectares of rubber plantation in terms of inputs and best practice methods. The current yield of latex is 1,200 kg per hectare which is 250 kg per hectare less than that of India. [20]

Bamboo Plantation: The geographical location and the climatic condition of the Karbi Anglong district favours bamboo plantation and it has the potential to be the largest bamboo growing district of Assam. In Karbi Anglong, the total area under bamboo cultivation in the year 2004-05 was 1,325.05 hectares, and the area per grower was 0.010 hectares with 5,35,718 number of bamboo bushes in total and 3.84 number of bamboo bushes per grower.

Citronella Plantation: Since late 80's citronella plantation has been gaining popularity among the local farmers in the upland areas. Large areas which have been abandoned after one or two Jhum cycles are found to be suitable for citronella plantation. Local people are interested in citronella plantation as it is eco-friendly. In fact, Karbi Anglong contributes a substantial share to the total citronella oil production in the state. There is ample scope for tea, rubber and citronella plantation in the district with institutional credit support.

[18] https://www.ruralmarketing.in/industry/agriculture/landless-ginger-farmers-of-assam
[19] Trend of sugarcane and jaggery production in Assam and associated problems and prospects Mahima Begum1 , Dhiman Dev Singha2 and Bijnan Chandra Bordoloi3 Sugarcane Research Station, Assam Agricultural University, Buralikson-785618, Assam, India; SSRG International Journal of Agriculture & Environmental Science (SSRG-IJAES)–volume 3 Issue 6 Nov to Dec 2016
http://www.internationaljournalssrg.org/IJAES/2016/Volume3-Issue6/IJAES-V3I6P104.pdf
[20] http://shodhganga.inflibnet.ac.in/bitstream/10603/28525/8/08_chapter%202.pdf

Sericulture: Sericulture is a very old and indigenous cottage industry amongst the tribal people of the region. It comprises in the culture of Eri (or Endi), Muga, Mulberry, and Oak Tassar. Eri culture has been traditionally practiced by the people as household occupation and particularly the Karbis, Dimasas, Kacharis, and Tiwas have been using its fabric in various forms since the past few centuries. During the Ahom and the British periods, Karbi Anglong was the only major supplier of Eri cocoons in the entire North-East of India.

Muga culture has also been recently introduced in a few foothill areas bordering Nagaon and Golaghat Districts for production of Muga cocoons, especially Muga seed cocoons. Eri is currently practiced on a larger scale as compared to Muga and Pat, in most part, as castor (Eri host tree) grow much quicker (8-9 months). However, it is the lesser remunerative silk variety amongst the three types of silk. Muga cocoons and yarn is sold for the highest price. Due to a dearth of processing of cocoons into yarn at a local level, sericulture has grown to be largely restrictive to cocoon production, self-consumption and sale.

Table 9: Eri silk Production details.

Type of silk[21]	Families engaged	Area (ha)	Yield of cocoon (MT)	Silk Yarn Produced (MT)	Spinning charkha
Eri	8,994	647.5	219	174	860
Muga	0	125	0	0	
Mulberry	137	319	2.7	0.26	

Source: Statistical Handbook Assam 2010-11

Wet-Cultivation: In Karbi-Anglong, wet cultivation is extensively carried out in Howraghat, Samalagnso, Bokajan, Lumbajong and Rongkhang Development Blocks. It is also carried out along the narrow valleys of perennial streams known as Dongakhok. Such valleys are usually irrigated by the cultivators from stream itself.

Shifting Cultivation: Shifting Cultivation (Jhum Cultivation[22]) is an age-old practice and is a form of traditional cultivation amongst the tribes residing in the hilly region of Karbi Anglong. Out of the total geographical area of the North East i.e. 25.50 million hectares, Jhum cultivation accounts for 2.70 million hectares of production area. About 4.50 lakh tribal 65 families survive on Jhum cultivation in North East. In Karbi Anglong, about 65% of the people are dependent on Jhum cultivation.

[21] http://databank.nedfi.com/sites/default/files/Sericulture_Assam_2010-11.pdf; statistical handbook Assam 2011

[22] **Jhum cultivation**, also known as the slash and burn agriculture, is the process of growing crops by first clearing the land of trees and vegetation and burning them thereafter. The burnt soil contains potash which increases the nutrient content of the soil.

The people cultivate on the same plot of land after an interval of 8-10 years. So, the people have to move from 1 hillock to another in search of new plots of jhum land. But at present, due to the growing population pressure on the land, the Jhum cycle has been reduced to 4 to 5 years and, even 2-3 years in some areas. In the process of Jhum cultivation, farmers do not use fertilizers or pesticides.

The practice of Jhum cultivation by farmers in Karbi Anglong has led to organic agricultural produce in the district.

Agriculture, being the single largest contributor to the District Domestic Product (DDP) accounts for about 44.91% of the total DDP of Karbi Anglong. Moreover, this sector engages 73% of the total working force, 59% as cultivators and 14% as agricultural labour.

Any person in Karbi Anglong belonging to a non-tribal community has to obtain a trade license from the Autonomous Council to start their venture.

Poultry: Poultry is largely confined to backyard rearing. There is one breeding (broiler) farm at Khatkhatiar Bokajan, two government poultry farms at Diphu and Hamren, one government demonstration farm at Kheroni and one government duck breeding farm at Phuloni. There is only one government feed mixing plant at Diphu and none in the private sector. As per Livestock Census, 2013, the livestock population details are as follows; Cattle- 4,00,429, buffalo- 14,867, pig-1,68,431, fowl-39,52,628, duck-3,25,193, sheep-443, goat- 1,76,550

Sheep and Goatary: Small backyard goatary units are generally maintained by most of the tribal as well as non-tribal people in the plain areas of the district for sustenance or as a supplementary occupation. The famous Assam Hill Goat, a good variety is available only in this district. There are two sheep and goat breeding farm at Diphu and Khanduli (Hamren sub-division).

Piggery: Pig farming is the most popular and traditional activity of the tribal people of this region, in particular. There are two government breeding farms at Diphu and Dokamokam and one government Feed Mixing plant at Diphu.

Fishery Development: The hill district, Karbi Anglong is not a major producer of fish. It is generally practiced by the people residing at the foothill areas of the region. The varieties of fish available in the district are Fry (Puthi), Shoal (Magur, Shrimp, Singi, Climbing Perch (Kawoi), Mud Fish, Rohit, Hilsa, Mud Eel and Hag fish. Dighalpani, Arikati Beel, Batisa Beel, Lutumari Beel, Barganga Beel as well as rivers like Dikharu, Jamuna, Kopili and Langpi are the most important natural fisheries of Karbi Anglong. There are 12 fish farms in the district out of which 4 farms are managed by Fishery Department, while 2 are leased out, and the remaining has been defunct for a while.

Trade and Services: Majority of the people engaged in trade and business in this district are non-tribal, who have largely migrated from Bihar, U.P., Rajasthan, West Bengal etc. Most tribal households of Karbi Anglong prefer residing within the district for work than to migrate to areas out of the district for daily wage labour as well. Of late, due to the pressure on land and unemployment, tribal too, have started venturing into the business sector. Any person in Karbi Anglong, belonging to a non-tribal community has to obtain permission in the form of trade licence from the Autonomous Council to start their venture. [23]

3.4.3 Sector/Sub-sector/commodities wise findings

(Findings based on stakeholders' interviews, FGD and observations)

Agriculture

In the district of Karbi Anglong paddy is the primary crop that is cultivated. Mono-cropping is the primary practice undertaken to cultivate paddy. Mono-cropping is understood to be the predominant method of cultivation due to inadequate irrigation facilities. In some parts of Karbi Anglong (such as Langsomepi) wherein irrigation is adequate, there are instances of double cropping. Most farmers are keen on undertaking the cultivation of summer paddy in the region, however most are unable to do so due to lack of irrigation facilities. Paddy is produced as a marketable surplus. 30,000MT of paddy is cultivated within the district of Karbi Anglong.

Inadequate paddy procurement centres restricts the scope of getting minimum support price from Food Corporation of India.

The Food Corporation of India (FCI) procured 15,000 quintals of paddy in 2016 at the rate of Rs.1,500 per quintal. However, many farmers were unable to sell their produce as there weren't adequate procurement centres for paddy. There are also a number of farmers in the Langsomepi block of Karbi Anglong who are keen on cultivating sticky rice, that are export quality rice (especially to South-East Asia) which fetch higher rates in the market. Sticky rice (Joha rice) are cultivated in the villages which does not have local market but if promoted, it has big overseas market.

The average rainfall of the district is 1,200 mm per year. Due to unexpected heavy rains – concentration and uneven distribution of rainfall – many farmers are disaffected with the condition of wash away of crops.
The irrigation needs of Karbi Anglong are critical in encouraging farmers to undertake double cropping methods in the district. The agriculture department is keen on exploring opportunities for drip irrigation.

[23] *http://shodhganga.inflibnet.ac.in/bitstream/10603/28525/8/08_chapter%202.pdf*

Paddy, sugarcane, ginger, maize, sesame seeds, turmeric, pineapple, peas, banana, litchi, and Areca nut are the major crops cultivated in the district of Karbi Anglong. There are also instances of wheat being cultivated largely amongst immigrant populations in Karbi Anglong, however, this is mostly for self-consumption of immigrants as they are more accustomed to consuming wheat. The district does produce a surplus of paddy.

Sugarcane has been growing in popularity in the past few years. Majority of the cultivation occurring in the western part of Karbi Anglong. Sugarcane was a crop that was largely cultivated by migrants in the district of Karbi Anglong, however, it is now being cultivated by the local tribal population of the district as well.

With the advent of sugarcane as one of the major crops cultivated, several farmers are engaged in the processing of sugarcane into jaggery that is sold in local markets. There have also recently been demands for sugar processing mills in the district.

Ginger and turmeric are some of the major high value products cultivated and sold in Karbi Anglong. 32,000MT of ginger is produced within the district of Karbi Anglong. Raw ginger is sold at Rs.10 per Kg, while peeled ginger is sold at Rs.80 per Kg. 1 bigha (0.28 acre) of ginger cultivation yields 10-12 quintals of ginger. Most of the farmers are engaged in selling raw ginger.

Turmeric is also sold in large quantities from the district. Processed, or powdered turmeric is sold at Rs. 180 per kg, and dried turmeric is sold at Rs.120 per kg. Some farmers that have access to grinding mills, pay Rs.5 to powder about 1 kg of turmeric. Diphu is the major market for the district of Karbi Anglong. 1 bigha of cultivation of turmeric yields approximately 40 bags, each bag weighs 40-45 kg Most of the farmers sell raw turmeric.

Most of the farmers in the district are small landholders. The average estimated landholding size in Karbi Anglong is 12 bigha (3.4 acre). In the hilly region of the district, most farmers possess land holding of 10 bighas (2.8 acres), however, there are also a few number of marginal and landless farmers. It was understood during the discussion with the local people that the official land holding of the villagers in the hilly area is more as they follow shifting cultivation practice and also use government land (including forest area) to grow seasame, betel leaf and Areca nut.

On average, approximately 5-10 percent of farmers in the hilly region is landless, however, all households are intensely engaged in homestead garden cultivation. In the plain area of Karbi Anglong (Langsomepi Block), most farmers have an average holding size of 12 bighas (3.4 acre) of agriculture land, however landless farmers are prevalent amongst migrants. Most immigrants practice lease farming in this block. Migrant population from Bihar, and West Bengal comprise of the larger part of the landless and marginal landholding community in Karbi Anglong. Homestead gardens (badis) generally possess a variety of crops that are cultivated, however, most of badi crops are cultivated for self-consumption.

The district of Karbi Anglong has been a politically disturbed region for a large number of years. In spite of good potential of processing of several agriculture and horticulture commodities (viz. ginger, pineapple, turmeric etc.) the related enterprises have shied away from the region due to turbulent political situation. GINFED, is a local ginger growers marketing cooperative that was tasked with overseeing the purchase of ginger produced by the local farmers in Karbi Anglong. However, GINFED performance has also been affected due to the political reasons.

As farmers commonly practice shifting cultivation, a majority of the farmers within the district (especially in the hill blocks) do not use any fertilizers or pesticides. This is particularly useful in the case of branding of the products**.** Organic branding does add value to the final product, however, as the commodities do not have any organic certification, the farmers are unable to sell their produce as an organic product. The certification for organic produce is ongoing, however, it does face political and policy challenges.

In the plain region of the district that border the district of Nagaon, for instance, in the block of Langsomepi, wherein tribal populations are lower in number, Jhum cultivation is not practiced, hence there is a need for the application of fertilizers and pesticides. In this case, there are a few progressive farmers that are producing vermicompost in order to organically fertilize the soil. In the Sonpur village of Langsomepi, an estimated 10 vermicompost tanks are set up, each with a capacity of 96 cubic feet.

The district of Karbi Anglong also cultivates and processes rubber in large parts. Rubber trees are often cultivated, and milked for its sap. The sap is also processed by the locals which are pressed by manual machines, and are dried and sold in local markets. However, due to an unavailability of proper markets, rubber sheets are sold at a mere Rs.60 per sheet (1 sheet = 0.5 kg approx.).

Migrant population from Bihar and West Bengal comprise of the larger part of the landless and marginal landholding community in Karbi Anglong. In absence of additional skills to earn from non-farm activities, they are the most vulnerable section of the population.

Availability of land in the villages is not an issue but farmers require tractors. They do not get benefit of government schemes for tractor as the some villages are not registered separately as revenue village.

Farmers are selling broom grass @Rs.10-12 per kg (dried) and Rs.3-5 per kg (raw).

Turmeric cultivation is good in the district. The villages have good scope of formation of producer organization around turmeric.

Focus Group Discussion with villagers

Due to Jhum cultivation practice, the agriculture produce of the hilly region of Karbi Anglong is without the use of chemical fertilizers and pesticides but efforts towards organic certification have not yet been made.

Sericulture and Weaving:

Eri cultivation is a crucial part of tribal tradition and culture. Tribal households cultivate Eri silk worms for the production of cocoons, which are later sold in local markets. However, as spinning of yarn from cocoon by using Takli (small support-style spindle) is a time consuming laborious process the farmers often sell eri cocoons in local markets. The eri cocoons are sold at Rs.650 per Kg. However, if the cocoons are spun into silk yarn, it can fetch Rs.2,350 per Kg. The silk worms are also an important part of the local community's diet.

The sericulture department does offer manual and motorised spinning machines that work on deriving silk yarn from cocoons at a subsidized rate, however, due to lack of awareness and convergence of departments, the local community of Eri silk cultivators, and weavers are unable to gain access to these yarn spinning machines.

As weaving is a tradition amongst the tribes of Karbi Anglong, several tribal communities weave their own clothes, especially during festivals. The looms used by most tribal communities are also hand-made and traditional, this means that the production capacity of the looms are not very high. It takes approximately a week to weave an entire Mekhla -Chador[24] set using these traditional bamboo looms. Due to the increasing need of cloth and the shortage of time to weave, the tribal communities often purchase woven cloth from the market too. Woven cloth is often a captive market. This means that most woven cloth is sold within the village itself. In some cases, woven cloth is sold in the district market at Diphu, however, it is very rare.

The sericulture department can provide yarn producing and processing equipment that are supposed to be distributed amongst the villagers in the district of Karbi Anglong, however, the lack of awareness of several villagers towards these entitlements is one of the primary reasons why many of the tribal villagers are unable to attain them. Additionally, the lack of convergence of schemes between weaving and sericulture amongst the tribal community is another challenge for promoting sericulture as a lucrative livelihood activity. The sericulture department can provide subsidized manual and automatic machines to villagers who may choose to purchase it. The motorised spinning machine has an output of 200 gms of yarn per day,

The option of solar powered yarn spinning machine by Central Silk Board's Research Institute (CSTRI) has a good scope to substantially increase farmers' incomes.

Fisheries

The fisheries department does not receive any major funding or support from the Karbi Anglong Autonomous Council. The Autonomous Council has given more focus on dairy in the present financial year budget than on fisheries. Hence, the fisheries department does not receive any major funding or support from the council.

There are no major reservoirs in Karbi Anglong, neither are there too many ponds within the district. The fisheries department believe that pond fisheries is a crucial way through which fisheries can be promoted in Karbi Anglong. The district of Karbi Anglong is in deficit of fish production and import fish for consumption largely from the neighbouring district of Nagaon

Textiles and handloom

The textile and handloom department is only involved in the production and weaving of cloth, and are not involved in the spinning of yarn. Eri silk yarn has a large potential in Karbi Anglong. The Textile and Handloom Department are keen on the villagers to spin cocoons into yarn, however, the enabling of such practices fall under the Sericulture Department.

[24] *Mekhela-Chador is the traditional Assamese dress, worn by women of all ages except children. https://en.wikipedia.org/wiki/Mekhela_chador*

As the fine work and designs that are carried out by the tribal are often replicated by commercial enterprises wherein the cloth is woven by machines, the tribal populations lose out on their design rights.

Sericulture is practiced widely amongst several tribal populations, however, the silk-worm that converts to cocoons are mostly cultivated for food in many tribal areas.

Insurgency and lack of a patent on silk that hails from Karbi Anglong is a major barrier faced by the weavers of the district. The fine work and designs that are carried out by the tribal are often replicated by commercial enterprise, wherein the cloth is woven by machines, the tribal populations lose out on their design rights.

Forest Department:

The Chief Minister Gramaya Unnayan Yojana[25] is one of the state missions that is for development and rural growth within the state of Assam. The mission has nine sub-missions under it, which works in sync with several other line departments. However, the forest based livelihoods is not specifically presented in the mission. The French Development Agency (government development wing of French Government) has supported an initiative which is in collaboration with the Forest Department of Assam. The initiative supports forest livelihoods for 140 JFMCs, and EDCs (95 JFMCs, and 45 EDCs) in the first phase of the project all across the state of Assam.

Eri cocoon and silkworm rearing by farmers

[25] **Chief Minister's Samagra Gramya Unnayan Yojana (CMSGUY):** A 5-year mega-mission called Chief Minister Samagra Gramya Unnayan Yojana (CMSGUY) was launched in the Financial Year(FY) 2016-17, which is scheduled to culminate in the FY 2021-22, coinciding with 75 years of India's Independence. The main objective of the mission is to double the farm income, in unison with the vision of Hon'ble Prime Minister Shri Narendra Modi. https://finance.assam.gov.in/schemes/cmsguy

The project intends on expanding the number of JFMCs to twice as much in the second phase. The project focuses on the development of micro-plans for the reduction of biotic pressure by humans in the core forest areas. The department does however, support certain livelihood activities for self-sustenance of the forest dwelling population there too. In the case of JFMCs, the Forest Department has financially supported and trained forest dwellers in water hyacinth handicrafts, tapestry production, and weaving. The criteria for selecting the JFMCs and EDCs was carried out by the Forest Department on a target oriented basis. The JFMCs and EDCs planting and achieving a target plantation of trees were selected for this project.

Under the project, several enterprising initiatives are being undertaken for forest livelihood production. For example, French vanilla producer company, Eurovanille (http://www.eurovanille.com/en/home.html) has been actively exploring opportunities to encourage forest dwellers to cultivate vanilla. The company is also exploring the possibility of supplying the community with vanilla tissue cultivation and are also working on a buy-back mechanism, however, most of the work is still carried out on a pilot basis.

Eurovanille, a France based vanilla processing company has been exploring the possibility of introducing vanilla cultivation in the hilly area of Karbi Anglong with a buy-back mechanism.

Eurovanille has already been cultivating vanilla in the Nilgiri Hills, and have been fairly active in Manipur and Meghalaya. They have begun some preliminary tests in Assam as well.

In the case of weaving, Jacquard looms have been provided to forest communities to produce woven cloth for commercial purpose. The department has also just begun a brand called Banasristi, which is a brand that is created by the Forest Department for the community, which deals in the retail of all the commodities produced by the community itself. Mushroom cultivation has also recently grown in popularity.

The Forest Department is also working on its working plan code which hasn't been conceived since 1994. The new working plan code will also include an inventory of all NTFPs available in Assam. The working plan is drafted with the help of the environmental organization, IORA. Political disturbances are not conducive to external companies to take up enterprises in the area. Based on the interaction with local people it was learnt that a Haryana based company tried for organic certification of paddy, seasame and ginger but Idea could not move further.

Pineapple, orange, banana, litchi are cultivated and also sent to Nagaland. Pineapple quality is very good but the local environment is not favourable for value chain intervention in terms of setting up of processing units.

It was also learnt during the discussion with the local people that paddy is discretely going to Jorhat and Bangladesh. No assessment is done to estimate the volume of paddy going to Bangladesh.

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Table 10: Social class wise land holding

Social Class	Karbi (ST)	Lumbajong and Rongkhang block
Average agriculture land (acre)	1.36	
Average homestead land (acre)	0.77	

Based on the discussion with the local people, it was understood that the tribal farmers' access government land (including forest land) also for agriculture therefore the average land used for agriculture is generally more than the land officially recorded in their name.

Table 11: Income from existing farm based activities

Commodities	Land used (acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure (Rs.)	Net Income (Rs.)	Remarks
Paddy	1.94	3,289	1,642	19,383	10, 241	66,842	Only 24% of the sample HHs are able to sell paddy.
Bamboo				11,000			
Pineapple				11,000			
Banana				7,000			
Broom Grass				12,000			
Areca nut				8,200			
Ginger	0.42	300	250	7,500			
Turmeric	0.28	150	100	1,000			
Total				**77,083**	**10,241**	**66,842**	

Table 12: Proposed increase in income from farm based activities

Commodities	Land used (acre)	Increased Average Productioin (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure(Rs.)*	Net Income (Rs.)
Paddy (SRI) for the 24% sample HHs	1.94	4,934	2,463	26,361	7,063	76,998
Bamboo				11,000		
Pineapple				11,000		
Banana				7,000		
Broom Grass				12,000		
Areca nut				8,200		
Ginger	0.42	300	250	7,500		
Turmeric	0.28	150	100	1,000		
Total				**84,061**	**7,063**	**76,998**

Note: Expenditure of SRI paddy is factored in the income

Table 13: Income from existing allied and off-farm based activity

Activities	No. of units available	No. of Units Sold	Income (Rs.)	Expenses related to activities (Rs.)	Net Income (Rs.)	Remarks
Poultry	17	13	2,583	4,050	22,168	80% of the sample HH sell birds
Piggery	3	3	16,300			52% of the sample HHs sell pigs
Goatery	5	3	4,800			20% of the sample HHs sell goats
Eri cocoon @Rs.650- no. of units sold in kg	0.13 acre	3.9	2,535			30% of the sample HHs sell cocoon
Total			**26,218**	**4,050**	**22,168**	

Note: The percentage are based on the total number of households interviewed

Table 14: Proposed increase in income from allied and off-farm based activity

Activities	No. of units available	No. of Units Sold	Income(Rs.)	Expenses related to activities(Rs.)	Net Income(Rs.)
Poultry	17	13	2,583		2,583
Piggery (proposed activity piglet fattening)*	15	15	2,04,000	1,60,950	43,050
Goatary	5	3	4,800		4,800
	Total		**2,11,383**	**1,60,950**	**50,433**

*Note: Please refer annexure 1

Table 15: Exiting income from wage labour

Activities	Number of days	Income **(Rs.)**
Agriculture wage labour	180	1,59,00

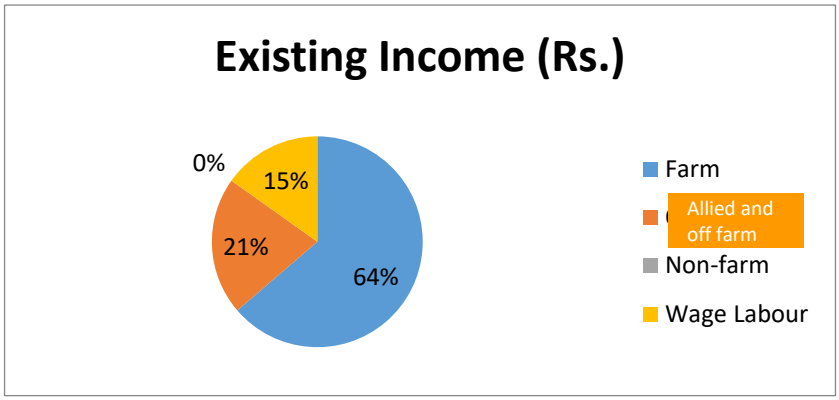
Table 16: Proposed income from non-farm activities*

Activities	**Income (Rs.)**
Eri yarn selling @Rs.2,350. 1 kg cocoon translates to around 800 gram of yarn. Eri cocoon produced from 0.28 acre is 7.8 kg. Total yarn produced from 7.8 kg is 6.24 kg	14,664
Total	**14,664**

***Note: Non-farm activity does not feature in existing livelihood basket**

Table 17: Comparative income from farm, allied, off-farm, non-farm and wage labour

	Farm	Allied and off-farm	Non-farm	Wage labour	Total
Existing Income **(Rs.)**	6,6842	22,168	0	15,900	1,04,910
Increased Income**(Rs.)**	76,998	50,433	14,664	15,900	1,57,995



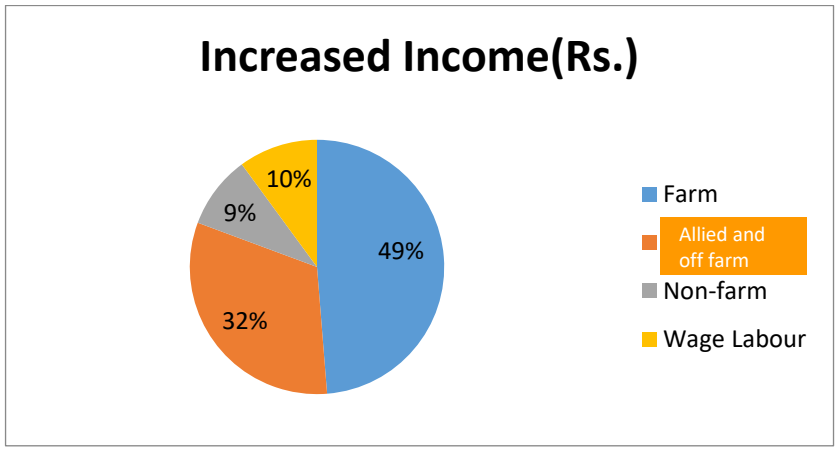


Table 18: social class wise landholding

Social Class	OBC
Average agriculture land (acre)	0.71
Average homestead land (acre)	0.28
Average leased in land (acre)	1.14

Table 19: Existing farm based activities

Commodities	Land used (in acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure (Rs.)	Net Income(Rs.)
Paddy	1.45	974.1	300	3,300	5,180	6,384
Coconut	0.11		42.5	1,020		
Areca nut	0.08	365.8	213.1	4,688		
Betel-leaf			8	2,556		
Total				**11,564**	**5,180**	**6,384**

Table 20: Proposed increase in income in farm based activities

Commodities	Land used (acre)	Average Production (kg)	Average Quantity sold (kg)	Income(Rs.)	Expenditure(Rs.)	Net Income(Rs.)
Paddy (SRI)	1.45	1,461	450	4,488	5,180	7,572
Coconut	0.1		42.5	1,020		
Areca nut	0.28	365.8	213.1	4,688		
Betel-leaf			8	2,556		
Total				**12,752**	**5,180**	**7,572**

Table 21: Income from existing allied activity

Activities	Land Used (acre)	No. of Units Sold	Income (Rs.)	Expenses related to activities(Rs.)	Net Income(Rs.)
Fishery	0.1 acre	87.5	10,750	1,375	31,175
Goatery		2	5,000		
Dairy		276 litre	16,800		
Total			**32,550**	**1,375**	**31,175**

Table 22: Proposed increase in income from allied activity

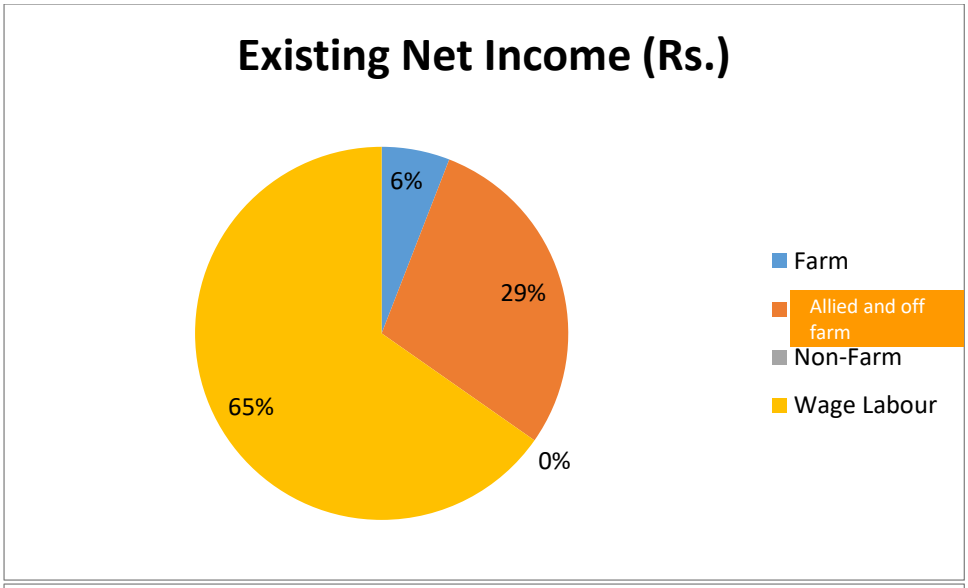
Activities		No. of Units Sold	Income year 1(Rs.)	Expenses related to activities year 1(Rs.)	Net Income Year 1(Rs.)	Income year 2(Rs.)	Expenses related to activities year 2(Rs.)	Net Income year 2(Rs.)
Fishery	0.1 acre	384	46,080	4,714	41,366	46,080	4,714	41,366
Goatary		2	5,000	0	5,000	5,000	0	5,000
Dairy*	430 lactating days for two crossbred cows providing 10 litre per day@Rs.35 per litre for one year. Capital cost (cow-shed, calf-pen, cost of two cows@Rs.30,000. cost of chaff cutter, cost of transportation, cost of dairy appliances) of Rs.1,04,000 is included in the expenses with recurring cost of Rs.55,430 in first year and Rs.64,490 in second year.	4,300	1,50,500	1,59,430	-8,930	1,32,300	64,490	67,810
	Total		**2,01,580**	**1,64,144**	**37,436**	**1,83,380**	**69,204**	**1,14,176**

***Note:** Please refer annexure 2

Table 23: Existing income from wage labour

Activities	Number of days	Income (Rs.)
Agriculture wage labour	150	22,500
Non-Agriculture wage labour	105	18,500
Migratory wage labour	193.3	29,600
Total	448.3	70,600

	Farm	Allied	Non-farm	Wage labour	Total
Existing Net Income**(Rs.)**	6,384	31,175	0	70,600	1,08,159
Increased Net Income**(Rs.)**	7,572	1,14,176	0	70,600	1,92,348



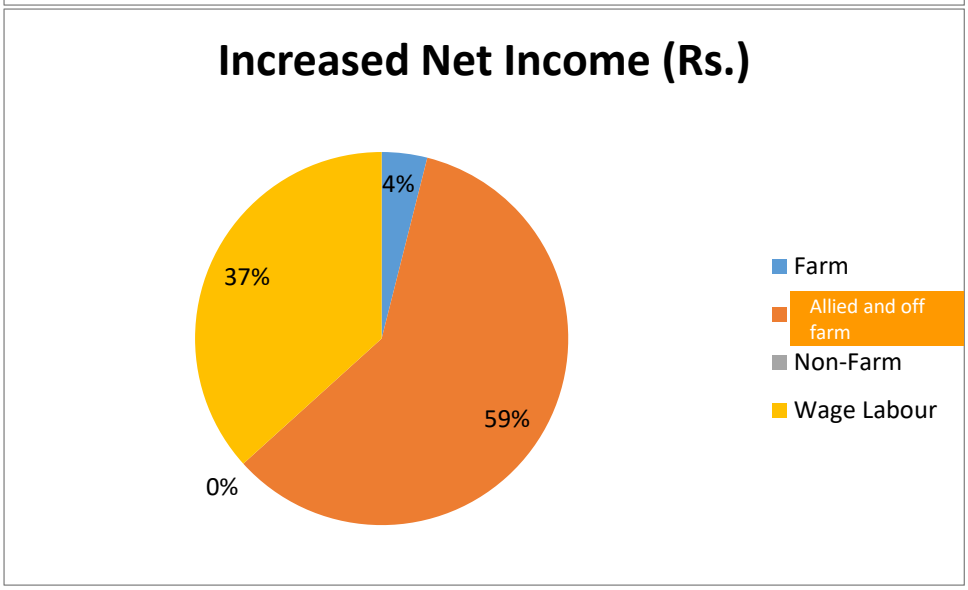


Table 24: Comparative livelihood basket of Schedule Tribe and OBC in Karbi Anglong

	Land holding (acre)			Farm income(Rs.)			Allied and Off-farm income(Rs.)			Non-farm income(Rs.)			Income from wage labour
	Agriculture	Homestead	Leased in	Existing Net Income	Possible Increased Net Income	%increase	Existing Net Income	Possible Increased Net Income	% increase in income	Existing Net Income	Possible Increased Net Income	%increase in income	
Karbi (Lumbajong and Rongkhang blocks)	1.3	0.77		66,842	76,998	15.19	22,168	50,433	127.50		14,664	100	15,900
OBC	0.7	0.28	1.1	6,384	7,572	18.61	31,175	1,14,176	266.24			70,600	70,600

The livelihood basket of Karbi farmers is characterized by the geographical factors. Broom-grass harvesting and ginger cultivation is unique to this community as well as to the geography of Lumbajong and Rongkhang blocks of the district.

Analysis of social class wise livelihood basket-Karbi Anglong: The livelihood basket of Karbi tribe shows paddy, ginger, pineapple, banana bamboo, broom grass are the major commodity in the income from farm based activity. Piggery is the only major off-farm activity which provides comparatively more income than poultry and goatary. The households were also found engaged in wage labour activity during the time when they do not take up cultivation. If the households are engaged with the model of fattening of 15 crossbred piglets, the increase in income from off-farm activities can be more than double. In farm based activity, they can increase the income to some extent by adopting SRI method of paddy cultivation. Based on the discussion with the local people, it was realized that the Karbi farmers usually do not take agriculture land on lease but they access forest land and cultivates seasame, betel leaf and Areca nut. In non-farm activity, the tribal family can increase their income around three times if they produce yarn from eri-silk cocoon. For the OBC farmers, agriculture is mostly at subsistence level and major income is from wage labour followed by off-farm activities (fisheries and dairy). While the income can be marginally increased from agriculture through SRI paddy, the income can significantly increase by introducing two crossbred cows and adopting scientific methods of pond based culture fisheries.

Section Summary

This Section uses several references of primary and secondary sources to identify the district communities that comprise of several religions, castes, and work related communities of Karbi Anglong. The district population and demography was closely studied in order to understand the scope and potential for livelihood based interventions. The district is the largest in Assam, and is majorly dominated by tribal in the hilly region. The district comprises of dense forests. The Karbis are the major tribe in the region.

The chapter also reviews the commodities cultivated or reared within the chosen districts. The commodities are then validated through findings of the core research team through the means of FGDs, and stakeholder interviews within the district of Karbi Anglong.

A holistic approach was undertaken during the course of effectively mapping livelihood practices that are ongoing in three blocks of the district.

The livelihood mapping exercise was divided in the categories, farm, allied off-farm, and non-farm, following which the core research team did an in-depth review of secondary and primary literature to understand each commodity within the broad category. This review was possible and enriched, due to the nuanced findings of the core team in most commodities. For example, 'Sticky rice (Joha rice- *Oryza sativa*) is cultivated in the villages which do not have local market, but if promoted, it has big overseas market', is one of the nuances identified by the core team that enriches the report.

The scope for piggery and dairy is high in the region, and will add substantial value, and in turn, would derive a larger monetary income for the farmers in the district. This is possible as tribes are intensively engaged in rearing of pigs. Dairy has scope more with the non-tribal communities. The chapter also underlines crucial practices of cultivation and rearing that are indigenous to the sample region.

Sericulture and weaving were also identified as activities that possess a large scope for contributing towards the doubling of farmers income in Karbi Anglong, especially considering the engagement of tribal communities in these vocations.

Additionally, and importantly, the chapter also provides the livelihood value addition intervention which highlights the opportunity for doubling the farmers' income through farm, allied, off-farm, and non-farm activities. The interventions highlighted are community, social class, landholding, and region specific, as livelihood practices vary substantially according to these components.

3.5 Dhemaji

3.5.1 District Overview

Dhemaji District is one of the districts situated in the remote corner of North East India, on the north bank of river Brahmaputra. The boundaries of the district are the hilly ranges of Arunachal Pradesh to the North and the East, Lakhimpur district in the West and the river Brahmaputra in the South. The district has a total geographical area of 3,237 sq. Meters.

The total population of Dhemaji 6,86,133. 93% of the total population lives in the rural area. 47% of the population is Schedule Tribe. There is also a large section of people belonging to Other Backward Classes (OBC) with their population comprising of Ahoms, Chutiyas, Konches etc. The Schedule tribes include Mishings, Sonowal Kacharis Bodos, Deoris, Lalungs, Hazongs, Ex-tea garden community makes up only a negligible part of the total population. The principal languages of the region are Assamese, Mishing, Bodo, and Bengali. The principal religion is Hinduism. However, Christianity, and Islam are also practiced to a limited extent too.

Census 2011

		Number	Percentage
Scheduled Castes	**Persons**	**44,225**	**6.45**
	Males	23,006	6.55
	Females	21,219	6.34
Scheduled Tribes	**Persons**	**3,25,560**	**47.45**
	Males	1,65,449	47.10
	Females	1,60,111	47.81

District	Dhemaji
Population	6,86,133
Hindu	95.47%
Muslim	1.96%
Christian	1.27%
Sikh	0.04%
Buddhist	0.13%
Jain	0.02%
Others	0.92%
Not Available	0.18%

The climate of the district is moderate. The temperature varies between 8°C (min) to 35°C (max). The average rainfall of the district, on an average, is 3,000 mm, with the North East Monsoon contributing a major share.

The river Brahmaputra flows from east to west in the southern part of the district. Different tributaries viz, Dihingia, Jiadhal, Moridhal, Telijan, Kaitongjan, Laipulia Nadi, Kapurdhuwa, Sissi, Gai, Tangani and Guttong originating from Arunachal Pradesh in the north, flow southwest carrying enormous amount of alluvium through the district before meeting the river Brahmaputra. The district is vulnerable to floods and occurrences of floods are a regular feature in several rural households, which causes a lot of damage. Nearly 27% of the net cropped is flood prone as well as flood affected. The soil of the district is mainly alluvial and sandy. The riverbeds are generally higher than the level of land.

Table 25: Geographical area of Dhemaji

S. No	Category	Area in Hectares	Percentage
1.	**Total geographical area**	3,23,700.00	
2.	**Built up land**	208.00	6.43
3.	**Total cultivable land**	1,24,819.00	38.56
4.	**Area under plantation:**		
	Horticulture	2,534.00	0.78
	Sericulture	513.14	0.16
	Social forestry	1,098.00	0.33
5.	**Forest**	53,224.71	16.44
6.	**Water bodies**	44,136.00	13.63
7.	**Waste land/grass land**	97,167.15	30.01

Source: http://dhemaji.nic.in/Land_Utilisation.htm

3.5.2 Sector/Sub-sector/Commodities Overview[26]

Agriculture is the main occupation of the people engaging about 59% of the working population. Paddy is the major agricultural crop cultivated in 69,290 ha (Summer, Autumn and Winter paddy), constituting around 55% of the gross cropped area (2001-2002). Mustard is the major oil seed crop grown in the district. Potato and pulses are other major crops grown in the district. Fruits and vegetables are also cultivated on a moderate scale. Pig, Dairy, and Goat rearing are the major allied agricultural activities carried out in the district.

Apart from Agriculture and allied activities, Sericulture is also practiced. The region is historically renowned for its Muga rearing practices. Industrial activity is not prominent in the district and no major industrial units exist in the district. There are around 248 SSI units registered with District Industries and Commerce Centre (DICC).

[26] http://dhemaji.nic.in/Economy.htm

Agriculture

Agriculture is the principal occupation and more than 85% of the total population depends on it. Irrigation is largely rain fed, with mechanized shallow tube wells. Sali, Ahu, and Boro are the three main varieties of rice commonly grown in Dhemaji and Lakhimpur districts. Kharif rice (Sali) occupies an area of about 54,000 ha of which 16,878 ha is under HYV. Ahu rice covers an area of 14,000 ha. Around 6,000 ha of the district is under Bao rice that is mainly grown in the low lying alluvial belts. In Rabi season, toria and wheat cover an area of 13,200 ha and 2,000 ha respectively. Out of the total cropped area around 20,155 ha is double cropped. The major cropping systems are Sali rice followed by Ahu rice, followed by toria rice followed by vegetables and rice-fallow. In addition, sugarcane, and mustard are also grown in some places of the district. The principal mustard growing areas are Gohaingaon, Talahi, and Narayanpur mouzas of Dhakuakhana. Pulses are mostly grown in alluvial flat lands on the riverbanks. The commonly grown pulses are Matimah (Phaseolus mango), Magumah (Phaseolus aureus), Arhar (Cajanus cajon), Masurmah (Pisum sativum).

Fish drying is a prevalent practice in Dhemaji and dry fish has a high market value. However, poor communication facilities and road connectivity results into high cost of transportation, making the option non-feasible.

Cattle rearing

Most families' rear pigs, goats, and poultry however, lack of adequate veterinary facility and knowledge of scientific breeding has left the livestock with a poor gene pool. People continuously lose their cattle and poultry to the scourge of floodwaters.

Sericulture

Dhemaji and Lakhimpur districts occupy a unique place in the production of the three different kinds of silks - Pat, Muga, and Eri - which possess a high demand in the national and international markets. Muga silk (*Antheraea assamensis*) and Eri silk worm rearing (*Samia cynthia ricini*) and production of silk yarn and fabric is wide spread amongst the people of Dhemaji and Dhakuakhana. However due to lack of proper infrastructure and appropriate marketing facility this industry has not been optimized to its full potential.

Fish Drying

Fish drying is another practice carried out during the monsoon season, mainly by the people living near the rivers. The market value of the produce is high, but poor communication facilities and road connectivity in the district, especially during the monsoon months, result in high transportation costs. Another factor that affects the trade adversely is the lack of storage facility so that the producers can wait till the roads are repaired.

3.5.3 Sector/Sub-sector/commodities wise findings

(Findings based on stakeholders' interview, FGD and observations)

Agriculture

Experience of Centre for Microfinance and Livelihoods (CML):

Variety intervention

Boro paddy is suitable mostly in the flood prone areas. Traditional rice variety grows is cultivated for a longer duration of time, viz. a viz. 150 to 160 days. CML's intervention was to reduce the number of days so as to ensure that the harvesting period will be before the onset of the rainy season. In 2017 there was an incident where farmers delayed their plantation therefore only 10% of their crops were inundated due to flood. A new variety of rice called "Navin "a flood resilient variety developed by the International Rice Research Institute (IRRI). The Assam government is promoting new variety rice across the district. The yield has increased up to 35 mon per bigha (1 mon = 40 kg). The average production is 25 mon.

International Rice Research Institute (IRRI) has developed a flood resistant variety of paddy, 'Navin'. Agriculture Department along with Agriculture University in Jorhat have developed a new flood resistant variety of seed called the "Swarna Paddy" (HYV variety). These varieties of paddy need to be promoted.

Technical intervention

System of Rice Intensification (SRI) is introduced along with farm mechanization viz. advanced weeder which has increased the production. CML along with the Mishing Autonomous Council also Introduced pump set for irrigation facilities.

Organic

Most of the areas in Dhemaji are practicing organic agriculture. CML intervention is to restore the organic way of cultivation through use of organic pesticides.

In areas where the incident of flood is very high and silt deposit is up to 10 ft. Such areas are not suitable for cultivation. In such areas where agriculture is not possible CML has encouraged and supported the communities to enhance their weaving skills by introducing improved handlooms.

As of now 450 women are engaged in Handloom in three clusters - Dhemaji cluster, Lakhimpur cluster, and Digholia Cluster. Women were organised into groups and cluster and provided 60 days residential training which included product diversification, design and entrepreneurship aspect. After completion of training they were provided a loom which costed Rs. 12,000 per loom.

Traditional hand weaving loom

Cocoon rearing is practiced for Eri silk only whereas for other silk items it is procured from agencies like Grameen Sahara. CML has planned to promote Farmers Producer Organization by collectivizing the women engaged with weaving. The proposed value chain intervention will range from pre-cocoon to market linkage.

As of now weavers still consider handloom as a secondary activity. Presently they work for 4-5 hour and earn around Rs. 6,000 per month. The production volume become low during harvesting season as more focus shifts towards harvesting.

The Agriculture Department along with Agriculture University in Jorhat have developed a new variety of seeds called the "Swarna Paddy" (HYV variety) a flood resistant paddy which can be cultivated during monsoon season. This type of paddy was introduced 3 years ago.

Mustard is one of the key crops grown in Dhemaji. The areas under vegetables production is very less and there is a significant demand supply gap. During the off-season, vegetables come from Barpeta, Guwahat, Shillong, and Arunachal Pradesh.

The certified hybrid seeds are usually provided from Guwahati by State Government as per guidelines. Farmers are very reluctant to use the hybrid seeds because of the delay in receiving seeds from the department. In most cases mustard seeds were distributed when the season for plantation is already over.

Dhemaji is known as a flood prone district however the incidents of flood are not uniform and there is only a small area which gets severely affected by flood. There are both riverine belts and foothill areas. The soil types are different in both the areas therefore agriculture practices are different in both the areas.

In Dhemaji the increasing number of tea gardens indicates presence of large amount of flood free areas.

Improving in the farming practices should be one of the important agenda. It includes farming practices of Sali crops which is a rain fed paddy crops and another is Ahu or Boro paddy which if sown from November can be easily harvested in May i.e., before the onset of monsoon to avoid flood. Farmers require proper irrigation facility to take up this late variety of paddy and to adopt change in sowing practice

Farmers produce Paddy, black gram, mustard, vegetables viz. cabbage, cauliflower, potato, and undertake livestock rearing mostly piggery, and backyard poultry. As the farmers do not use chemical fertilizers and pesticides therefore the produce is mostly organic.

Absence of minimum support price for black gram and mustard is major challenge for the farmers. In 2016, the procurement price of oilseed from the government was half the production cost. There are times when the market price of black gram is so low that the farmers instead of selling it in the market they distribute it to relatives and friends. They mostly sell their produce to traders both local traders from Dhemaji as well as traders from Bihar.

- Around 80% of the villagers are not approaching banks for loans as the loans from middlemen are available more easily.
- Farmers do not want to access government schemes and subsidy as they find it erratic and challenging for their crop cultivation cycle. Farmers don't receive timely inputs from government departments as extension services either.
- Irrigation: Around 75% of the farmers have no irrigation facilities. As a result, migration is very common for the male farmers to the cities viz. Guwahati and Hyderabad in search of wage labour.
- Farmers were unaware about crop insurance therefore they cannot safeguard in spite of the district being flood prone.

Piggery

Dhemaji is the highest piglet producing district of Assam where piglet fattening is practiced by Mishing community and Boro community. Unfortunately, the communities do not get competitive market price as they mostly sell at farm-gate market.

Families keep 3-4 pigs per household. The pigs are kept for fattening and sold at farm-gate market @Rs.20,000-25,000 for 40 kg weight. The price realized by the farmers is considered low as per market price at other places. Unavailability of sufficient feed discourages the farmers to increase the unit size of pigs. Moreover, the poor veterinary services is another reason for the farmers for not to increase unit size.

Sericulture

Cocoon rearing is practiced for Eri silk only whereas for other silk items it is procured from agencies like Grameen Sahara.

Eri silk is very different in Dhemaji than other places in the country. It is called white silk. Due to different colour and texture, the silk from Dhemaji has a high demand in the market.

There is huge scope to upgrade the communities in silk value chain and engage them with producing silk yarn and silk fabrics than just being limited to cocoon production. Eri is produced four times a year whereas Muga is reared in winter only. They produce cocoon and sell it at the rate of Rs. 3 per cocoon. Besides they also sell the yarn at the rate of Rs 16,000 per kg. In one bigha land the earning can be Rs 40,000 per season. One serious threat for sericulture is the effect of pesticides used in tea garden which affect the plant and at times it also kill the pupa. While this issue is known to concerned departments but no action has been taken so far. Mela and Dhemaji are the two main markets for the handloom produce.

Acknowledging the better returns than agriculture, farmers have been shifting their focus to small tea gardens. Increase in the areas of tea garden, increases use of pesticides. It is detrimental for Muga silkworm which gets severely affected by the use of high dose of pesticides in tea cultivation. This is not only destroying the prospect of the Muga Silk rearing in the region but also killing a highly prestigious heritage of the region

3.5.4 Social class wise livelihood basket

Dhemaji

Social Class	OBC
Average agriculture land (acre)	1.48
Average homestead land (acre)	0.45
Average leased in land* (acre)	2.45

***Note:** Out of the total households surveyed 22% farmers were found taking agriculture land on lease.

Table 26: Income from existing Farm based activities

Commodities	Land used (acre)	Average Production (kg)	Average Quantity sold (kg)	Income(Rs.)	Expenditure (Rs.)	Net Income (Rs.)	Remarks
Paddy	1.6	1,513	900	10,404	28,391	1,05,023	33% of sample HHs sell paddy
Pulses(Black gram)	0.57	275	218	6,769			26% of sample HHs sell black gram
Mustard	0.82	435	320	9,500			22% of sample HHs sell black mustard
Vegetables	0.82	3,816	3,634	80,984			17.7% sample HHs sell vegetables
Areca nut	0.28	1,516	1,113	25,757			
Total				**1,33,414**	**28,391**	**1,05,023**	**1,05,023**

Table 27: Proposed increase in income in farm based activities

Commodities	Land used (acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure (Rs.)	Net Income(Rs.)
Paddy (SRI)	1.6	2,269.5	1,350	14,149	Expenditure of SRI paddy is factored in the income	
Pulses(Black gram)	0.57	275	218	6,769	26,160	1,10,999
Mustard	0.82	435	320	9,500		
Vegetables	0.82	3,816	3,634	80,984		
Areca nut	0.28	1,516	1,113	25,757		
	Total			**1,37,159**	**26,160**	**1,10,999**

Table 28: Existing allied activity

Activities	No. of units	No. of Units Sold	Income	Expenses related to activities(Rs.)	Net Income(Rs.)	Remarks
Piggery	3	2	20,638	12,553	41,196	40% farmers of sample HHs sell poultry
Poultry	10	9	2,631			80% farmers of sample HHs sell pig
Fishery (unit sold in kg)	0.37 acre	178	25,800	9,205.0		22% farmers of sample HHs sell fish
Goatery	7	3	9,060	775		22% farmers of sample HHs sell goat
Dairy (unit sold in litre)	2	127	5,600			8% farmers of sample HHs sell milk
Total			**63,729**	**22,533**	**41,196**	

Note: The percentage are of the total number of households surveyed

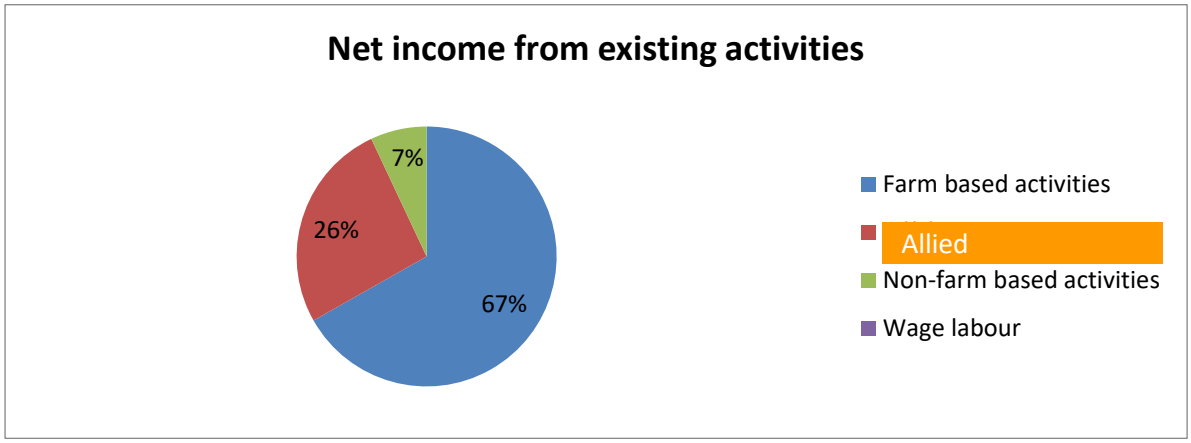
Table 29: Proposed increase in income from allied activity

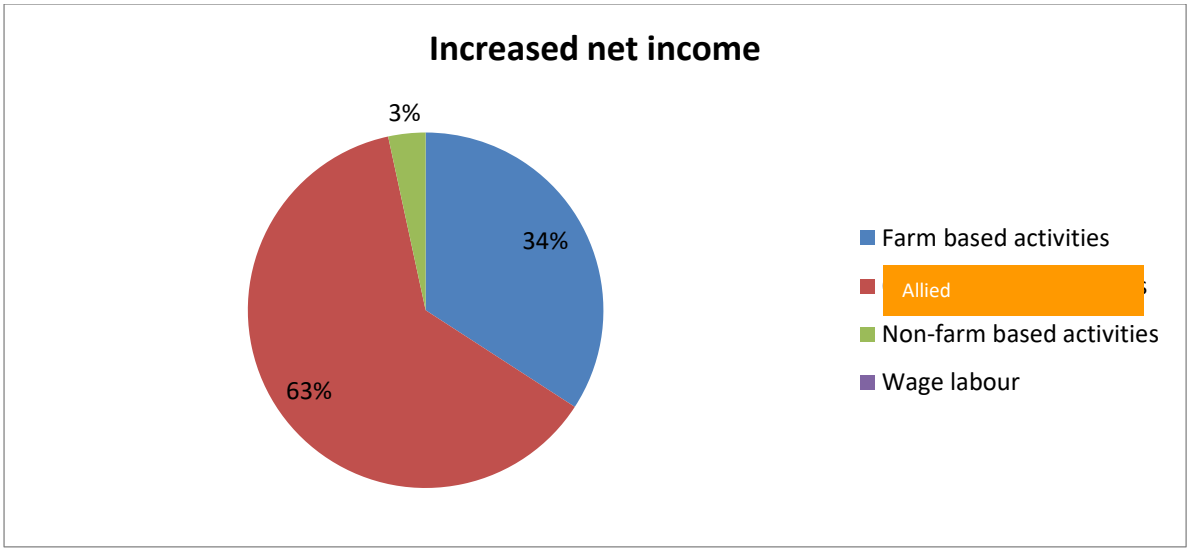
Activities	No. of units	No. of Units Sold	Income year 1(Rs.)	Expenses related to activities year 1(Rs.)	Net Income Year 1(Rs.)	Net Income year 2(Rs.)	Expenses related to activities year 2(Rs.)	Net income Year 2(Rs.)
Poultry	10	9	2,631	0	2,631	2,631	0	2,631
Piggery (piglet fattening)		15	2,04,000	1,60,950	43,050	2,04,000	1,60,950	43,050
Fishery	0.37 acre	792	87,480	6,222	81,258	87,480	6,222	81,258
Goatary	7	3	9,060	775	8,285	9,060	775	8,285
Dairy (Please refer annexure 2)	430 lactating days for two cows providing 10 litre per day@Rs.35 per litre for one year. Capital cost (cow-shed, calf-pen, cost of two cows@Rs.30,000. cost of chaff cutter, cost of transportation, cost of dairy appliances) of Rs.1,04,000 is included in the expenses with recurring cost of Rs.55,430 in first year and Rs.64,490 in second year.	4,300	1,50,500	1,59,430	-8,930	1,32,300	64,490	67,810
	Total		4,53,671	3,27,377	1,26,294	4,35,471	2,32,437	2,03,034

Table 30: Existing Non-farm based activities

Activities	Number of days	Income	Remarks
Weaving	75	11,000	15% of sample HHs are engaged in weaving activity

	Farm based activities	Allied activities	Non-farm based activities	Wage labour
Net income from existing activities	1,05,023	41,196	11,000	
Increased net income	1,10,999	2,03,034	11,000	





Social Class	ST (Mishing)	
Average agriculture land (acre)	2.5	
Average homestead land (acre)	0.9	
Average leased in land (acre)	4.2	22% farmers are taking land on lease for agriculture

Table 31: Income from existing farm based activities

Commodities	Land used (acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure (Rs.)	Net Income (Rs.)	Remarks
Paddy	2.3	2,231	1,972	22,252	15,650	37,646	30% farmers sell paddy
Maize	2.1	650	525	19,171			24% farmers sell maize
Pulses(Black gram)	0.2	240	225	4,300			24% farmers sell black gram
Mustard	1.2	234	149	7,573			18% farmers sell Mustard
Total				**53,296**	**15,650**	**37,646**	

Table 32: Proposed increase in income from farm based activities

Commodities	Land used (acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure (Rs.)	Net Income(Rs.)
Paddy (SRI)	2.3	3,346.5	2,958	30,262.72	Expenditure of SRI paddy is factored in the income	
Maize	2.1	650	525	19,171	12,150	49,156
Pulses(Black gram)	0.2	240	225	4,300		
Mustard	1.2	234	149	7,573		
Total				**61,306**	**12,150**	**49,156**

Table 33: Income from existing allied activities

Activities	No. of units	No. of Units Sold	Income (Rs.)	Expenses related to activities (Rs.)	Net Income (Rs.)	Remarks
Piggery	2	2	18,468	3,396	15,072	96% farmers sell pig
Poultry	12	12	2,696		2,696	75% farmers sell poultry
Fishery (no. of units sold in kg)	0.28 acre	162	10,000		10,000	12% farmers sell fish
Goatery	4	4	5,872		5,872	33% farmers sell goat
Dairy (no. of unit sold in litre)	3	220	7,400		7,400	9% farmers sell milk
Total			**44,436**	**3,396**	**41,040**	

Table 34: Proposed increase in income from allied activities

Activities	No. of units	No. of Units Sold	Income year 1(Rs.)	Expenses related to activities year 1 (Rs.)	Net Income Year 1 (Rs.)	Income year 2 (Rs.)	Expenses related to activities year 2 (Rs.)	Net income Year 2 (Rs.)
Poultry	12	12	2,696	0	2,696	2,696	0	2,696
Piggery (piglet fattening)*		15	2,04,000	1,60,950	43,050	2,04,000	1,60,950	43,050
Fishery	0.28 acre	600	72,000	4,714	67,286	72,000	4,714	67,286
Goatary-	4	4	5,872		5,872	5,872		5,872
Dairy	430 lactating days for two cows providing 10 litre per day@Rs.35 per litre for one year. Capital cost (cow-shed, calf-pen, cost of two cows@Rs.30,000. cost of chaff cutter, cost of transportation, cost of dairy appliances) of Rs.1,04,000 is included in the expenses with recurring cost of Rs.55,430 in first year and Rs.64,490 in second year.	4,300	1,50,500	1,59,430	-8,930	1,32,300	64,490	67,810
	Total		**4,35,068**	**3,25,094**	**1,09,974**	**4,16,868**	**2,30,154**	**1,86,714**

* Please refer annexure 1

Table 35: Income from existing non-Farm based activities

Activities	Number of days	Income (Rs.)	Remarks
Weaving	128	36,083	36% of total HHs are engaged with weaving activity

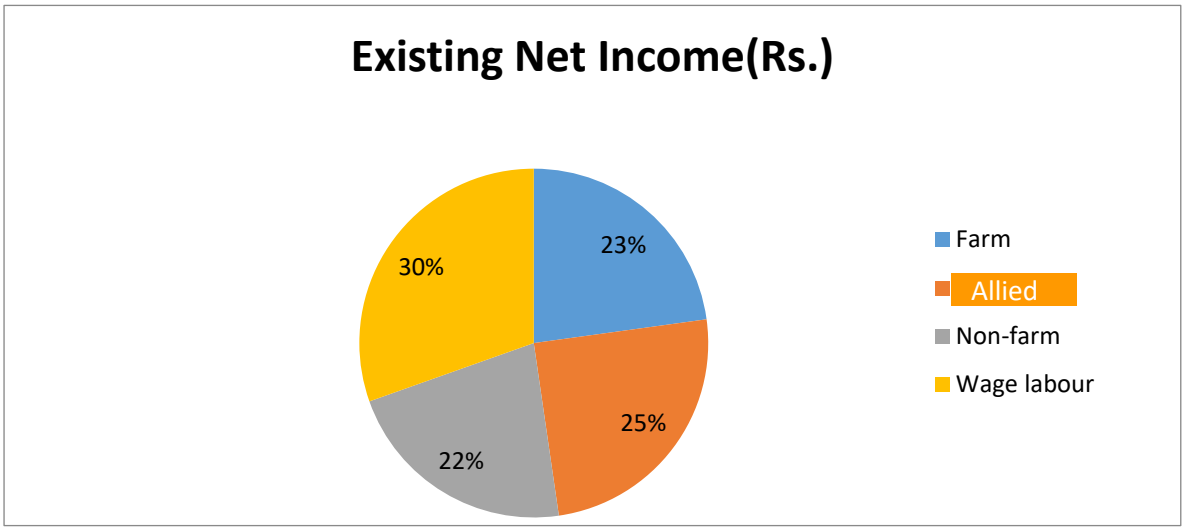
Table 36: Proposed increase in income from non-farm activities

Activities	No. of days	Income (Rs.)
Eri yarn selling @Rs.2350. 1 kg cocoon gives around 800 gram of yarn. Eri cocoon produced from 0.28 acre is 7.8 kg. Total yarn produced from 3.9 kg is 6.24 kg		14,664
Weaving	128	36,083

Table 37: Existing wage labour activities

Activities	Number of days	Income (Rs.)	Remarks
Non-Agriculture Wage labour	102	26,800	15% farmers are engaged in non-agriculture wage labour
Migratory wage labour	96	23,392	42% farmers are engaged in migratory wage labour

	Farm	Allied	Non-farm	Wage labour	Total
Existing Net Income **(Rs.)**	37,646	41,040	36,083	50,192	1,64,961
Increased Net Income (Rs.)	49,156	1,86,714	50,747	50,192	3,36,809



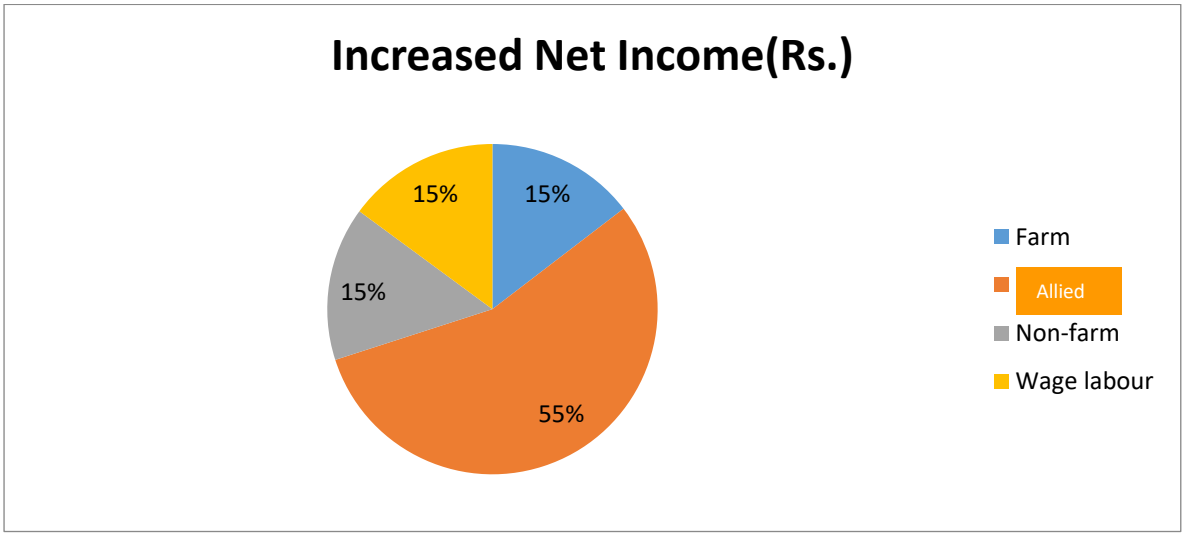


Table 38: Social class wise comparative livelihood basket

	Land holding (acre)			Farm income (Rs.)			Income from allied activities(Rs.)			Non-farm income (Rs.)			
	Agriculture	Homestead	Leased in	Existing Net Income	Possible Increased Net Income	%increase	Existing Net Income	Possible Increased Net Income	% increase in income	Existing Net Income	Possible Increased Net Income	%increase in income	Income from Wage Labour(Rs.)
ST (Mishing)	2.57	0.9	4.2	37,646	49,156	30.57	41,040	1,86,714	354.96	36,083	50,147	39	50,192
OBC	1.48	0.45	2.45	1,05,023	1,10,999	5.69	41,196	2,03,034	392.85	11,000	11,000	-	

Analysis of social class wise livelihood basket-Dhemaji

In the livelihood basket of OBC farmers vegetable contributes maximum from farm based activities followed by Areca nut, paddy, mustard and black-gram. Unlike other districts OBC farmers of Dhemaji are found engaged with pig rearing activity. The major income from off-farm activities comes from piggery and fisheries. Income from weaving also contributes in the livelihood basket of the OBC farmers. Due to their engagement in diversity of activities in farm and off-farm, they do not work as wage labour.

As the existing livelihood basket has more diversity in off-farm activities hence the income can be increased multi-fold with intervention around dairy, fisheries and piggery. In fact, any two of the off-farm activities can easily increase farmers' income more than two times.

For Mishing Tribe, paddy is the major agriculture commodity followed by maize and mustard in the livelihood basket. In off farm activity, the community is engaged with piggery, fishery and dairy and earns the income in same proportion. Income from weaving is one of the major contributors from non-farm activities for Mishing community. The community also earn income from wage labour activity. Farmers' income can be increased by introducing any two interventions viz. fattening of 15 piglets, applying scientific methods of pond based culture fisheries and introducing two crossbred cows.

Section Summary

Dhemaji District is one of the districts situated in the remote corner of Assam. The district lies on the northern bank of river Brahmaputra. The district has over 90% of the population that is rural. 47% of the districts population is tribal out of which the Mishing community is the predominant tribe residing in the district. The district also comprises of OBCs, while Muslims and Christians make up a minority of the district.

Dhemaji is a flood prone district, and the occurrence of floods is a regular feature. However, the entire district does not suffer from this condition. 27% of the net cropped area is flood affected. The riverbeds are generally higher than the level of land.

Agriculture is the main activity that engages 59% of the districts population. While paddy is a major crop cultivated in the district, Mustard, an oil seed crop, along with potato and pulses are also cultivated in the district. The majority of the districts cultivable area is largely rain-fed. Organic cultivation practices of crops and vegetables are natural and is practiced in large area in the district of Dhemaji.

As the district comprises of a significant tribal population, piggery is a widely practiced off-farm activity amongst the tribal community and with some OBC community as well. However, the constant occurrence of floods have resulted in the loss of pigs and other livestock for all communities.

Another livelihood activity which is typical to tribal tradition is sericulture. Dhemaji occupies a unique place in the production of the three different kinds of silks - Pat, Muga and Eri - which have a very high demand in the national and international markets. Muga silk (*Antheraea assamensis*) and Eri silk worm rearing (*Samia cynthia ricini*) and production of silk yarn and fabric is wide spread amongst the people of Dhemaji. Weaving is also practiced as a livelihood vocation as it too is an integral part of tribal culture in Dhemaji.

The district has a poor connectivity of roads, and is also poorly connected in terms of finance and credit linkage. Based on the discussion with the local people, approximately 80% of villagers have taken loans, however, these are largely through middlemen as they are easily accessible which is not the case with bank or micro-finance institutions. This indicates the high requirement of credit in the district but a low rate of financial inclusion.

3.6 Nagaon

3.6.1 District Overview

The district of Nagaon in Assam is located in the centre of the state of Assam. The district area spreads across 3,831 Square Kilometres of land area. The district topography comprises of plain areas largely, however in the few peripheral areas of the state, the terrain is hilly (especially the area bordering the neighbouring districts of Karbi Anglong). The Brahmaputra river flows along the northern periphery of the district. The district is bordered by the districts of West and east Karbi Anglong, Sonitpur, and Golaghat. The district is one of the oldest district in the state of Assam. The administrative district came into being in the year 1832. The erstwhile jurisdiction of Nagaon was much larger, however, a large chunk of the Naga Hills, the Mikir Hills and North Cachar Hills were later separated from the district.

The district of Nagaon historically has a high rate of inward migration of various communities. This has resulted in a large variety of livelihood practices in the district due to the community based livelihood practices.

The district was largely ruled by the Ahom Kingdom before the British Empire. The Ahomi culture and tradition is still deeply entrenched in the people of Nagaon. The district is home to the birth place of Sankardeva, the great saint of the Bhakti movement era was born at Bordowa, at a distance of 15 Kilometres from the district headquarters town.

The current demography of Nagaon largely comprises of Bengali Muslims, Assamese Muslims, Bengali Hindus, and Assamese Hindus. A little over half of the population in the district are Muslim. A sizeable section of the Hindus are Vaisnavite. In spite of the dominant population of Nagaon largely being Muslim and Hindu, there is also a sizeable population of Assamese tribes in the region. Tiwas and Karbis are the most prevalent tribes in the district of Nagaon, followed by Bodos, and a few Dhimasa, and Nagas. Nagaon district of Assam has total population of 2,823,768 as per the Census 2011. 13.1% people lives in Urban areas while 86.9% lives in the Rural areas.

Caste-wise Population - Nagaon district

Schedule Caste (SC) constitutes 9.4% while Schedule Tribe (ST) were 4.1% of total population in Nagaon district of Assam.

Table 39: Caste-wise population - Nagaon district

	Total	Male	Female
Schedule Caste	2,66,350	1,36,473	1,29,877
Schedule Tribe	1,15,153	57,759	57,394

Table 40: Religion-wise population - Nagaon district

Religion	Total		Male	Female
Hindu	12,25,246	43.39%	6,23,923	6,01,323
Muslim	15,63,203	55.36%	7,97,294	7,65,909
Christian	26,844	0.95%	13,582	13,262
Sikh	3,036	0.11%	1,575	1,461
Buddhist	1,073	0.04%	555	518
Jain	1,162	0.04%	611	551
Other Religion	61	0%	27	34
No Religion Specified	3,143	0.11%	1,545	1,598

The district has been the meeting ground of diverse ethnic groups, cultural streams since time immemorial. Throughout history, the district has always had a high rate of inward migration of people from various neighbouring landscapes. Inward migration in the recent past, include people largely from Bihar, West Bengal, and Bangladesh.

Table 41: Geographical area of Nagaon 3,993 sq. km.

Geographical Area	3,993 sq km
Forest Area	3,831 Ha.
Net sown area	2,34,633 Ha.
Total Cropped Area	3,54,801 Ha.
Area Sown more than once	1,20,168 Ha.

Source: http://nagaon.nic.in/glance.html

The climate of the district is generally humid subtropical (hot and wet in summer and dry and cool in winter). The humidity varies from 60-90%. The district receives mean annual rainfall of 1,300 mm. The monsoon of the district commences from March and the intensity gradually increases up to August and then declines to the minimum during November and December. The maximum temperature rises up to 38 degrees centigrade in July-August and minimum fall to 8 degrees centigrade in January.

Nagaon district is rich in natural resources. Geologically the soil in the district of Nagaon is sandy new alluvium.

The share of net sown area to the total geographical area amounts to a little above 57 percent, and witnessing a low cropping intensity, about 58 percent of the net sown area is sown more than once. Primarily due to high population density, the percentage of fallow land in the district is considerably low.

3.6.2 Commodities Overview

Agriculture and Horticulture:

Paddy is the crop that is cultivated in majority by the entire rural population of Nagaon. The farmers here cultivate paddy twice a year (winter and monsoon). Jute is the second largest crop cultivated in Nagaon, however, it is mostly cultivated by migrants with small landholdings. Additionally, the farmers are also engaged in vegetable cultivation, however, in large part this is restricted to homestead garden cultivation. Cauliflower, Brinjal, Okra, Tomatoes, Potatoes, Cabbage, Chilly, and Radish are some of the major vegetables cultivated in Nagaon.

Banana has been growing in popularity as a horticulture produce in the recent past. Banana is closely followed by coconut cultivation. Additionally, Litchi, Pineapple, Assam Lemon, and Jackfruit are some of the other horticulture products cultivated in Nagaon.

The district of Nagaon also has a high production rate of Areca nut and Betel leaf, however, most production is cultivated in homestead gardens for self-consumption.

Jute is cultivated by most of the minority and migrant population. However, jute cultivators are at a very primary rung of the value chain as they are at the mercy of moneylenders and middlemen who dictate the price. This highlights the urgency of the need of farmer-owned collectives to be formed so as to acquire fair prices directly from the jute mill.

Jute

Nearly 80,000 farmers are engaged in jute cultivation in Assam and the annual production of jute fibre is 1.3 lakh tonnes. A Jute Research Centre has been set up at Dhing of Nagaon district of the state to explore the potentialities of jute production in Assam.

70 per cent of the state's jute farmers grow the fibre on 2 to 4 bigha plots, while the rest grow it on 5 to 8 bigha plots. But barring a very negligible percentage, most of the farmers are in the grip of moneylenders and middlemen, who, in turn, dictate the price of jute in the market.

Jute researcher and Guwahati College lecturer Apurba Kumar Das mentioned- besides the involvement of middlemen and touts at the trading level, a practice called dadani[27] in jute producing districts is also seen eating up a lion's share of the profits of the state's poor jute growers.[28]

Livestock and Fisheries:

Nagaon is considered to be the fish capital of the North-Eastern region of India. The district of Nagaon also has the largest fish market in the North-East of India. Fisheries is practiced by all communities that reside within the rural district of Nagaon. However, it is largely practiced by farmers with adequate land holdings.

[27] *Farmers often took loans from moneylenders to purchase seeds and in return, the latter takes control of the crops and reaped the profits, while paying the former a lump sum. This age-old system, in which farmers sell their produce to moneylenders at a predetermined rate, is called dadani*

[28] https://www.telegraphindia.com/1120109/jsp/northeast/story_14976672.jsp

Nagaon district produces roughly 14,000 MT of fish in a year which is about 9% of the total production in the state. It is estimated that 95% of the population consume fish. This would estimate the total requirement of fish in the district in a year at about 23,000 MT. There is a visible dominance of imported fish in the organized markets.

Dairy

The people in rural areas of the district have long tradition of maintaining cows and buffaloes. The production of milk is 1.5 litre/day. The low productivity of the dairy animals is apparently due to poor genetic character of the local cows. There is high preponderance of small holdings in the district. Considering the demand and supply gap in the district, there is ample scope for development of this activity in the district, particularly in rural areas adjacent to urban and semi-urban areas.

Handloom

The handloom industry is the most important cottage industry in Assam with a glorious past. It is closely associated with art and culture of the society. Mahatma Gandhi made no exaggeration when he remarked "Every woman of Assam is a born weaver. No Assamese girl can expect to become a wife if she does not weave. And she weaves fairy tales. Some of the old patterns were of matchless beauty". Weaving is a traditional activity of the state.

Nagaon district presents a unique picture in the Handloom and Textile sector. Weaving of fabrics is a way of livelihood of large number of rural families and artisans. Looms are part and parcel of rural households and weaving is an integral part of rural livelihood. However, this important sector is yet to be explored commercially. It needs to be kept in mind that hitherto weaving is only a part time activity, and not the primary bread earning activity. As a result, Handloom has not been able to develop to its fullest potential. It is proposed that the inherent advantage which women have in weaving skills shall be leveraged upon. It is felt that demand for the products already exists.

Jajori, which is located about 17 Km from Nagaon town is a very important centre of handloom production. Famous for its "Kacha Pat" products, there are approximately 6,705 weavers here covering most of the families of the region. Considering its importance, the government has established a Handloom Production Centre at Jajori. The area has immense potential by way of organising, modernisation, training and providing adequate marketing linkages. It is proposed to use the SHG method here to develop its inherent advantage fruitfully.

Despite Nagaon being the highest fish producing district in Northeast India, it faces a supply demand gap of 9,000MT which is supplemented by states like Andhra Pradesh.

Handicrafts

Handicraft is an important cottage and household industry sector, which is largely emphasised for providing self-employment opportunities in the rural areas to supplement/augment their earnings. The focus may be given to development of (1) Kuhila craft (2) Pottery & Terracotta (3) Jute, Cane & Bamboo products (4) Rantholi Jewellery.[29]

3.6.3 Sector/Sub-sector/Commodities wise findings

(Findings based on FGDs, stakeholders' interviews and observation)

Agriculture

Paddy, Mustard, Areca nut (*Areca catechu)*, Assam Lemon (*Citrus Limon*), Maize, Sugarcane, Brinjal, and Caulifower are some of the commodities which are in a large-scale production in Nagaon. Farmers usually have marketable surplus of the aforementioned crops that are cultivated. There are some local private companies that are involved in the processing of paddy in the Kaliabohr block of Nagaon. Banana has been recently undertaken as a horticultural commodity in Kaliabohr and it has scope of increased production. Black gram is one of the major commodities in Northern Assam that is cultivated by most of the farmers. It is understood during the interaction with the farmers that while they usually have marketable surplus of black gram but since they do not have access to mainstream market the marketable surplus is sold to the market intermediaries who provide sub-optimal price. It was also reported by the farmers as well as by the officials at district and block level that majority of the traders who are engaged in the trading of black gram are from Uttar Pradesh and Bihar. This gives an impression that local traders are not well aware of market dynamics of black gram.

Jute is another commodity which is undertaken by the farmers in Nagaon. The district has a Jute mill also but the farmers are limited to primary level of Jute value chain by selling the Jute fibre alone, therefore, the returns are also sub-optimal. There is scope of better returns through value addition if the farmers can make ropes and other handicrafts from Jute. The farmers up until now have not forayed in this direction due to lack of skill as well as lack of knowledge about the market.

During the FGD at village Mukoli (Batadrava block), an aquatic plant Kuhila was found in abundance. The villagers use the stem of the plant to make paper like matter which they further use in making toys and other decorative items.

[29] http://nagaon.nic.in/econ.html

Sola or Kuhila is a plant, growing wild in marshy waterlogged areas. The biological name of shola is (*Aeschynomene indica* or *Aeschynomene aspera)* (bean family) and is an aquatic plant. The shola pith is the cortex or core of the plant and these inner soft milky-white and spongy materials are almost similar to "Thermocol", artificially produced in a laboratory. However, sholapith is much superior to thermocol in terms of malleability, texture, lustre and sponginess and is preferred by the artisans.

Kuhila is an aquatic plant found in Nagaon which is used extensively in handicraft and artisan work of the district. The value addition of Kuhila for artisans must be explored by the state government.

Roha and Kaliabohr blocks have been affected by floods in 2017, however, this is not regular, and has occurred for the first time in 36 years[30] . The average landholding of farmers in the district of Nagaon is 0.8 hectares. Only 27% of the agricultural land in Nagaon is irrigated, while the rest still remain highly dependent on monsoon spells which is erratic in terms of timeliness. The average rainfall in the district of Nagaon is 1,300 mm[31]. Groundwater level in Nagaon is up to 200 meter[32]. This indicates that the district is not starved of water, but lacks adequate irrigation facilities. Unavailability of electricity adds on to the problem of irrigation in the district. Road connectivity in Nagaon is poor. The recent floods have only worsened the road conditions. The lack of road connectivity and other transport facilities for their produce has compelled the farmers to find remain dependent on the traders at farm-gate and receive sub-optimal price of their produce.

As discussed with the officials of the Department of Agriculture, around 60% of farmers in Nagaon still practice traditional farming methods. However, the agriculture department is involved in training and overall capacity building of farmers in modern scientific agricultural techniques. Many farmers have not yet adopted scientific methods of fertilizer and pesticide application. Based on the interaction with the farmers during FGD, it was understood that farmers need more on field support for which the agri-extension system needs to be improved.

The Assam State Agriculture Marketing Board (ASAMB) has made several attempts to encourage local villagers to sell their produce collectively to private players, but have faced fierce competition from traders at the local level. Traders compete with ASAMB through competitive pricing to ensure that the villagers continue selling to them. The Marketing Board is now undertaking a new initiative by trying to establish online markets for the villagers to trade. While this is good initiative but ASAMB requires more fund to scale it up at state level.

Kuhila garland

[30] *Nagaon, Morigaon, Sonitpur and Biswanath districts are experiencing the worst floods in over 36 years with the Brahmaputra submerging more places: https://www.telegraphindia.com/1170815/jsp/northeast/story_167262.jsp*
[31] *http://nagaon.gov.in/geog.html*
[32] *http://www.cgwb.gov.in/District_Profile/Assam/Nagaon.pdf*

Emerging Farmers Producer Organization (FPO) in Nagaon:

Soudo Assam Pathar Porichalan Parishad (SAPPP) is an NGO in Nagaon which has been working to collectivize farmers and have registered the collective as Farmers Producer Company in 2015. The Secretary General of the NGO, Mohammad Anwar Hussain states that the FPC Sankarazan Agro Producer Company has 600 farmers as members. The FPC is largely focussing on Potato value chain. They have a tie-up with Pune based Siddhivinayak Agri Processing Pvt. Ltd. to procure quality potato seeds for the member farmers. The FPC also has buy-back agreement with the company for harvested potato. The FPC also work on maize in a relatively smaller volume. Other important activity of the FPC is trading of seeds and fertilizers for which they have obtained trade license. It is planned to increase the number of farmers by 1,000 and engage the FPC in seed production activity. According to Mr. Anwar the annual turnover of the FPC in Rs.30 lakh.

Fisheries:

Fisheries is one of the other vocations that have recently witnessed a surge of popularity as a vocation amongst several farmers in Nagaon. Recently, some progressive farmers have taken initiatives and demonstrated good income from the activity which has encouraged many other farmers to take up fisheries as livelihood activity. There has not been any religious or communal reason for not cultivating fish.

Pakhimoria, Botodorba, Kaliabor, Baijgaon, Lao Khwa, Jhuria, and Binakandi are the blocks within the district of Nagaon that are heavily engaged in fish cultivation.

Rohu, Catla, Mrigal, are the most common fish that are cultivated within the district of Nagaon. These are also the species of fish which are currently produced as a marketable surplus. The department has also initiated Pomfret cultivation, however, it has not yet reached a marketable surplus limit, but does have immense potential for it. Cultivation in 1 acre yields 20-25 quintals per year. As discussed with the fisheries department, the aforementioned blocks in the district of Nagaon cultivate fish in several water bodies available to them. 5,787 ha of ponds and tanks, 8,000 ha of Beel, 2,825 ha rivers, 2,354 ha of low lying areas (seasonal), 30,000 ha of paddy fields (seasonal), and 870 ha of road side canals are all used for fish cultivation. In total 73,490 ha (peak monsoon season) are used for fisheries within the district of Nagaon.

Most farmers practice fisheries in a very simple manner. While the farmers have shown enthusiasm towards fisheries as a livelihood activity but the pond based culture fisheries adopted by them is far from being ideal. It results into low yield as they try to go for intensive fisheries in pond which ultimately results into mortality and production of small size fish.

In spite of the large water bodies available for fisheries during the peak monsoon season, it shrinks drastically during the summers. The farmers have accordingly adopted fisheries based on the seasons. For instance, the farmers harvest table size fish at the beginning of the winter season. However, from winter till the summer ends, the farmers harvest fry and fingerling size fish.

Non-Timber Forest Produce:

Kaliabohr and Lao Khwa are the only 2 blocks within the district of Nagaon that border forest areas (Kaziranga National Park).The Karbi community is involved in the collection and harvest of NTFPs in Kaliabohr, however, their harvesting techniques have been unsustainable and harmful to the forest region. Due to which there is a growing need for scientific technique and skill induction within these communities.

Transit rules, such as the transit permit restrictions imposed by the Forest Department on all forest products has been stifling to several potential enterprises in Nagaon. For instance, RIMCO (matchstick producing unit) based in the district of Assam, was shut down due to the stringent imposition of transit legislation. The Forest Department has been actively trying to initiate buy back agreements between the forest dwelling communities and private ayurvedic companies in the region such as Patanjali, however it hasn't worked out as Patanjali was focused on contract farming of their raw material instead of sourcing it from the communities directly.

Sericulture and Weaving:

Eri silk cocoon cultivation is carried out in the villages by some tribal HHs. These cocoons are used to weave silk cloth products like Mekhela chador, Gamochas, handkerchiefs, etc. Mekhela chador, Gamocha are traditional clothes of Assam. A Mekhela chador is sold at 2,500 rupees per piece, shawls at 4,000 rupees per piece by the villagers. Traders purchase these materials from the village directly. Silk cultivation in its current form is adequate for the self-use and consumption, however, there is potential to increase this production if there were more trees. Silkworm are provided to the villagers at a 100% subsidised rate to the villagers by the sericulture department.

It was observed during the visit that there are instances of formation of collectives related to production of handloom (viz. initiative of Assam SRLM in Raha block). These collectives have gained access to loans via SHGs and invested in the construction of weaving units and handlooms. There is also stiff competition from private cottage industries that have set up their units in villages. These private cottage industries are competitive, and have the means to produce larger quantities of woven cloth, as they do have a higher number of labourers and capital. They also possess the capability to invest in the purchase of higher quality yarn from Guwahati, and still sell their products at a competitive price in the market. This is a severe challenge for many tribal households and collectives, as they do not possess the means to purchase high quality yarn and still be competitive in their pricing.

In addition to this, many collectives are not aware of the market supply and demand chains. Most tribal and SHG based weavers do not have a robust business model upon which they can base their production rate. In most part, many of the tribal and SHG weavers have not considered the plantation of Castor trees for cultivation of silk yarn within their lands. If the weavers are engaged in cocoon to yarn production, it would remove the need for the weavers to purchase expensive yarn from neighbouring places like Guwahati, and would also reduce their production cost substantially.

3.6.4 Social class wise livelihood basket

Social Class: Muslim	
Average agriculture land (acre)	0.45
Average homestead land (acre)	0.34
Average leased in land (acre)	0.74

Table 42: Income from existing farm based activities

Commodities	Land used (in acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure (Rs.)	Net Income (Rs.)
Paddy	1.1	1,878	950	11,342	10,675	39,069
Areca nut	0.09	300	260	6,402		
Jute	0.71	1,000	1,000	32,000		
Total				**49,744**	**10,675**	**39,069**

Table 43: Proposed increase in income from farm based activities

Commodities	Land used (in acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure (Rs.)	Net Income (Rs.)	Remarks
Paddy (SRI)	1.1	2,817	1,425	15,425	Expenditure of SRI paddy is factored in the income	46,461	100% farmers are selling paddy
Areca nut	0.09	300	260	6,402	7,366		50% HHs are selling Areca nut
Jute	0.71	1,000	1,000	32,000			80% HHs are selling Jute
Total				**53,827**	**7,366**	**46,461**	

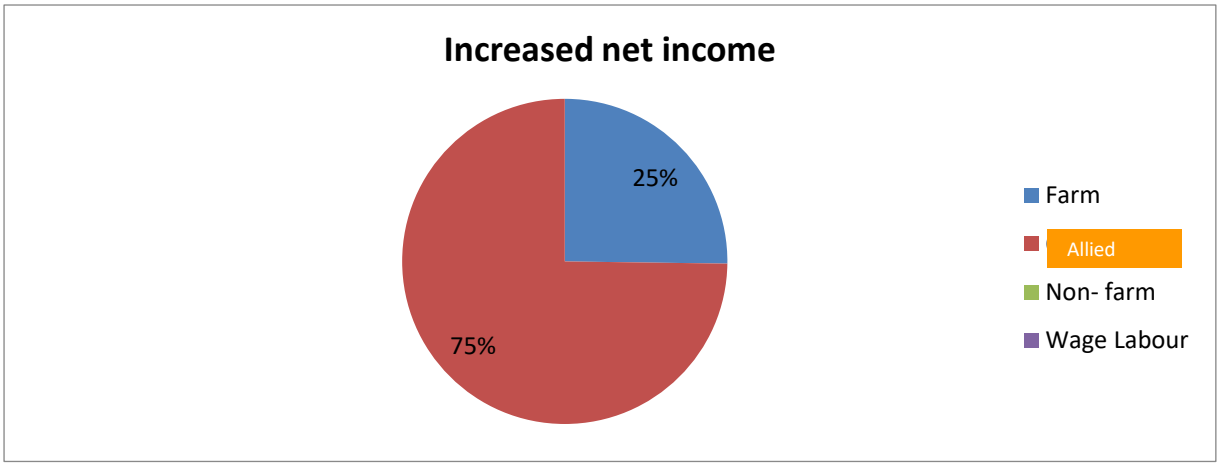
Table 44: Income from existing allied activity

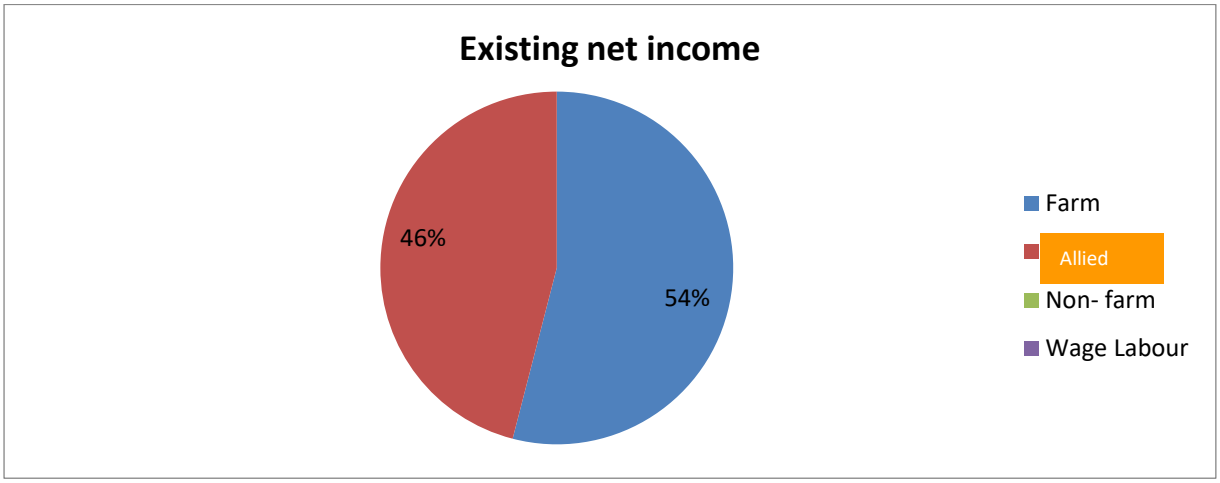
Activities	No. of units	No. of Units Sold	Income (Rs.)	Expenses related to activities(Rs.)	Net Income (Rs.)	Remarks
Poultry	11	9	2,689		2,689	70% HHs are selling birds
Fishery	0.28 acre pond	270	32,400	1,842	30,558	85% HHs are selling fish
Total			35,089	1,842	33,247	

Table 45: Proposed increase in income from allied activity

Activities	No. of units	No. of Units Sold	Income year 1(Rs.)	Expenses related to activities year 1(Rs.)	Net Income Year 1(Rs.)	Income year 2(Rs.)	Expenses related to activities year 2(Rs.)	Net Income Year 2(Rs.)
Poultry	11	9	2,689		2,689	2,689		2,689
Fishery	0.28 acre pond	600 kg	72,000	4,714	67,286	72,000	4,714	67,286
Dairy	430 lactating days for two cows providing 10 litre per day @ Rs.35 per litre for one year. Capital cost (cow-shed, calf-pen, cost of two cows @ Rs.30,000. cost of chaff cutter, cost of transportation, cost of dairy appliances) of Rs.1,04,000 is included in the expenses with recurring cost of Rs.55,430 in first year and Rs.64,490 in second year.	4,300 litre	1,50,500	1,59,430	-8,930	1,32,300	64,490	67,810
	Total		**2,25,189**	**1,64,144**	**61,045**	**2,06,989**	**69,204**	**1,37,785**

	Farm	Allied	Non- farm	Wage Labour	Total
Existing net income(Rs.)	39,069	33,247			72,316
Increased net income(Rs.)	46,461	1,37,785			1,84,246





Social Class: General	
Average agriculture land (acre)	0.68
Average homestead land (acre)	0.17
Average leased in land (acre)	1.3

Table 46: Existing farm based activities

Commodities	Land used (in acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure (Rs.)	Net Income (Rs.)	Remark
Paddy	2	2,657	2,337	28,248	12,574	26,067	100% HHs are engaged with paddy cultivation and selling
Pulses	0.6	311.6	261.6	6,636			22% HHs are selling pulses
Areca nut	0.08	357	297	3,757			63% HHs are engaged with selling Areca nut
Total				**38,641**	**12,574**	**26,067**	

Table 47: Proposed increase in income from farm based activities

Commodities	Land used (in acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure (Rs.)	Net Income (Rs.)
Paddy (SRI)	2	3,985.5	3,505.5	38,417.28	Expenditure of SRI paddy is factored in the income	44,303
Pulses	0.6	311.6	261.6	6,636	4,507	
Areca nut	0.08	357	297	3,757		
Total				**48,810**	**4,507**	**44,303**

Table 48: Existing income from allied activity

Activities	No. of units	No. of Units Sold	Income (Rs.)	Expenses related to activities (Rs.)	Net Income (Rs.)	Remark
Dairy (unit of selling in litre)	2	340 litre	12,200	1,550		19% of the total HHs are selling milk
Fishery	0.28 acre pond	450 kg	45,000	5,052		7% of the total HHs are selling fish
Total			**57,200**	**6,602**	**50,599**	

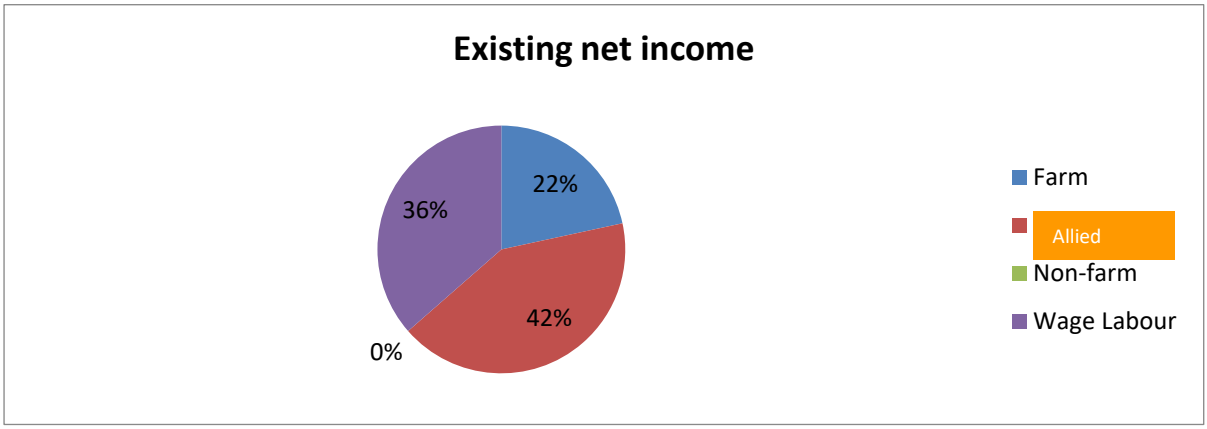
Table 49: Proposed increase in income from allied activity

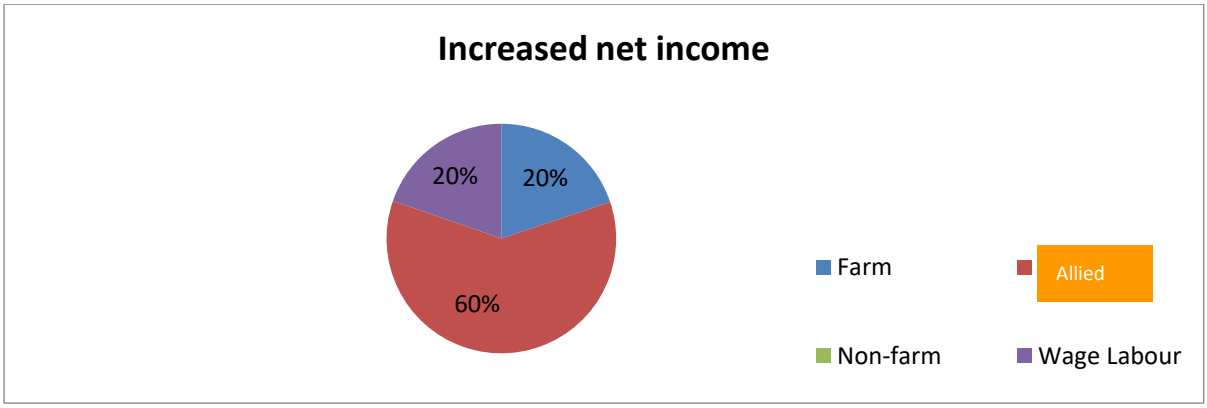
Activities	No. of units	No. of Units Sold	Income year 1 (Rs.)	Expenses related to activities year 1 (Rs.)	Net Income Year 1 (Rs.)	Income year 2 (Rs.)	Expenses related to activities year 2 (Rs.)	Net Income Year 2 (Rs.)
Fishery	0.28 acre pond	600 kg	72,000	4,714.0	67,286	72,000	4,714.0	67,286
Dairy	430 lactating days for two cows providing 10 litre per day@Rs.35 per litre for one year. Capital cost (cow-shed, calf-pen, cost of two cows@Rs.30,000. cost of chaff cutter, cost of transportation, cost of dairy appliances) of Rs.1,04,000 is included in the expenses with recurring cost of Rs.55,430 in first year and Rs.64,490 in second year.	4,300 litre	1,50,500	1,59,430	-8,930	1,32,300	64,490	67,810.0
	Total		**222500**	**1,64,144**	**58,356**	**2,04,300**		**135096**

Table 50: Existing income from wage labour based activities

Activities	Number of days	Income(Rs.)
Agriculture wage labour	49	10,593
Non-Agriculture wage labour	149	33,357
		43,950

	Farm	Off farm	Non-farm	Wage Labour	Total
Existing net income(Rs.)	26,067	50,599	0	43,950	1,20,616
Increased net income(Rs.)	44,303	1,35,096		43,950	2,23,349





Social Class: OBC	
Average agriculture land (acre)	0.8
Average homestead land (acre)	0.17
Average leased in land (acre)	1.5

Table 51: Existing farm based activities

Commodities	Land used (in acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure (Rs.)	Net Income (Rs.)	Remark
Paddy	1.7	2,134	1,492	18,062	13,050	45,311	53% of the total HHs are selling paddy
Pulses	0.5	329	276	9,244			18% of the total HHs are selling pulses
Vegetables	0.45	681.5	634	9,925			11% of the total HHs are selling vegetables
Areca nut	0.14	481	388	4,753			47% of the total HHs are selling Areca nut
Jute	0.48	426	426	12,709			13% of the total HHs are selling Jute
Coconut (in piece)		62	48	3,668			13% of the total HHs are selling coconut
Total				**58,361**	**13,050**	**45,311**	

Table 52: Proposed increase in income from farm based activities

Commodities	Land used(in acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure (Rs.)	Net Income (Rs.)
Paddy (SRI)	1.7	3,201	2,238	24,564.32	Expenditure of SRI paddy is factored in the income	57,438
Pulses	0.5	329	276	9,244	7,425	
Vegetables	0.45	681.5	634	9,925		
Areca nut	0.14	481	388	4,753		
Jute	0.48	426	426	12,709		
Coconut (in piece)		62	48	3,668		
Total				**64,863**	**7,425**	**57,438**

Table 53: Income from existing allied activity

Activities	No. of units	No. of Units Sold	Income (Rs.)	Expenses related to activities (Rs.)	Net Income (Rs.)	Remark
Poultry	10	7	1,596			20% of the total HHs are selling birds
Fisheries	0.08 acre pond	61 kg	6,100	1,973		6% of the total HHs are selling fish
Goatary	4	3	7,615			15% of the total HHs are selling goats
Dairy	2	372 litre	11,546	1,390		7% of the total HHs are selling milk
Total			**26,857**	**3,363**	**23,494**	

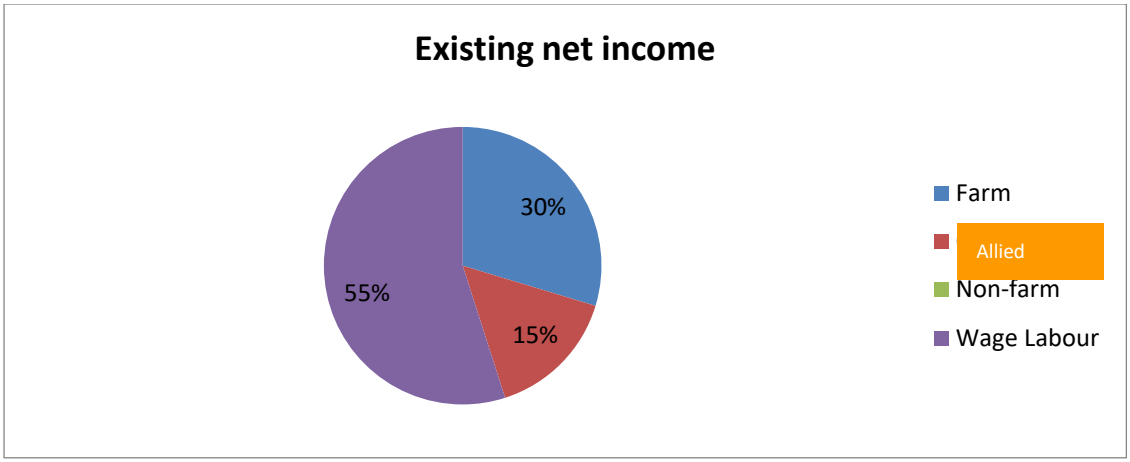
Table 54: Proposed increase in income from allied activity

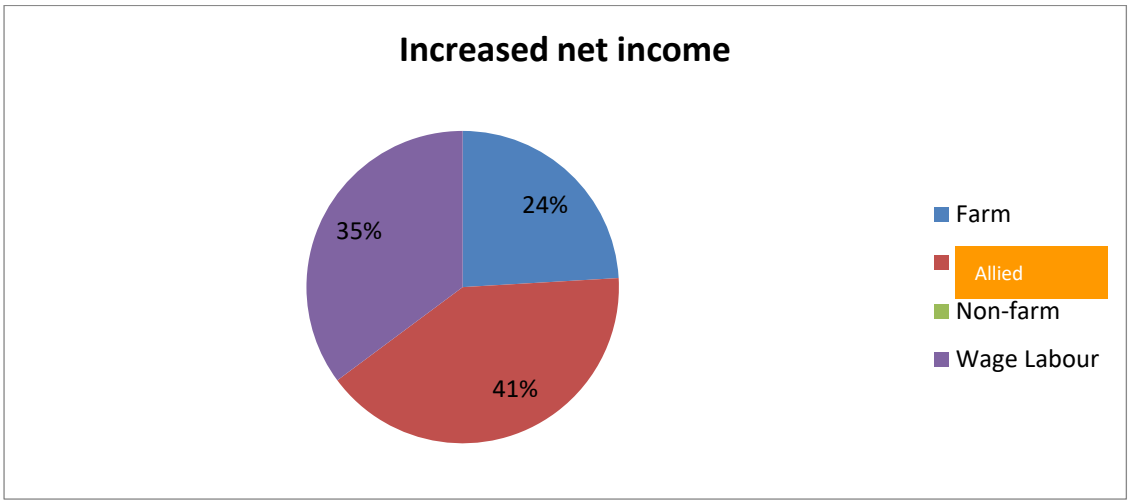
Activities	No. of units	No. of Units Sold	Income year 1(Rs.)	% of total income	Expenses related to activities year 1(Rs.)	Net Income Year 1(Rs.)	Income year 2(Rs.)	Expenses related to activities year 2(Rs.)	Net Income Year 2(Rs.)
Poultry	10	7	1,596			1,596	1,596.8	500	1,596
Fishery	0.08 acre pond	180	21,600		1,414.0	20,186	21,600	1,414.0	20,186.0
Goatery	4	3	7,615		0	7,615	7,615.3	0	7,615.3
Dairy	430 lactating days for two cows providing 10 litre per day@Rs.35 per litre for one year. Capital cost (cow-shed, calf-pen, cost of two cows@Rs.30,000. cost of chaff cutter, cost of transportation, cost of dairy appliances) of Rs.1,04,000 is included in the expenses with recurring cost of Rs.55,430 in first year and Rs.64,490 in second year.	4,300	1,50,500		1,59,430	-8,930	1,32,300	64,490	67,810.0
	Total		**1,81,311**		**1,60,844**	**20,467**	**1,63,112**	**66,404**	**97,207**

Table 55: Existing income from wage labour activities

Activities	Number of days	Income(Rs.)	Remark
Agriculture wage labour	74	16,022	30% of the total HHs are engaged with agriculture wage labour
Non-agriculture wage labour	151	34,576	39% of the total HHs are engaged with non-agriculture wage labour
Migratory wage labour	136	33,313	9% of the total HHs are engaged with migratory wage labour
	Total	**83,911**	

	Farm	Off farm	Non-farm	Wage Labour	Total
Existing net income(Rs.)	45,311	23,494		83,911	1,52,716
Increased net income(Rs.)	57,438	97,207		83,911	2,38,556





Social Class: Schedule Tribe (Tiwa)	
Average agriculture land (acre)	0.65
Average homestead land (acre)	0.2
Average leased in land (acre)	1.8

Table 56: Existing income from farm based activities

Commodities	Land used (acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure	Net Income	Remark
Paddy	1.8	1,899	953	9,985	16,711	15,899	59% of the total HHs are selling paddy
Pulses	0.6	500	360	10,874			16% of the total HHs are selling paddy
Areca nut	0.27	581	457	4,651			76% of the total HHs are selling Areca nut
Jute	0.42	240	240	7,100			7% of the total HHs are selling jute
Total				**32,610**	**16,711**	**15,899**	

Table 57: Proposed increase in income from farm based activities

Commodities	Land used (acre)	Average Production (kg)	Average Quantity sold (kg)	Income(Rs.)	Expenditure(Rs.)	Net Income(Rs.)
Paddy (SRI)	1.8	2848.5	1429.5	13,579.6	Expenditure of SRI paddy is factored in the income	27,471
Pulses	0.6	500	360	10,874	8,734	
Areca nut	0.27	581	457	4,651		
Jute	0.42	240	240	7100		
Total				36,204.6	8,734	27,471

Table 58: Existing Income from allied activity

Activities	No. of units	No. of Units Sold	Income	% of total income	Expenses related to activities	Net Income	Remark
Piggery	2	2	16,583		4,322	12,261	38% of the total HHs are selling pig
Poultry	10	6	1,322			1,322	59% of the total HHs are selling birds
Goatery	3	2	3,682			3,682	17% of the total HHs are selling goat
Total			**21,587**		**4,322.00**	**17,265**	

Table 59: Proposed increase in income from allied activity

Activities	No. of units	No. of Units Sold	Income year 1	Expenses related to activities	Net Income
Poultry	10	6	1322		1322
Piggery (piglet fattening)	15	15	2,04,000	1,60,950	43,050
Goatary	3	2	3681		36,81
	Total		**2,09,003**	**1,60,950**	**48,054**

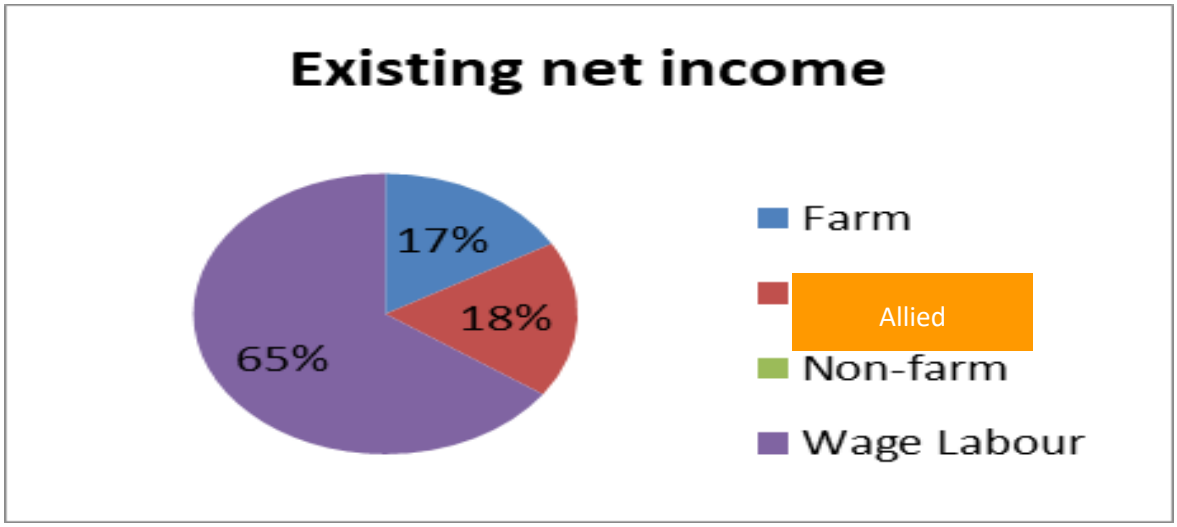
Table 60: Existing income from wage labour based activities

Activities	Number of days	Income	Remark
Agriculture wage labour	102	21,111	29% of the total HHs are engaged with agriculture wage labour
Non-Agriculture wage labour	179	41,242	54% of the total HHs are engaged with non-agriculture wage labour
		62,353	

Table 61: Increased income from non-farm activities

Activities	No. of days	Income
Eri yarn selling @Rs.2350. 1 kg cocoon gives around 800 gram of yarn. Eri cocoon produced from 0.28 acre is 7.8 kg. Total yarn produced from 7.8 kg is 6.24 kg		14,664
Total		**14,664**

	Farm	Off farm	Non-farm	Wage Labour	Total
Existing net income	15,899	17,265		62,353	95,517
Increased net income	27,471	48,054	14,664	62,353	1,52,542



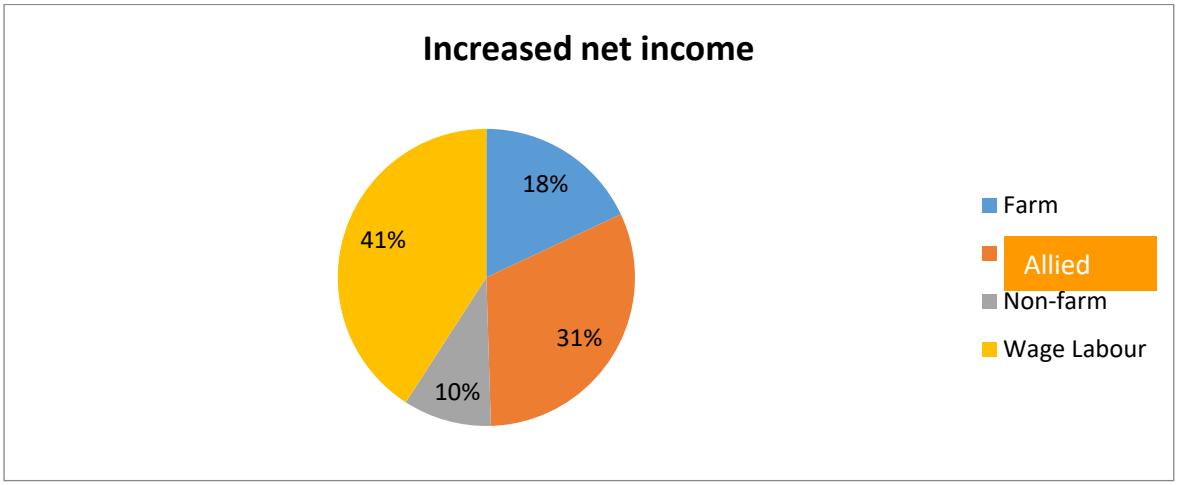


Table 62: Comparative social class livelihood basket of Nagaon

	Land holding (acre)			Farm income			Income from allied activity			Non-farm income			
	Agriculture	Homestead	Leased in	Existing Net Income	Possible Increased Net Income	%increase	Existing Net Income	Possible Increased Net Income	% increase in income	Existing Net Income	Possible Increased Net Income	%increase in income	Wage Labour income
Muslim	0.45	0.3	0.74	39,069	46,461	18.92	33,247	1,37,785	314.43				
General	0.68	0.17	1.3	26,067	44,303	69.96	50,599	1,35,096	166.99				43,950
OBC	0.8	0.17	1.5	45,311	57,438	26.76	23494	97207	313.75				83,911
ST (Tiwa)	0.65	0.2	1.8	15,899	27,471	72.78	17265	48054	178.33		14664		62,593

Analysis of social class wise livelihood basket-Nagaon

In Nagaon there is diversity of communities and the respective livelihood basket also reflects the same. Muslim community who have comparatively less agriculture land and generally take agriculture land on lease. As the income from agriculture is comparatively less, they are compelled to be engaged with Jute cultivation in addition to paddy to increase income.

As the agriculture land is limited so is the return from agriculture activities therefore the scope to increase income lies with allied activities. With the introduction of two cross-bred cows and adoption of scientific method of pond based culture fisheries there are potential to increase the income significantly. It requires intensive support from Animal Husbandry department, adoption of farmers to imbibe improved practices and it is also required that the NGOs should demonstrate the model for which government should create opportunities.

OBC class has diversity in terms of commodities in agriculture but the increase in net income is comparatively less. In off-farm section, the income can be significantly improved with the intervention in fisheries and dairy. It is imperative that the farmers get extension support from Animal Husbandry department so that they are able to adopt skills to rear crossbred cows and also improve fish production.

For general class, the income from off-farm can be comparatively more than farm based activities. The interventions in fisheries and dairy have enough potential to increase the existing income. The support from Animal Husbandry Department, farmers willingness to accept improved practices and role of NGOs to demonstrate the model are imperative to increase the farmers' income.

For ST (Tiwa) community also, possibilities of increase of income from off-farm activities are more than farm activities. Piglet fattening has good potential to increase the income significantly. It is very important that the Animal Husbandry department provides regular extension support to introduce crossbred variety of pigs. As such market is never a problem for pig within and in the neighbouring districts.

The suggested interventions increase farmers' incomes are very much in tandem with the culture of social class. Dairy and fisheries are recommended for general, OBC and Muslim but piggery and sericulture are exclusively recommended for Schedule Tribe community.

3.6.5 Fisheries Case Study:

Mr. Usman Ali, Pakhimoria, Nagaon, Mob.: +91 9678788902

Background

Mr. Usman Ali is a fish farmer in the Pakhimoria block of Nagaon district, Assam. He has been actively engaged in fisheries as his primary livelihood activity for 15 years. He is currently involved with 12 other fish farmers from the block of Pakhimoria in Nagaon district itself. As Usman and the rest of the fish farmers do not possess any fish pond by themselves, they have taken up a government beel on a 7-year lease through their cooperative society Murikolon Meen Palak Unnayan Committee. The lease will expire in the year 2020.

The size of the beel is an estimated 3 sq. km in the Pakhimoria block of Nagaon itself. The beel is currently leased out by the Fisheries Department under the district government initiative of promoting informal fish farmer collectives to rear fish as a livelihood activity. No private company can rear fish in these beels.

The fish fry that is introduced to the beel is done so in order to rear the fish to table size. The fish fry is purchased collectively from private hatcheries in the block of Dokmoka in Nagaon. All the fish sold by them are sold as table size fish only. In addition to input costs in the form of fish fry, the collective also invests in fish medicine for their produce. The group spends Rs. 25,000 on fish medicine which was procured from a private veterinary doctor in Nagaon itself. The summer season is when the requirement of fish medicine is at its peak as high temperatures result in low oxygen levels in the beel which then results in a greater degree of fish diseases. The collective only uses veterinary doctor prescribed medication for their produce. The group also invests in fish feed for their produce of fish. On average they invest Rs. 75,000 on fish feed per year. The feed used is a by-product sourced from Mustard.

The farmers' collective rears Rohu, Catla, Mrigal, Grass Carp and Silver Carp. Out of the 200 quintals of fish fry introduced to the beel, the cooperative harvests 160 quintals of table size fish. On an average the size of table fish harvested from the beels vary between 1 to 3.5 kg, depending on the variety of fish.

The entire produce of the cooperative is sold in the Nagaon fish market itself.

Challenges and proposed intervention

- Usman Ali and his collective face challenges with regards to the date of the payment of the government lease. As the financial year closing and beginning is scheduled from April to March, it is not the best time for harvesting of fish. As the fish farmers are compelled to pay the annual lease at this time, they are forced to harvest part of their supply (wherein table fish weigh 1 kg per fish) the farmers realize a loss at harvest during this time. Usman believes that if the dates of lease payment are revised to coincide with an ideal harvest time during the months of August or December, they can gain a larger degree of profits by harvesting larger size table fish.
- The floods that occurred in the year 2017 in Nagaon destroyed nearly 70% of the collectives produce as there was no dam and water canal facilities at the beel. This resulted in large losses for the year. Usman believes that if there were to be better water canal facilities and dam facilities, it would alleviate such pressures from natural calamities.
- Additionally, as there is no fish insurance scheme, the collective had to bear the losses that occurred due to the inundation last year. Usman mentioned that some sort of insurance facility for their fish produce against natural calamities would be a welcome relief for the collective, and would incentivize the collective to increase production.
- The collective also faces constant challenges from illegal and unsolicited fishing in the beel. As the beel is under a lease no trespassers are permitted to fish in the beel. However, this is still a constant occurrence. The collective would find it challenging to patrol such a large area between just 13 farmers. However, the collective still undertakes patrolling activities at the beel, but is not able to entirely eradicate the problem of unsolicited fishing. The collective would like the government support in order to patrol the beel in order to disallow unsolicited fishing activities.
- The collective has also recently been finding it increasingly challenging to acquire medicines, fish feed, and fish fry in such large quantities as the collectives demand for fish feed, medicine and fish fry is increasing. Usman mentioned that there is a lot more scope for increasing production in the beel, however, the limited availability of quality fish fry, medicines, and fish feed is making it increasingly difficult for them to increase their fish production.

3.6.6 Handloom and Textile Case Study:

Mr. Subhash Debnath, Kathiatoli, Nagaon, Mob.: +91 9401273580

Background

Maa Durga Handloom Textile, is a Handloom and Textile private enterprise that is part of a larger cottage industry unit that is currently operational in the Kathiatoli block of the district of Nagaon in Assam. The owner of the enterprise is Mr. Subhash Debnath. The enterprise has been operational for nearly 50 years, as it was established in the year 1970 in Nagaon. The enterprise was set up by Mr. Subhash Debnath's father. The enterprise is in Kathiatoli. There are 7-8 other such private enterprises that have formed this private cottage industry.

Maa Durga Handloom and Textiles alone employs 70-80 workers for weaving yarn into Mekhla Chadors, dying, and other miscellaneous tasks such as packaging. 90% of the weavers are men from neighbouring villages from within the block of Kathiatoli in Nagaon itself. The weavers are paid based on their production value, and not daily wages. Each weaver is paid an amount of Rs.150 (lower quality) to Rs. 200 (higher quality) per mekhla chador produced. On average, each weaver weaves 1 mekhla chador a day. Each weaver works on one handloom through the day.

There are 15-20 handlooms that are used for production in Maa Durga Handloom and Textile. The looms used are pit looms that are made out of Bamboo which are used by the weavers.

Mr. Debnath purchases yarn from Guwahati as the yarn is not locally available. The main yarn used in the production of Mekhla Chadors are acrylic and polyester. The yarn is purchased at a wholesale rate of Rs. 293 per 0.5 kg(1 bundle) for acrylic, and Rs. 320 per 0.5 kg(1 bundle) for polyester. On average, 200 gram of yarn are required to produce one Mekhla Chador, this estimates an average profit margin of Rs. 300 per piece of Mekhla Chador, as Mr. Debnath sells each Mekhla Chador at the rate of Rs. 300 (low quality) and Rs. 500 (high quality) in the Guwahati wholesale market itself. Approximately 1200 mekhla chadors are produced by Maa Durga Handloom and Textiles every year.

The Mekhla Chadors produced in Maa Durga Handloom and Textile is almost completely sold in Guwahati markets. Less than 1% of the produce is sold within the block of Kathiatoli. The Mekhla Chadors sold within the block are for a few known local customers. Mr. Debnath mentioned that his produce is all sold within the state of Assam itself.

Challenges and proposed intervention

The case of Maa Durga Handloom and Textile is a strong case for the fact of the existence of a market for Handloom and Textile, especially in the production of Mekhla Chadors. This case study also helps establish that there is a possibility of farmers to engage actively in the production of mekhla chadors and other woven fabric as a means of doubling their income. However, there are certain stipulations in order for farmers to be able to double their income through weaving, they are as follows:

- As weaving is a traditional practice in the state of Assam at a household level, farmers from a certain number of households can be collectivized to form Producer Groups which could federate to a Farmer Producer Company for weaving.
- Handlooms that are used by farmers at the household level are mostly outdated looms and do not have a high production capacity. This can be upgraded through already existing schemes that are provided by the Handloom and Textile Department of Assam. Maina looms are provided to farmers at a subsidized rate of Rs. 70,000 by the Handloom and Textile Department.
- Yarn banks are also available for the purchase of yarn. The collectivization of farmers into collectives can reduce the purchase cost of yarn and ensure higher returns for the farmers for their produce, as the purchase would be for a large-scale production purpose purchase.
- With the skill building and thorough training of farmers through already existing training exercises offered by the Handloom and Textile Department, the farmers can increase their productivity of woven cloth to be sold at higher volumes and high quality.
- Additionally, the farmers will find it easier to access loans from banks as an established collective organization as compared to an individual farmer.
- Through the federation of Producer Groups into Farmer Producer Companies, it allows the produce of the farmers to reach wider markets across the state of Assam, and could also explore markets for woven cloth outside of the state.

Section Summary

The district of Nagaon is one of the most populated districts within the state. As a result of its large population, the district possesses a diverse group of communities. Tribals, Muslims, OBCs, and general class communities are spread across several parts of the district. Livelihood activities and practices vary accordingly. There is also a large number of migrant population from neighbouring states of Bihar and West Bengal.

Paddy remains the commodity upon which the majority of the community relies. However, cultivation of pulses and vegetables are also taken up in large part. Areca nut and Jute are also some of the other agricultural commodities cultivated and traded in the district. Jute is known to be cultivated majorly amongst the Muslim communities, however, it has been taken up by other communities too. The district is mostly rain fed, and only 27% of the land is irrigated. Some blocks of the district are also vulnerable and prone to floods almost every year. The district is the fish capital of the North-East, and also has one of the largest fish market in the North eastern region. The Muslim community is heavily engaged in fish cultivation and trade. Nagaon district produces roughly 14,000 MT fish in a year which is about 9% of the total production in the state.

Aside from fish cultivation, the district residents are also engaged in handicrafts, and handloom and weaving. There are several weaving cottage industry set ups in the district that produce large quantities of woven cloth, especially the local Assamese Mekhla Chador. Kuhila (an aquatic plant) is cultivated in some parts of Nagaon (Batadrava block). The stem is used to produce paper like material from which toys and other decorative items are made by some households. The items have good local demand.

Piggery and sericulture is a restricted livelihood practice to the tribal population. However, the flood affected blocks within which some of the tribal reside impedes the ability for tribal to be occupied in sericulture, as the cultivation of castor plantation is challenging in a flood.

3.7 Bongaigaon

3.7.1 District Overview

Bongaigaon district is surrounded by four districts of Assam, namely Barpeta district in the east Dhubri and Kokrajhar district towards the west, Goalpara district in the south and Chirang district in the north. The headquarters of the district is located at Bongaigaon town situated at the lower part of the Brahmaputra valley. It is one of the smallest districts of Assam.

Bongaigaon district possesses three sub divisions namely Bongaigaon, North Salmara and Bijni subdivisions. Bongaigaon subdivision consists of two Revenue circles such as Sidli (part II) and Bongaigaon(Pt) Revenue circles, North Salmara sub division has also two revenue circles viz Boitamari and Srijangram and Bijni Sub division occupies only Bijni(Pt) Revenue Circle. The district has all together 5 revenue circles with 563 villages. The total Bongaigoan cover an area of 1,093 sq km. An official Census 2011 the demographic details consists of population of 7,38,804 out of which around 85% population lives in rural area. The population of Schedule Tribe in the district is only 2.5% of the total population. Bongaigaon is a minority concentrated district, having Muslim population 50.22% (Census 2011).

Table 63: Religion wise population (Census 2011)

District	Bongaigaon
Population	7,38,804
Hindu	48.61 %
Muslim	50.22 %
Christian	0.80 %
Sikh	0.05 %
Buddhist	0.03 %
Jain	0.12 %
Others	0.00 %
Not Available	0.16 %

Table 64: Bongaigaon District

		Number	Percentage
Scheduled Castes	Persons	82,784	11.21
	Males	42,513	11.31
	Females	40,271	11.09
Scheduled Tribes	Persons	18,835	2.55
	Males	9,377	2.50
	Females	9,458	2.61

In Bongaigaon, the climate is warm and temperate. The average annual temperature in Bongaigaon is 24.3 °C. Precipitation here averages 3,159 mm

The district falls under Brahmaputra river basin. The district has a large reservoir of water resources with the river Brahmaputra and its two tributaries of Ai and Manas. The soil type is generally sandy to sandy loam with alluvial deposits. Among the 15 Agro-climatic regions of the country, identified on the basis of homogeneity in Agro-characteristics, Bongaigaon falls in the Lower Brahmaputra Valley zone. The Agro climatic conditions of the district are conducive to various agricultural activities. The topography of the district represents mostly plain lands except a small portion of isolated hills in Bijni sub-division, bordering Bhutan. Agriculture in the district is characterised by over dependence on rainfall, predominance of seasonal crops and traditional methods of cultivation. The forest cover in the district is estimated to be 56,598 hectares i.e. 22.6 percent of its total geographical area as per the estimates of Forest Statistics of Assam 2005.

The economy of Bongaigaon district is basically agrarian in nature with about 80 percent of the population dependent on agriculture. Paddy is the major crop. Other important crops include oil seeds, pulses, cash crop viz. jute, vegetables etc. Agriculture in the district is characterized by over dependence on rainfall, predominance of seasonal crops and traditional methods of cultivation. The sector contributes 38 percent of the total income in the Gross District Domestic Product while the secondary sector contributes 19 percent. The district has favourable agro climatic conditions for the development of various plantation and horticulture crops. However, the horticulture & plantation crops are generally not cultivated on a commercial scale in the district. Approximately 1,04,454 farmers are involved in cultivating horticultural crops. As per the estimates of PLP, NABARD (2006-07); the total area under plantation and horticulture in the district is 18,839 hectares. The district has high potential for growth of citrus fruits, pineapple, Areca nut, and medicinal and aromatic plants, besides rubber plantation.

3.7.2 Commodities Overview

Agriculture in Bongaigaon

Agriculture is the major contributor to the Net State Domestic Product and is the largest employer of the workforce in Bongaigaon district. A robust growth in the agricultural sector is of crucial importance for speedy development of the economy and it needs to grow at least @ 4% p.a. The agro climatic conditions of the district are conducive for various agricultural activities. Farming continues to be the major occupation in the district. As per Census 2011, there were 2.6 lakh workers in the district. Out of that 0.83 lakh cultivators and 0.52 lakh agricultural labourers depended on agriculture for their livelihood. Secondary sector has also grown around agriculture in the form of agro-processing industries, farm equipment units etc. In recent years a trend of diversion of agriculture land for some other activities has been observed. This trend together with deterioration in soil health, decreasing size of land holdings, and inadequate marketing networks constrain optimum price realisation by farmers, has put a challenge on not only increasing the current production/ productivity level but also sustaining the increasing trend.

There is a large dependence on wage labour for the workforce in Bongaigaon. Out of 2.6 lakh workers in the district of Bongaigaon, 31.9% are engaged in cultivation farming, while 20% in wage labour.

Major crops cultivated are Paddy, Jute, Wheat, Sugarcane, Potato, Mustard, etc. The average size of land holding is less than 1 ha. Commercial cultivation of Banana, vegetables & medicinal crops like Mentha, Tulsi is gradually increasing. The gross cropped area of the district was 1,05,421 ha and net sown area was 67,635 ha constituting 44.5% of geographical area. An area of 37,786 was sown more than once. [33]

Livestock:

Poultry and goat are reared in large number in the district while pigs number are least.

Name of Block	Small Animals				
	Poultry (No.)	Duck (No.)	Pigs(No.)	Goat(No.)	Sheep (No.)
Manikpur	43,426	14,802	315	12,948	4963
Dangtol	1,20,222	32,831	2939	30,630	1,276
Boitamari	93,926	19,749	3691	24,387	7,087
Srijongram	1,56,675	33,788	2534	43,087	18,301
Tapattary	1,19,499	14,151	1,464	23,309	9,262
Total	**5,33,748**	**1,15,321**	**10,943**	**1,34,361**	**40,889**

Source: *District Irrigation Plan 2016-20, Bongaigaon, Nabcon Consultancy Services Private Limited*

[33] https://dirhorti.assam.gov.in/.../District%20Irrigation%20Plan%2C%20Bongaigaon_0.pd...

Dairy is practiced by most of the small and marginal farmers and landless labourers in the district and to them this activity provides economic security by serving as a hedge against crop failure. The economy of the district is basically agrarian and as such the economic development of the district is highly dependent on agriculture and allied activities. Traditionally, dairy farming is a subsidiary occupation of the farmers of the district. Despite the large population of livestock, the milk production in the district is low mainly due to predominance of local cows with a poor genetic make-up.

Name of Block	Large Animals.		
	Indigenous Cow(No.)	Hybrid Cow(No.)	In descriptive Buffalo.
Manikpur Block	49,314	913	120
Dangtol Block	49,704	2212	270
Boitamari Block	36,844	1275	610
Srijangram Block	77,535	2,736	759
Tapattary Block	34,095	1,579	875
Total	**2,47,492**	**8,715**	**2,634**

Source: *District Irrigation Plan 2016-20, Bongaigaon, Nabcon Consultancy Services Private Limited*

3.7.3 Sector/Sub-sector/Commodities wise findings

(Findings based on stakeholders' interview, FGD and observations):

Agriculture:

Paddy is the main crop cultivated in all villages within the district of Bongaigoan. Vegetables are the next largest cultivated commodity in the district. Tomato, potato, beans, and pumpkin are the vegetables that are predominantly cultivated here. Plantation crops such as banana and Tea are also cultivated locally within the district.

In the year 2011 the total paddy production in the district was 1,00,581 tonnes, however, the production of rice was only 65,375. Whereas the requirement for rice is around 98,141. This indicates a deficit of 32,763 tonnes. The deficit of rice can be further attributed to the occurrence of natural calamities like flood, lack of infrastructural facilities at the ground level. The National Food Security Mission has been set up in order to increase production and improve productivity.

Additionally, mustard, ginger, arhar daal, lentils, and garlic are some of the other commodities produced in the district. However, with the exception of Areca nut these vegetables are cultivated on homestead land, and is almost entirely for self-consumption.

The unawareness of modern best practices of farmers has at times proven to be severely challenging for farmers producing their commodities. For instance, the haphazard used of pesticide application practiced by farmers with the motive for increased returns resulted in an unfortunate series of events. ***Bhutan was a major importer of vegetables from Assam, however, due to the excessive dosage of pesticide application in the produce, the country rejected the produce.*** The pesticide content presence in the produce is very high making it very harmful for consumption.

In (post) flood affected areas, farmers cultivated groundnut and during floods plant jute as a flood resistant crop. This is a measure that farmers have adopted in case of natural disasters especially in the context of floods.

Jute cultivation is practiced in the block of Srijangram within the Bongaigaon district. However, as the quality of Jute cultivated is low, the returns are accordingly sub-optimal. Farmers sell their produce for just Rs. 2,000 per quintal. In spite of this, farmers still cultivate the crop as a means of supplementary income, and not a cash crop. In fact, the presence of middlemen is big challenge for the farmers to realize better price.

Most blocks lack storage facilities for farmers. The non-availability of the storage has had a huge impact on the farmers especially in the case of bumper harvest whereby most of the perishable produce like tomatoes, beans, cauliflower has to sell off at a throw away prices.

As per the information provided by the Agriculture Development Officer (ADO) of Manikpur Block, about 30% of the cultivated area is irrigated and the rest is still rain fed. In areas like Manikpur block, the absence of irrigation facilities is closely related with the non-availability of electricity.

Bamboo is grown extensively in the region but isn't optimally utilised. Bamboo as a commodity is yet to be viewed and taken up to its absolute potential. Farmers mostly use the commodity for fencing or minor construction work on their own farm or homestead land. However, there are instances of the potential of Bamboo. In the village of Srijangram, a farmer uses the bamboo for the production of fish traps as successful enterprise. The fish traps manufactured by this farmer in Srijangram is traded in larger cities in Assam, with Guwahati being the largest market.

The unawareness of markets for niche commodities has resulted in the wastage of several valuable commodities. Additionally, the lack of linkage with such niche markets due to challenges in infrastructure have resulted in the inability of farmers to connect to such markets. Medicinal fruits such as giant apple, considered as a therapeutic treatment for diabetes is cultivated sporadically in Boitamari, which is sold in cities like Guwahati for Rs. 60-70 a kg. Cotton production is also practiced in small pockets of Srijangram Block. Farmers have undertaken niche commodity cultivation. Thailand berries are one of the high value products taken up by farmers in Manikpur and Boitamari, however the lack of a market for these products dissuade farmers from scaling up their production.

In post flood affected areas, farmers cultivated groundnut and during flood they plant jute as one of the flood resistant crop. This is an adaptive measure that farmers have adopted in case of natural disasters, especially in the context of floods.

Fisheries:

The district of Bongaigaon has five fish hatcheries. There are also nine fishermen co-operatives within the district. In spite of the co-operative, the members continue to individually market their produce, as opposed to doing so collectively. In areas like Srijnagram and Abhaypuri, there are large beels and government has leased these to fishermen cooperatives for fishing. No private entities are allowed for fishing in the registered beels. This is good initiatives of the government to promote the fishermen cooperatives.

Animal Husbandry

The National Livestock Mission has been implemented in the district in order to augment livestock production with a particular emphasis on cattle, piggery, poultry, and duckery. Cattle, especially for milk production is a relatively higher preference for farmers within the district. The government has been actively pursuing artificial insemination programs within the district, in order to increase milk production.

Diseases amongst cattle have been a very challenging ordeal for farmers rearing cows. Foot and mouth disease often is an endemic that result in a loss of cattle. In spite of this, there are just 10 dispensaries across the district, with limited access to quality veterinary services, and other cattle related health services. This poses great challenges to the farmers, especially in case of availing vaccination and medicines. Due to the unavailability of subsidised vaccinations and medicines, farmers are generally compelled to make their purchases from private clinics in their vicinity. It thus increases the cost of production which often poses as a dissuading factor for sub-optimal healthcare of the cattle, resulting in further loss. As per the information provided by the Veterinary Officer only 50% of the villages vaccinate their livestock. It increases risk on the mortality rate and production.

In the last four years there has been no livestock development oriented scheme, except the Rashtriya Krishi Vikas Yojna (RKVY) scheme, and the newly launched program National Livestock Mission (NLM).

3.7.4 Social class wise livelihood basket

Table 65: Bongaigaon

Social Class	Muslim	
Average agriculture land (acre)	1.48	
Average leased in land (acre)	1	34% farmers take land on lease for agriculture purpose
Average homestead land (acre)	0.27	

Table 66: Income from existing farm based activities

Commodities	Land used (in acre)	Average Production (kg)	Average Quantity sold (kg)	Income	% of production which is sold	Expenditure	Net Income	Remarks
Paddy	1.36	2,197	936	12,282	42.6	14,429	43,666	Income is from Boro and Sali paddy. Only 18.6% farmers are selling boro and Sali paddy. 57.6% farmers who are cultivating Sali are selling it.
Mustard	0.4	192	168	5,300	87.5			Only 17% farmers are engaged with mustard cultivation.
Pulses-Masoor	0.6	134	108	4,370	80.6			Only 17% farmers cultivate masoor
Pulses-Mati and Khes	0.3	197	170	5,000	86.3			Only 10% farmers cultivate mati and khes
Vegetables	0.47	881	867	13,600	98.4			25.4% farmers are cultivating vegetables
Areca nut		695	570	7,800	82.0			Only 17% farmers are cultivating Areca nut
Jute	0.5	417	417	9,743	100.0			36% farmers are cultivating Jute
Total				**58,095**		**14,429**	**43,666**	

Table 67: Proposed increase in income from farm based activities

Commodities	Land used(acre)	Average Productioin (kg)	Average Quantity sold (kg)	Income(Rs.)	Expenditure(Rs.)	Net Income(Rs.)
Paddy (SRI)	1.36	3,295.5	1,404	16,704		
Mustard	0.4	192	168	5,300	11,047	51,469
Pulses-Masoor	0.6	134	108	4,370		
Pulses-Mati and Khes	0.3	197	170	5,000		
Vegetables	0.47	881	867	13,600		
Areca nut		695	570	7,800		
Jute	0.5	417	417	9,743		
Total				**62,517**	**11,047**	**51,469**

Table 68: Income from existing allied activity

Activities	No. of livestock	No. of Units Sold	Income (Rs.)	Expenses related to activities (Rs.)	Net Income (Rs.)	Remark
Dairy (units in litre)	1	246 litre	8,455	2,305	10,482	44% Households rear cow.
Goatary	3	2	3,255			42% Households rear goats
Poultry	8	4	1,077			83% Households have backyard poultry.
Total			**12,787**	**2,305**	**10,482**	

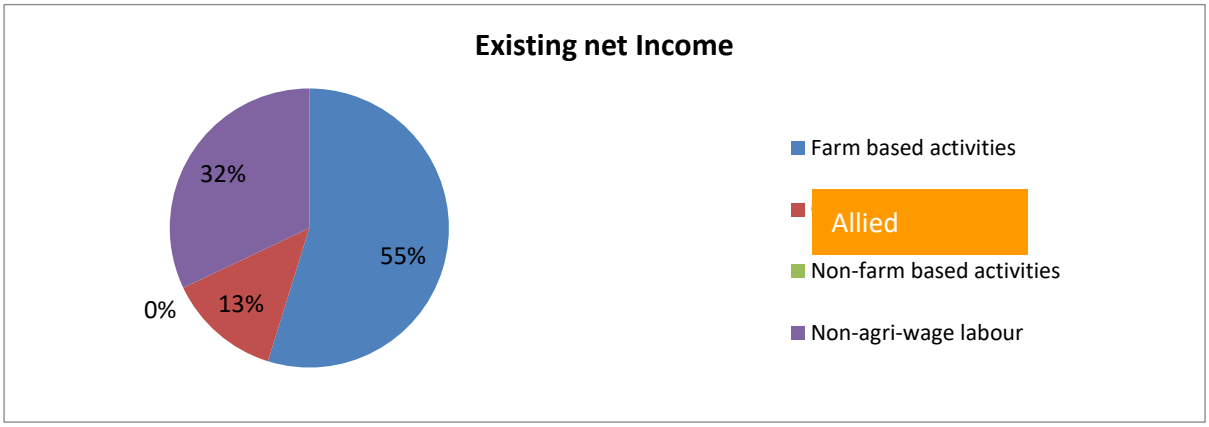
Table 69: Proposed increase in income from allied activity

Activities	No. of units	No. of Units Sold	Income year 1 (Rs.)	Expenses related to activities year 1 (Rs.)	Profit Year 1 (Rs.)	Income year 2 (Rs.)	Expenses related to activities year 2 (Rs.)	Profit year 2 (Rs.)
Dairy (unit sold in litre)	430 lactating days for two cows providing 10 litre per day@Rs.35 per litre for one year. Capital cost (cow-shed, calf-pen, cost of two cows@Rs.30,000. cost of chaff cutter, cost of transportation, cost of dairy appliances) of Rs.1,04,000 is included in the expenses with recurring cost of Rs.55,430 in first year and Rs.64,490 in second year.	4,300 litre	1,50,500	1,59,430	-8,930	1,32,300	64,490	67,810
Goatary	3	2	3,255		3,255	3,255		3,255
Poultry	8	4	1,077		1,077	1,077		1,077
	Total		**1,54,832**	**1,59,430**	**-1,532**	**1,36,632**	**64,490**	**72,142**

Table 70: Existing income from wage labour

Activities	Number of days	Income	Remarks
Non-Agriculture wage labour	101	25,539	59% of total HHs earning from non-agri wage labour

	Farm based activities	Allied activities	Non-farm based activities	Non-agri-wage labour	Total
Existing net Income	43,666	10,482	0	25,539	79,687
Increased net income	51,469	72,142		25,539	1,49,150



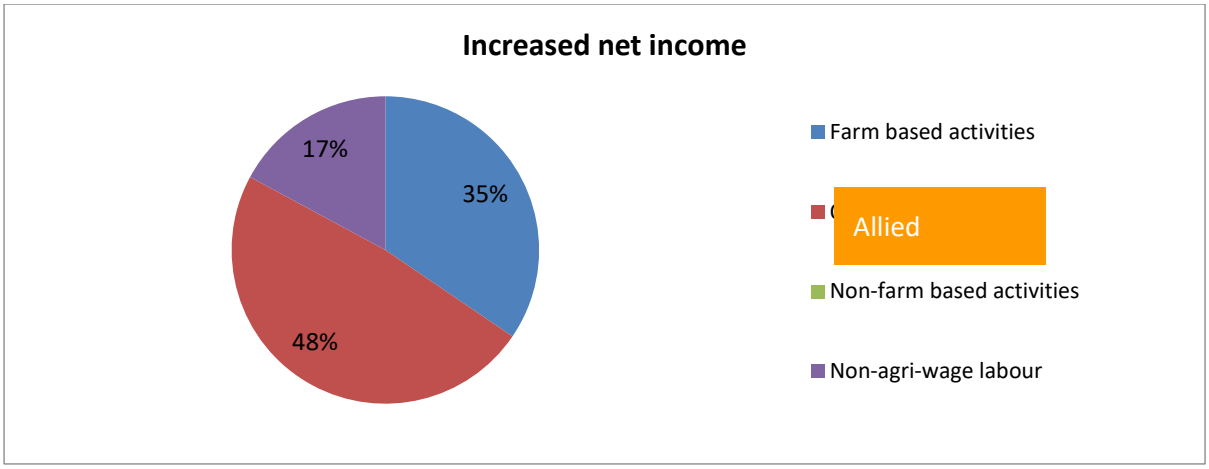


Table 71: Bongaigaon

Social Class: OBC		
Average agriculture land (acre)	1.37	
Average leased in land (acre)	1.4	53% farmers are taking agriculture land on lease
Average homestead land (acre)	0.45	

Table 72: Existing farm based activities

Commodities	Land used (in acre)	Average Production (kg)	Average Quantity sold (kg)	Income (Rs.)	Expenditure (Rs.)	Net Income (Rs.)	Remarks
Paddy	1.65	1,988	723	9,086	8,300	18,228	51% HH are selling paddy
Mustard	0.97	178	120	6,620			60% of HH doing mustard are selling it
Areca nut		535	493	10,822			85% of the HHs producing Areca nut are selling it
Total				**26,528**	**8,300**	**18,228**	

Table 73: Increase in income in farm based activities

Commodities	Land used(in acre)	Average Production (kg)	Average Quantity sold (kg)	Income(Rs.)	Expenditure(Rs.)	Net Income(Rs.)
Paddy (SRI)	1.65	2,982	1,084.5	12,357	Expenses related to SRI paddy is incorporated in overall income amount	24,881
Mustard	0.97	178	120	6,620	4,918	
Areca nut		535	493	10,822		
Total				**29,799**	**4,918**	**24,881**

Table 74: Income from existing allied activity

Activities	No. of livestock	No. of Units Sold	Income(Rs.)	Expenses related to activities(Rs.)	Net Income(Rs.)	Remarks
Dairy (units in litre)	1	212	9,262	1,550	13,970	44% HHs are rearing cow
Goatary	5	2	4,091			27% HHs are rearing goats
Poultry	9	7	2,167			55% HHs have back yard poultry
Total			**15,520**	**1,550**	**13,970**	

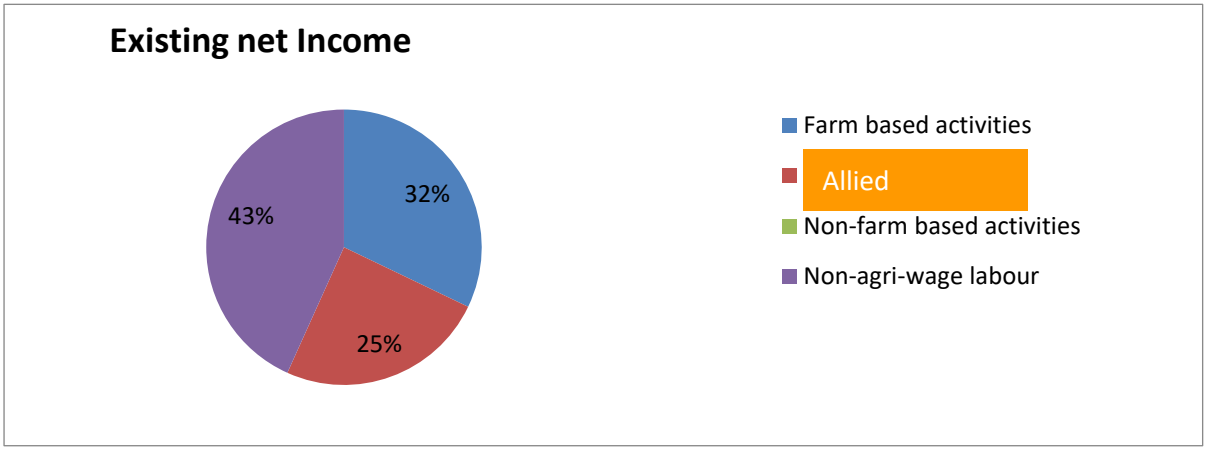
Table 75: Proposed increase in income from allied activities

Activities	No. of units	No. of Units Sold	Income year 1(Rs.)	Expenses related to activities year 1(Rs.)	Income Year 1(Rs.)	Income year 2(Rs.)	Expenses related to activities year 2(Rs.)	Income year 2(Rs.)
Dairy (unit sold in litre)	430 lactating days for two cows providing 10 litre per day@Rs.35 per litre for one year. Capital cost (cow-shed, calf-pen, cost of two cows@Rs.30,000. cost of chaff cutter, cost of transportation, cost of dairy appliances) of Rs.1,04,000 is included in the expenses with recurring cost of Rs.55,430 in first year and Rs.64,490 in second year.	4,300	1,50,500	1,59,430	-8,930	1,32,300	64,490	67,810
Goatary	5	2	4,091		4,091			4,091
Poultry	9	7	2,167		2,167			2,167
	Total		**1,56,758**	**1,59,430**	**-2,672**	**1,32,300**	**64,490**	**74,068**

Table 76: Existing income from wage labour

Activities	Number of days	Income
Non-Agriculture wage labour	100	24,550

	Farm based activities	Allied activities	Non-agri-wage labour	Total
Existing net Income(Rs.)	18,228	13,970	24,550	56,748
Increased net income(Rs.)	24,881	74,068	24,550	1,23,499



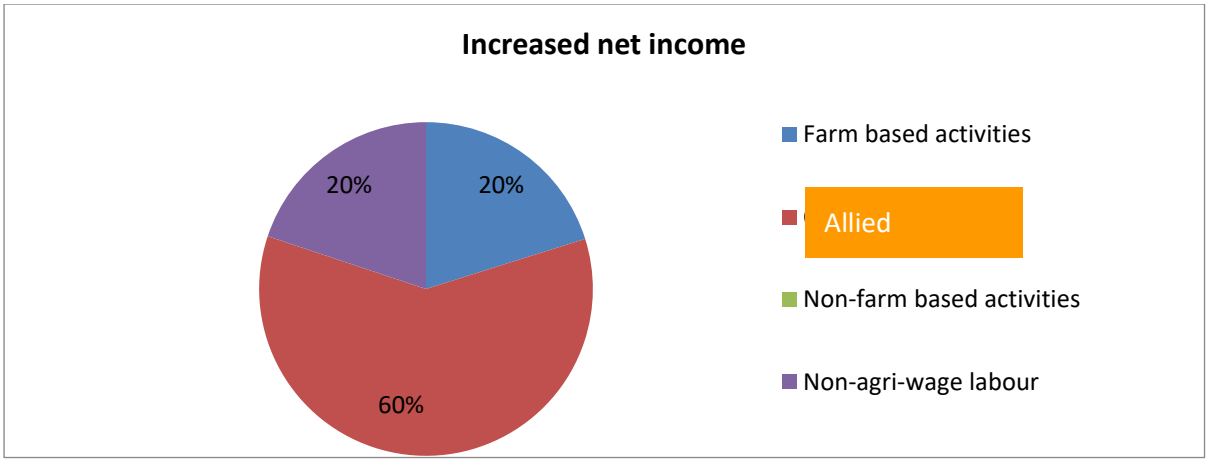


Table 77: Social Class wise comparative livelihood basket of Bongaigaon

	Land holding(acre)			Farm(Rs.)			Allied (Rs.)			Non-farm(Rs.)			Wage Labour(Rs.)
	Agriculture	Homestead	Leased in	Existing Net Income	Possible Increased Net Income	%increase	Existing Net Income	Possible Increased Net Income	% increase in income	Existing Net Income	Possible Increased Net Income	%increase in income	
Muslim	1.48	0.27	1	43,666	51,469	17.87	10,482	72,142	588.25				25,539
OBC	1.37	0.45	1.4	18,228	24,881	36.50	13,970	74,068	430.19				24,550

Analysis of social class wise livelihood basket- Bongaigaon: Vegetable, paddy and Jute are the major contributor of income in the livelihood basket of Muslim community. Dairy is the major activity in off-farm while goatary also contribute a part of it. Wage labour also contributes in the overall income. Intervention in dairy can increase the income significantly. For OBC, paddy, Areca nut and mustard contribute income from the farm sector while dairy and goatary contribute from the allied sector. Wage labour also contributes in the overall income. With the introduction of two cross-bred cows and adoption of scientific method of pond based culture fisheries there are potential to increase the income significantly. It requires intensive support from Animal Husbandry department, adoption of farmers to imbibe improved practices and it is also required that the NGOs should demonstrate the model for which government should create opportunities.

3.7.5 Bamboo Case Study

Mr. Abidur Islam, Kukila village, Bongaigoan district. Mob: 90895618127

Labourer making a bamboo basket used as a fish trap at Abidur Islam's workshop

Abidur Islam is a small farmer from the village of Kukila in the Srijangram Block of Bongaigoan District. Abidur who is 48 years of age, has been engaged in bamboo handicraft as a livelihood activity for the past 10 years. Abidur has a household of 7 members and he started bamboo making as a livelihood activity in the year 2008. Prior to taking up bamboo basket making, Abidur Islam worked as a daily wage labourer, wherein he used to make Rs. 4,000 a month, which resulted in a hand to mouth situation for him and his family.

Abidur came across the activity of bamboo making during his time as a daily wage labourer before 2008. He came across a craftsman making bamboo baskets within the block of Srijangram itself. While Abidur was intrigued to try making these bamboo baskets, he did not possess any kind of training or skill, and wasn't even aware about any training opportunities in bamboo crafts either. Realizing his lack of skill, Abidur purchased a basket and unwound the entire product and tried winding it back into its original shape all by himself. After days of trial and error, Abidur was able to wind the basket back in shape. This led him to keep practicing doing the same until he was perfect at doing so. After gaining confidence in the art of bamboo basket making, he then began crafting new bamboo baskets from bamboo poles.

Initially he only made one type of basket which is used for trapping fish by local farmers; now he has been making three more varieties of bamboo baskets in three different shapes and sizes for the purposes of storing live poultry birds (used to transport them to and from the market place by farmers), storing paddy, and storing fish. Abidur also sells thin bamboo sticks which are used in making incense sticks which he sells at the rate of Rs. 50 per kg. He sells these bamboo sticks to traders who place an order for their requirement and collect it from his workshop directly.

As the demand for his products increased, he had to employ one labourer to assist him in bamboo basket making. Abidur procures an average of 30 bamboo poles per month from the nearby village of Kukila itself wherein he goes from one household to the next buying bamboo poles that villagers plant in their homestead gardens, and in common areas. Abidur procures the poles at the rate of Rs. 200 per bamboo pole. Abidur can make 4-5 baskets out of one bamboo pole (each pole is an average of 10 metres in height).

On average, Abidur sells 50-60 baskets at the rate of Rs. 500 per basket a month, which results in a monthly income of Rs 25,000 to 30,000 (Rs. 3,00,000-3,60,000 annually). He sells his products either at weekly markets, or in some instances, he also sells them to middlemen and consumers directly within the village itself.

Abidur has not received any assistance from any agency or government department insofar, but he enjoys his works and plans to take up bamboo basket making for as long as he can. Bamboo is also easily available to him, and he does not face any major challenge in procuring it from the village of Kukila. Abidur is also ambitious and aims to set up a small retail outlet and brand his bamboo products for sale in the village, which would also cater to the markets of nearby villages.

Challenges

- Abidur's only challenge is the lack of a shed for his work place. As he doesn't have a shed at his workshop for making bamboo baskets, it makes his work particularly tough, especially in the heavy monsoons. He mentioned that the provision of a basic brick and mortar work place would be a welcome relief for him, and could increase his productivity for making baskets during the monsoons.

Section Summary

The district of Bongaigaon falls within the Brahmaputra river basin, specifically, the lower Branhmaputra Valley zone. The district also shares a boundary with Bhutan. Oil refineries are also one of the identity for this district. 80% of the district population is dependent on agriculture as their means of livelihood in which paddy is the major livelihood practice. The climate is also conducive to cultivation of oilseeds, pulses, vegetables and jute, which is also cultivated here. Horticulture is also a contributor to household income. Approximately 1,04,454 farmers are involved in horticultural. The total area under plantation and horticulture in the district is 18,839 hectares. The district has high potential for growth of citrus fruits, pineapple, Areca nut, and medicinal and aromatic plants besides rubber plantation.

Livestock is practiced in large numbers in Bongaigaon, wherein the preference towards livestock is towards large animals, vis-a-vis, cattle. Several farmers have cattle, mostly for ploughing fields, in case tractors are too expensive or in shortage. On the other hand, cows are also reared for milk, however, these are largely local breeds of cows with low milk yields. The district has very less number of hybrid cows. There are 2,47,000 indigenous cows and only 8,725 hybrid cows in the district. Poultry is followed by cattle as the next largest livestock livelihood option, which is followed by ducks, pig goats and sheep. Piggery is in low numbers due to the lesser presence of tribal communities in Bongaigaon. Fish is cultivated in the district, but in relatively lower numbers. However, the government has been encouraging the scaling up of fisheries as a practice, especially by co-operatives.

In post flood affected areas, farmer cultivated groundnut and during flood they plant jute as one of the flood resistant crop. This is an adaptive measure that farmers have adopted in case of natural disasters, especially in the context of floods. Off-farm has good potential to increase farmers income which is also evident from the comprehensive livelihood basket. This includes dairy and fisheries. There is scope of increasing farmers income from agriculture provided the irrigation facility along with the availability of electricity is improved.

Chapter IV

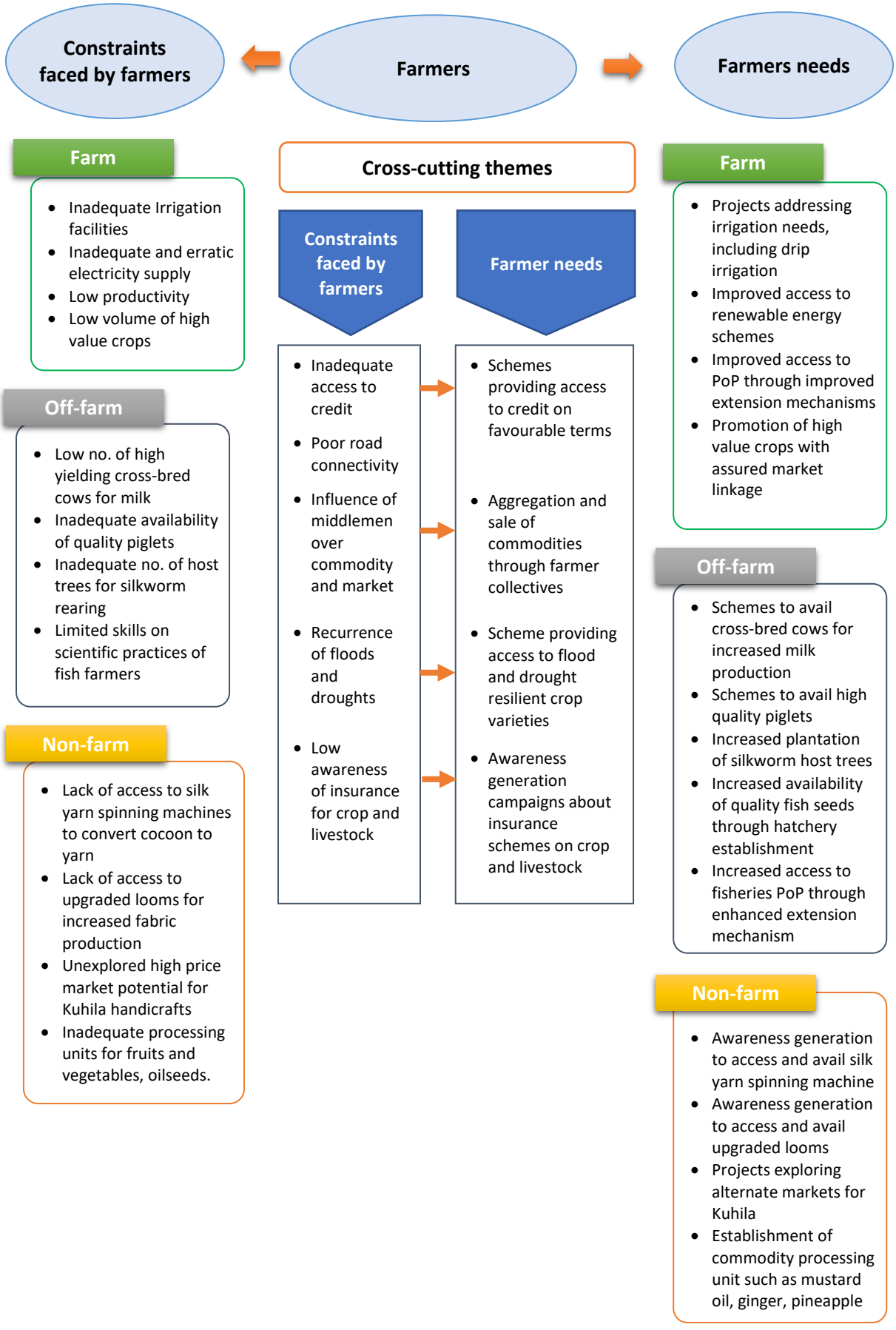
Observation and Analysis

Objectives and Findings

Objectives of study	Findings and major observations
To estimate the current income level of farmers in the state and its composition (in various agro-climatic zones, holding size-wise, social class wise, etc.).	Details (social class-wise) given in livelihood basket of farmers for each district.
To understand constraints faced by the farming community (including the distress situations, their frequency) that are limiting opportunities to income enhancement of the farmers.	• Constraints faced by the farmers are in terms of limited understanding on package of practices for different farm, off-farm activities resulting into sub-optimal production. • Farming (in the study districts) is mostly rain-fed and irrigation is inadequate. Inadequate availability of electricity further limits the scope of irrigation. • Per unit productivity is low for farm and off-farm commodities. • Due to inadequate extension services, input cost in farming and animal husbandry cost are on higher side. • Significant gaps of demand supply in fisheries, piggery and milk exists in the state. • Middlemen have a major influence at the local market therefore farmers get lower price for the farm and off-farm commodities viz. jute, sugarcane, fish, pig, silk cocoon etc. • Due to very limited awareness of market there are limited engagement of farmers in cultivation of high value crops. • The recurrence of floods on yearly basis in Dhemaji and parts of Nagaon and Bongaigaon have been severely affecting farmers' income
To study the constraints, possibilities and supports required for diversification of activities at farmer level, especially towards allied, off farm and non-farm activities.	• Limitations exist for farmers to upgrade in silk value chain by converting silk cocoon to yarn and realize almost three times more income. The farmers do not have access to silk yarn spinning machine nor have skills to operate the machine. Department of Sericulture can provide support to farmers to avail yarn producing machines. • Farmers usually possess indigenous cow varieties which produce low volume of milk. Introduction of two crossbred cows has potential to double farmers' income from increased milk production. • There is also a demand supply gap in fish seed within the state. • The possibility of diversification of activities is mentioned in the social class wise livelihood basket of the communities. For tribal, combination of pig fattening, silk yarn production and fisheries is

Objectives of study	Findings and major observations
	proposed; for Muslim, OBC and General communities, combination of fisheries and dairy is proposed. Intervention of SRI paddy is proposed across all social classes.
Estimation of farm economics and financial requirement (including bank loan) to double farm income (by 2022) and strategies to meet their financial requirement, if any	• Farm economics is depicted in district wise livelihood baskets of different social classes. • Doubling farm income is contingent on many factors viz. i) improvement in irrigation facilities, ii) improvement in electricity availability, iii) regular extension support in farm and off-farm activities contributing to increased productivity, iv) easy access to credit, v) awareness about crop insurance, vi) improved awareness about, and access to government schemes, vii) improved procurement mechanism through designated agencies viz. FCI, ASAMB etc. viii) improved road connectivity, ix) shifting to high value crops, x) access to better storage and processing facilities, xi) improved access to alternate and larger markets through aggregation of produce by promotion of collectives.
The extent of assistance from Central/State/PRIs being received by the farming community and hindrances in getting the benefits, if any.	• Farmers face constraints in selling paddy through procurement centres of Food Corporation of India as there are inadequate procurement centres. • Farmers lack adequate awareness about Pradhan Mantri Krishi Sinchayee Yojna (PMKSY), Pradhan Mantri Fasal Bima Yojna, livestock insurance, schemes of Sericulture and Department of Handloom and Textiles. • They also lack adequate awareness about extension services in agriculture and animal husbandry.
Supports / facilities / policy etc. required that could enable to double income by 2022 (farmer's view).	**Support and facilities required are:** • Access to affordable credit through mainstream financial institutions; • Access to extension support in agriculture and animal husbandry; • Infrastructure support in terms of irrigation (including drip irrigation); • Regular electricity supply; • Better road connectivity; • Market support in terms of better procurement policy for agriculture commodities

Figure 1: Constraints faced by farmers and farmers needs



Based on the discussion in four study districts with the communities, officials of government departments, District-block-village level representatives of Assam State Rural Livelihood Mission (ASRLM), SHGs and Village Organizations promoted by ASRLM, NGOs, traders and wholesalers it was understood that the farming communities practice different livelihood activities as per social class, geography, and religion. As per the scope of the study four agro-climatic regions were taken up. The outputs of the study is limited to the insights for these agro-climatic regions only and cannot be generalized for the entire state.

The analysis is around:

a. The existing practices in farm, off-farm, and non-farm based livelihood activities;
b. monetary return from these activities;
c. constraints in realizing optimum income from these activities at farmer as well as at policy level were minutely analysed.

4.1 Scope of increasing agriculture and allied productivity

It is evident that the productivity of agriculture and allied activity in Assam is less than the national average and also below the potential of the state. While the productivity of paddy of the state has significantly improved over the years but is still marginally below the national average. It is important to note paddy is cultivated in three seasons in Assam – summer, winter and autumn. While winter paddy is most prevalent among the three and productivity is also comparatively more, the production as well as productivity of summer and autumn paddy are severely constrained due to lack of irrigation. Productivity of horticultural crops is also constrained. The reasons of low productivity are crop-loss due to pest attack and insufficient irrigation. Moreover, climatic reasons also affect productivity in the state viz. flood in Dhemaji, in part of Nagaon and Bongaigaon; cultivation in Southern part of Nagaon and adjoining part of Karbi Anglong falls under rain-shadow areas.

The production in livestock and fisheries is also far below potential. Milk production in the state is abysmally low as percentage of crossbred cows is very less. While the state is bestowed with vast aquatic resources, the demand supply gap is 42,000 MT in fish production.

The availability of fish seeds is not sufficient in the state and the deficit is supplied from West Bengal. Moreover, the production of pig is also less than the demand. The reasons are less number of pig breeding farms, less number of crossbred pigs and feed producing plants in the state.

4.2 Improvement in total factor productivity

Farmers are inadequately aware about the package of practices in agriculture and allied activities. While demonstrations related to SRI were taken up by NGOs in some parts of the state, the larger outreach is yet to be attained. SRI was successfully introduced in 13 districts of Assam under the centrally sponsored National Food Security Mission (NFSM) in 2007. Later, the concept became more popular among the farmers of two central Assam districts —Nagaon and Morigaon. As per Senior agriculturist Arunima Deb Chaudhury of Nagaon district, SRI is not like the traditional way of cultivation with which some farmers of two or three districts of Assam are accustomed. The state's rice production increased from 29,16,014 metric tonnes in 2007 to 50,45,091 metric tonnes in 2011. Productivity increased from 1,349kg per hectare to 1,990kg per hectare during that period[34].

Cost of Paddy Cultivation under SRI for 0.33 acre; April 2008 to March 2009; SRI demo cum research project by Rashtriya Grameen Vikas Nidhi (RGVN) with 795 farmers in collaboration with 20 NGOs in 21 district; *sponsor- Sir Dorabji Tata Trust, Mumbai*

Sr. No.	Particulars	Mandays SRI/Normal	Rate (Rs.)	SRI (Rs.	Traditional (Rs.)
1	Land preparation	6	150	1,000	1,000
2	Organic Fertilizer		1 Ton	800	800
3	Seedling preparation	01-Mar	150	150	450
4	Seedling transplantation	04-Aug	150	600	1200
5	Chemical fertilizer			300	500
6	Weeding	3		500	
7	Irrigation	6/10 Litre		300	600
8	Harvesting			200	200
9	Cleaning, packaging, transportation			1,500	1,500
	Total Expenditure			**5,350**	**6,250**
	Total Production			**10 quintal**	**7.2 quintal**
	Total Income			**Rs.10,000**	**Rs.7,200**
	Profit			4,650	950

Due to not being aware about fertiliser dose management (as the farmers do not have soil health cards), the application of fertilizers is either inadequate or indiscriminate. Knowledge about appropriate package of practices is also largely absent. In fisheries, farmers lack skills of pond-based culture fisheries, therefore per unit production is less than the potential. Services of healthcare and vaccination of livestock are also not easily available.

[34] https://www.telegraphindia.com/1130326/jsp/northeast/story_16706222.jsp

It is therefore important that the extension system is improved. In addition to the government providing extension services, NGOs can also be roped in to augment the required support.

The setup of primary processing units for collectives, with adequate market linkage of the collectives will not only increase income through value addition of the commodity, but also drastically reduce post-harvest loss.

4.3 Diversification towards high value crops

The livelihood basket of different social class in the study districts reflects less amount of landholding dedicated for high value crops. One of the reasons is the average overall landholding is less and they also lack proper cultivation skills. Limited access to proper market and presence of middlemen are also the reasons which discourage the farmers to venture into high value crops.

4.4 Increase in crop intensity

There are possibilities of increasing crop intensity but the major constraint is lack of irrigation. If irrigation sources are made available, the farmers can take all three types of paddy, can increase acreage of vegetable cultivation in addition to taking up off-season vegetable cultivation.

4.5 Status of crop and livestock insurance

4.4.1 Crop Insurance in Assam

Background

Crop insurance in Assam in its current form is manifested through the Pradhan Mantri Fasal Bima Yojana (PMFBY) and is under the purview of the Department of Agriculture. The PMFBY began its implementation in the state in the year 2015-16. The scheme was an effort at converging erstwhile crop insurance schemes such as the Weather Based Crop Insurance scheme, the National Agriculture Insurance Scheme, and the Modified Agriculture Insurance Scheme. These respective central government schemes were active until the year 2015, which have been converged ever since.

The PMFBY was intended to cover losses that farmers suffer from due to floods, landslides, droughts, storms and other natural calamities. The central insurance scheme also covers low yields or a failure of crop yield due to the deficit of rainfall or adverse seasonal conditions. However, the scheme does not cover losses suffered by the farmers that arise out of human-wildlife conflict, such as elephants destroying paddy plantations[35].

[35] *https://agri-horti.assam.gov.in/sites/default/files/swf_utility_folder/departments/agriculture_medhassu_in_oid_3/do_u_want_2_know/10%28A%29.2.pdf*

Crop insurance in Assam has largely had a low number of farmers who have registered for insurance schemes. The reason for this largely stems from lack of awareness, lack of education, and the self-consumption nature of cultivation in Assam. As paddy is the primary crop cultivated in Assam (for self-consumption and sale) farmers do not view the crop from the perspective of insurance. A similar outlook is perceived by farmers for other horticulture crops, which is one of the reasons of low insurance registrations by farmers.

The state of Assam is one of the states with the lowest number of farmers who have registered for crop insurance. The total number of farmers who registered for crop insurance for the year 2016-17 was estimated at 51,000 for the entire state, most of which were farmers who had taken up loans from banks. Loanee farmers have largely constituted the farmers that have registered for insurance too, as this is mandated under the PMFBY[36]. For the year 2017-18 no non-loanee farmers subscribed for crop insurance. However, 7,000 loanee farmers had registered for the PMFBY for the year 2017-18.

The PMFBY is currently the only scheme on crop insurance being implemented in the state. There is no state government scheme that implements any crop insurance scheme. In its current form, under the PMFBY, farmers premium rate for Kharif Season is 2%, Rabi Season 1.5% and for Commercial / Horticultural crops 5% on Sum Insured. In terms of the premium to be paid, under the PMFBY, the farmers pay 50% of the premium while the state and central government pay 50% of the premium divided equally between the state and center (25% paid by each)[37].

Challenges

In the four surveyed districts of Assam, the crop insurance penetration in terms of farmers registered for insurance has not exceeded 1.5%, while awareness exists at up to 6%. The lack of crop insurance in the surveyed districts was largely due to a very low rate of awareness in the districts. Additionally, as farmers are unaware of the process of securing insurance for their crops, there is a perceived belief that the process of insuring their crops and availing the insurance is complicated, and not very beneficial.

On the other hand, remote districts such as Dhemaji and Karbi Anglong have an urgent need for crop insurance as their produce is commonly subject to wash away crops and human wildlife conflict (in the case of Karbi Anglong), and flooding in some parts of the district of Dhemaji.

[36] *https://community.data.gov.in/state-wise-farmers-insured-under-pradhan-mantri-fasal-bima-yojana-and-restructured-weather-based-crop-insurance-scheme-combined-during-kharif-2016/*

[37] *https://economictimes.indiatimes.com/news/economy/agriculture/farmers-under-crop-insurance-cover-in-assam/articleshow/45791653.cms*

The awareness of PMFBY was non-existent in the sample survey for the district of Karbi Anglong. As the unawareness and remoteness of Karbi Anglong and Dhemaji account as the prime reasons for inaccessibility of crop insurance in these two districts. In the districts of Nagaon and Bongaigaon as well, a lack of awareness about insurance is also the prime reason for inaccessibility of crop insurance schemes such as the PMFBY. Branch offices of insurance companies are limited. This results in low penetration of insurance schemes. However, additional reasons such as the perceived complexity of registering and availing crop insurance, along with the relatively lower amount of threat from floods and wildlife in these two districts have not motivated farmers towards the urgency of crop insurance.

4.4.2 Livestock Insurance in Assam

Background

The Government of India introduced a Centrally Sponsored Scheme (CSS) on Livestock Insurance on a pilot basis for the promotion of livestock rearing as a livelihood activity. Up until 2005-06 livestock was primarily reared by farmers who undertook the risk of losing their livestock to disease and natural calamities themselves and didn't have any means of reprieve through the government. In light of this, the pilot basis livestock insurance scheme was set up at Jorhat & Barpeta district in Assam along with the 100 other selected districts across the country. The full-fledged extended scheme on Livestock Insurance, which was approved on 20.11.2008 for remaining period of Eleventh Five Year Plan, by the Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, Govt. of India,has been implemented at Kamrup, Nagaon, Barpeta, Jorhat, Morigaon & Sonitpur districts in Assam among the 300 other selected districts of the country[38]. This scheme is also meant to provide more effective measures for disease control and improvement of genetic quality of animals, and to build a mechanism of assured protection to the farmers and cattle rearers against eventual loss of such animals. In spite of the sanction of the extension of livestock insurance in Assam, the implementation has been slow ever since. In spite of livestock insurance being extended as a national scheme, the implementation process of the scheme only begun in the beginning of the year 2017.

[38] *https://livestock.assam.gov.in/how-to/avail-the-livestock-insurance-schemerisk-management*

The livestock insurance for the state of Assam, is currently under the purview of the falls under the National Livestock Mission (NLM) in the state, which is housed under the Department of Animal Husbandry in the state. Livestock insurance in the state has been challenging, especially in the context of the dissemination and reception of funds for insurance. For instance, the funds of Rs. 5.72 crores for the fiscal year 2014-15[39] which were allocated and released by the central government for livestock were only released in the month of December of 2016 to the National Livelihood Mission[40]. This has made it fall short of reaching its targets for livestock insurance coverage in the state for the year 2016-17. The livestock insurance coverage is a central government scheme, and there is no state government scheme for the same.

Until the year 2014-15, livestock insurance was confined only to large cattle (cows, bulls, buffaloes), it was only under the revised National Livestock Mission plan that piggery and goatery has been covered under the scheme. The National Livestock Mission has a special focus on promoting piggery in Assam for the fiscal year 2017-18, and goatery for the following year 2018-19. The total budget for the allocation of livestock insurance in Assam currently stands at 5.92 crores as of December 2017[41].

As of December 2017, the livestock insurance scheme has covered 91,000 livestock animals (30,000 for pigs, 61,011 large cattle) in all of the 28 districts wherein the scheme is being implemented in the state of Assam[42].

Challenges

In the hilly district of Karbi Anglong, and the flood prone district of Dhemaji, the allocation of manpower for livestock insurance is very low. There are gaps in between the requirement and demand of veterinary doctors versus the availability, especially in the districts of Karbi Anglong and Dhemaji. This has resulted in low awareness and particularly low accessibility of farmers towards livestock insurance for the districts of Karbi Anglong and Dhemaji.

Due to the lack of know-how on insurance mechanisms pig farmers do not take up insurance for their pigs as insurance schemes for pigs has a tenure of 1 year, while pig farmers generally sell their pigs in 5-6 months. The fear of the insurance scheme not applying to them is a reason why many farmers do not register for pig insurance as they are unaware of the tenure component and benefits of insurance.

[39] https://animalhusbandry.assam.gov.in/frontimpotentdata/national-livestock-mission
[40] http://www.sentinelassam.com/story/main-news/0/national-livestock-mission-in-assam-moving-at-snail-s-pace/2017-12-04/1/327932#.Wt6oEohuZPY
[41] http://www.sentinelassam.com/story/main-news/0/national-livestock-mission-in-assam-moving-at-snail-s-pace/2017-12-04/1/327932#.Wt6oEohuZPY
[42] http://www.sentinelassam.com/story/main-news/0/national-livestock-mission-in-assam-moving-at-snail-s-pace/2017-12-04/1/327932#.Wt6oEohuZPY

In the districts of Nagaon and Bongaigaon, pig rearing is relatively less. Most farmers insure their large cattle such as cows, buffaloes and bulls. Additionally, in these districts, farmers insure only cross-bred cows, as they do not perceive indigenous variety of cows in a commercial sense. As there is a low yield of milk from indigenous cows, farmers are not inclined to insure these animals.

In addition to these challenges, insurance institutions are not yet fully operational in all districts. On average there is one insurance institution outlet for every 3-4 districts, which make the accessibility and coverage of insurance schemes more challenging for all districts.

4.5 District-wise awareness and accessibility of farmers towards insurance

Table 78: *Karbi Anglong:*

	Awareness	Accessibility
Crop insurance(PMFBY)	-	-
Livestock insurance	1%	-

Table 79: Nagaon

	Awareness	Accessibility
Crop insurance(PMFBY)	5.5%	-
Livestock insurance	6%	1.5%

Table 80: Dhemaji

	Awareness	Accessibility
Crop insurance(PMFBY)	4%	1%
Livestock insurance	-	-

Table 81: Bongaigaon

	Awareness	Accessibility
Crop insurance(PMFBY)	2%	1%
Livestock insurance	8%	2%

Soil Health Cards: On February 17, 2015, the Centre had launched the Rs 568-crore Soil Health Card (SHC) scheme under the Union Ministry of Agriculture. The scheme is supposed to be implemented in all States by their respective Agriculture departments. The scheme was launched based on the slogan 'Swasth Dhara, Khet Hara' (Healthy Soil, Green Cropfields). A SHC is meant to give each farmer the soil nutrient status of his land holding and advise him on the dosage of fertilizers and required soil amendments, that he should apply to maintain soil health in the long-run. Assam is an agrarian State, and as such this scheme is of vital importance where over 70 per cent of its population is directly dependent on agriculture.
In cycle-I of the scheme for fiscals 2015-16 and 2016-17, Assam had the target of collecting 2,78,707 soil samples for testing and met the collection target. Only 79,712 i.e. 28.6 per cent of the collected samples were tested and SHCs were given to only 1,57,970 farmers. http://www.sentinelassam.com/story/main-news/0/only-10-25-farmers-in-state-have-received-soil-health-cards/2017-10-25/1/320096#.WuBU3siFPIU

4.6 Increase in farmers income through Producers Collectives

An agricultural cooperative, also known as a farmers' co-op, is a cooperative where farmers pool their resources in certain areas of activity. A broad typology of agricultural cooperatives distinguishes between agricultural service cooperatives, which provide various services to their individually farming members, and agricultural production cooperatives, where production resources (land, machinery) are pooled and members cultivate their respective commodities jointly.

Assam has not ventured much into farmers' collectives. Efforts are taken in some districts (viz. Nagaon) but a more systematic approach and efforts are required to demonstrate the effectiveness of collectives in increasing farmers' income. Assam State Rural Livelihood Mission (ASRLM) is working as State Rural Livelihood Mission (SRLM) and has mandate to promote farmers collectives at village level and federate these collectives into larger Producer Organizations. ASRLM can use learning from the SRLMs of Bihar and Jharkhand where projects are implemented on integrating value chain with Farmer Producer Organizations.

4.6.1 Potential value chain interventions of Producer Collectives to double farmers' income

It is already established in different parts of the country that producer collectives have an important role in increasing farmers' income through farm, off-farm and non-farm activities. The age-old example of Amul, the poultry cooperatives promoted by Pradan, the vegetable and fruit collective promoted in South 24 Pargana of West Bengal etc. are some example to reckon with. The learning from study in four districts namely; Nagaon, Bongaigaon, Dhemaji, and Karbi Anglong provides ample scope to explore formation and engagement of producer collectives.

Sericulture in the study districts has largely been perceived as activity at individual household level. Additionally, sale of silk cocoons have been restrictive as they offer lower prices compared to that of silk yarn. However, if collectives were to become a medium of convergence of government schemes, the collective bargaining power would enable the farmers to gain access to sericulture schemes such as the acquisition of yarn spinning machines from the department. The formation of collectives would also result in the timely processing of yarn from silk cocoons by the members of the collective. The price of eri-silk yarn is three times more than the price of silk cocoon and producer collectives can be the means for the farmers to achieve this.

Figure 2: Existing Value Chain of Eri silk

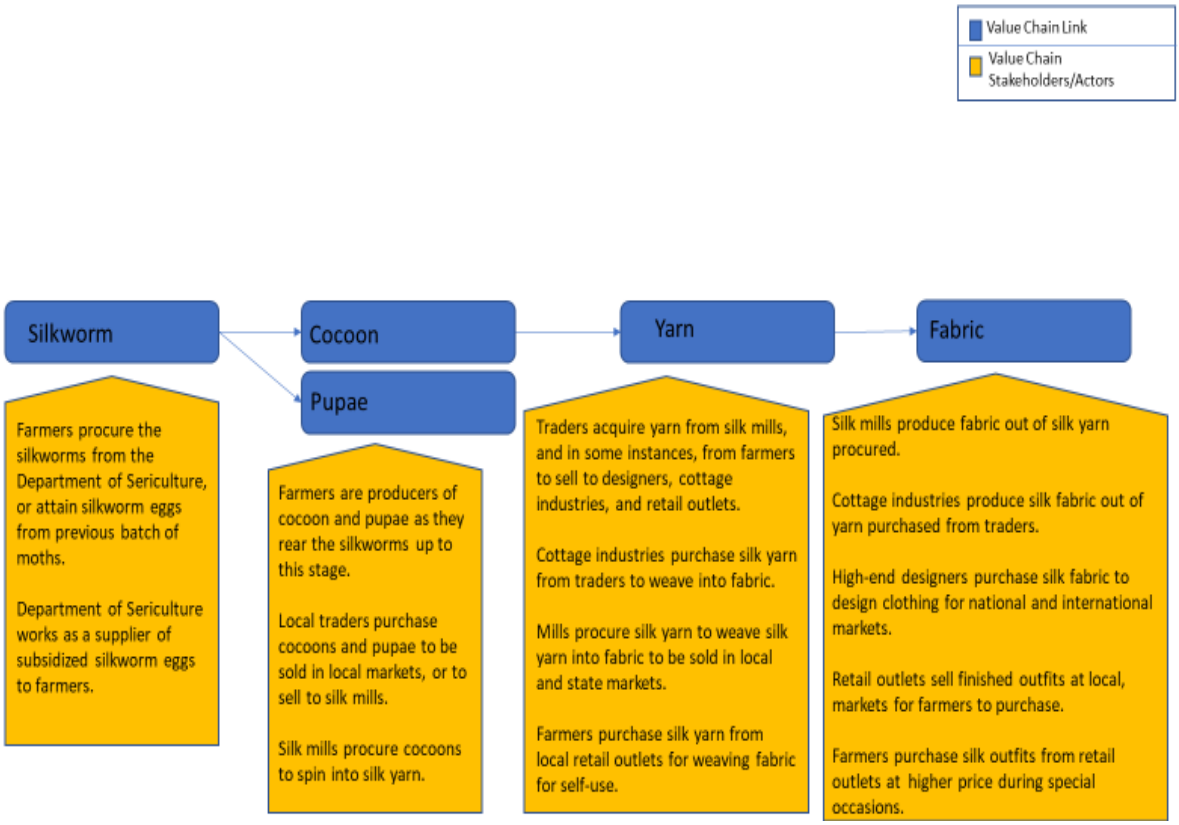
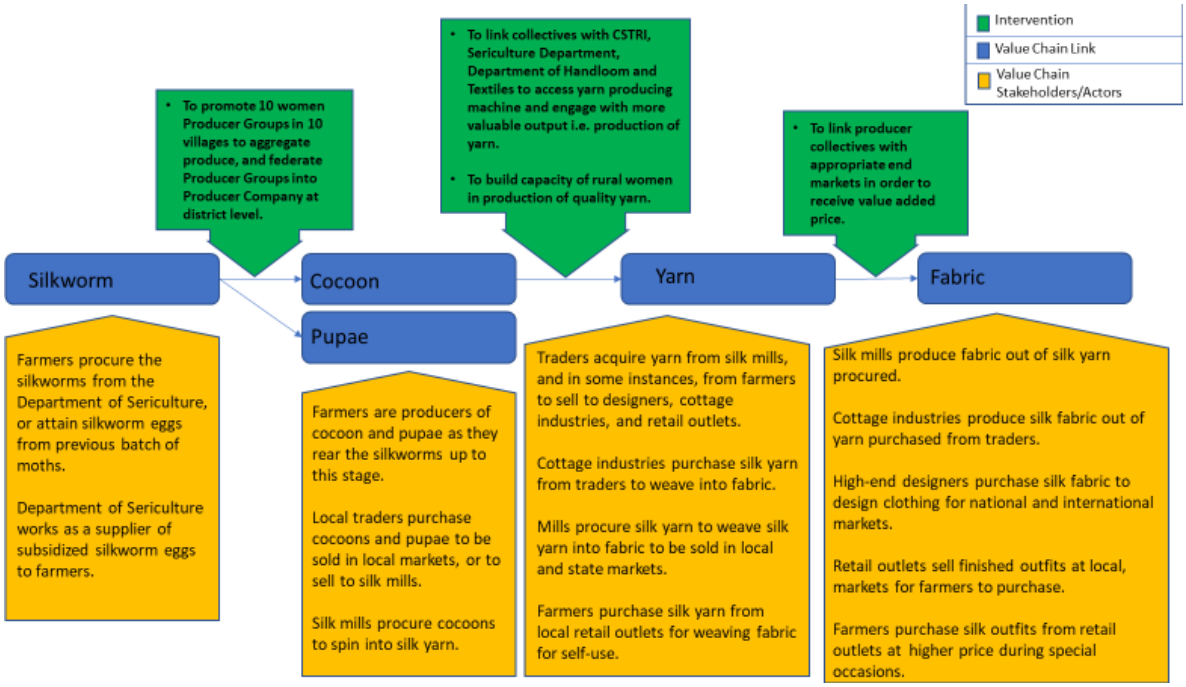


Figure 3: Proposed value chain intervention for Eri silk



Commodities viz. pineapple, ginger and other fruits are produced in abundance in the study districts but due to lack of processing post-harvest

losses are very high. Primary processing units with simple technical input can be set up under the jurisdiction of collectives. Producer collectives can take up the work of primary processing for value addition and realize better return. Moreover, rice mill, daal mill and mustard oil extraction unit could be other possible enterprises which can be taken up by producer collectives and extend better income to individual producers.

Weaving has been typically perceived as an activity that can be undertaken only for self-use, as very few farmers possess the time to undertake weaving on an individual scale in order to gain large returns. However, the setup of producer collectives could enable and ensure the timely production of adequate quantity and quality woven cloth if the work were to be distributed amongst the members of the collective. It is already successfully demonstrated by the cottage industries producing Mekhela-chador-gamocha etc. in large volumes in the district of Nagaon.

In the case of off-farm activities which include piggery, fishery, and poultry, producer collectives can be established to build pig breeding farms. Additionally, through the setup of collectives, the members of the collective could also establish poultry farms, and fish hatcheries for the timely supply of good quality and quantity seeds. This would reduce the farmers' individual dependence and pressure on line departments within the districts.

The production of commodities through collectives would also enable the collectives to gain access to large scale alternative markets unlike the current engagement with local markets that individual farmers are forced to access.

Producer collectives can also ensure the required infrastructure such as sheds for livestock, and storage facilities for agricultural produce to store commodities by accessing loans in an easier manner as it would be in an organizational capacity.

The role of a given 'Technical Support Agency' towards an 'implementing agency' in the formation of PGs and FPOs as a handholding and oversight agency is imperative for the establishment of well-functioning PGs and FPOs.

4.6.2 Potential market and marketing-based interventions of Producer Collectives to double farmers' income

Besides securing the production quality and quantity of commodities, and the provision of adequate infrastructure, the collectives can also become a means of marketing of the commodities. As mentioned earlier, the collectives could explore large scale and alternative markets through collective bargaining as they would have the adequate quantity and quality of commodities that would normally be traded in such markets. The increase in collective bargaining power through purchase and sale of commodities would ensure this objective.

In the case of commodities like Jute, as existing Jute mills rarely procure directly from farmers due to the insufficient quantity, the collectivization of farmers and their produce would allow them direct access to Jute mills for the sale of Jute thus increasing their income through quantity sale. If the farmers get direct access through producer collectives to Jute mill and other established markets the amount realized by them will automatically be double. As of now larger share of price from Jute fiber is received by the strong network of middlemen.

Another commodity could be pineapple. Pineapple production in Assam, especially from Karbi Anglong is of good quality but due to lack of appropriate value chain intervention, the farmers have yet to realize deserving market price. Formation of pineapple growers' producer collective and establishment of processing units can change the scenario. GINFED is one example to reckon with.

The establishment of collectives would also enable farmers to reduce input cost in the production of the commodities, as it would be a collective procurement of raw material or infrastructure. This would reduce their overhead cost of producing the commodity to a large extent allowing a larger rate of profitability for the members of the collective.

4.6.3 Establishment of Producer Collectives

The establishment of ethical and efficient producer collectives is critical in order to achieve the above mentioned outcomes. Besides inculcating the importance and credence of the idea of producer collectives through intensive formation drives, exposure visits of farmers to already successfully functioning collectives is an imperative to bring about the urgency and need for the establishment of these collectives within the four districts of Assam.

The role of producer collectives in these districts would require more engagement of the government with multi-faceted stakeholders such as academics and academic institutions, NGOs with work experience in this theme, and other state institutions that have implemented such collectives successfully. Academic institutes viz. IRMA have been conducting studies on impact of FPOs on farmers income, practice based research institute viz. ILRT have designed implementation plan and provided mentoring support the FPO promoting agencies, implementing agencies viz. IGS, ASA, BKSL, Access Development Services have rich experiences of formation of PGs and FPOs.

As the role of a collective could be multi-layered, and on several platforms, the engagement would involve thorough action research and additional scoping studies to understand which specific role a particular collective could play with absolute relevance to the region, and the community involved. The community themselves, would also play a critical role in the action research and scoping studies.

There is also a need to identify commodities with potential of scale which could be leveraged through the medium of collectives, whether in terms of production, or marketing.

4.7 Panchayati Raj Institution (PRI) in Assam

Panchayat Raj Institutions in Assam

Panchayat Raj Institutions (PRIs) in Assam function in a three-tier system as constituted by the 73rd amendment in the Constitution of India. The Gram Panchayat is the village level governance structure and representation of the villagers which is then federated to the Anchalik Panchayat which is constituted at a block level, and is lastly federated and converged as the Zilla Parishad at the district level.

There are several rural development roles and responsibilities that fall under the jurisdiction of the Gram, and Anchalik Panchayats, and the Zilla Parishad. The thematic areas of development under the PRIs in Assam are education, health, agriculture, social welfare such as pensions, Public Distribution Systems (PDS), PWD, or public infrastructure works, etc[43]. The roles and responsibilities conducted by the PRIs in rural development can be outlined as follows:

[43] http://www.asthabharati.org/Dia_Jul%2005/dip.htm

Table 82 : *Role of PRIs in Infrastructure and Rural Development*[44]

PRIs	Role and Jurisdiction of Infrastructure Development	Role and Jurisdiction of Rural Development Programmes
Zilla Parishad	i. Construction and maintenance of village roads ii. Opening and maintenance of agricultural farms, marketing agencies, go-downs and cold storages iii. Construction, renovation and maintenance of minor irrigation works iv. Establishment and maintenance of hospitals and health centres v. Establishment and maintenance of primary, secondary schools	i. Land reclamation and land development works ii. Fish seed production and distribution and development of inland fisheries iii. Activities towards development of household industries iv. Planning, supervision, monitoring and implementation of poverty alleviation programmes
Anchalik Panchayat	i. Construction and maintenance of public roads and maintenance of public ferries water ways ii. Construction, repairs and maintenance of primary school buildings iii. Implementation of individual irrigation works	i. Identification and implementation of agricultural development schemes ii. Training of farmers and extension activities iii. Planning and supervision of implementation of poverty alleviation programmes iv. Organization of training programmes in khadi, village and cottage industries v. Programmes relating to the development of women and children
Gram Panchayat	i. Construction and maintenance of village roads ii. Identification of locality for distribution of electricity iii. Establishment and maintenance of wireless receiving sets	i. Development of wasteland and grazing land ii. Development of fisheries in the villages by digging ponds and dobhas iii. Construction of goat and pig sheds iv. Distribution of house sites v. Selection of beneficiaries under poverty alleviation programmes vi. Participation in women and child welfare programmes, vii. Monitoring public distribution system

[44] http://shodhganga.inflibnet.ac.in/bitstream/10603/29214/12/12_chapter%205.pdf

While the functioning of the PRIs in Assam are regulated as per the 73rd amendment in the Constitution of India, the financial regulation is conducted under the Finance Commissions defined under the aegis of the Government of India. The current financial regulation of PRIs in Assam are governed by the tenets of the 14th Finance Commission of India.

In spite of thee passing and constitution of the Assam Panchayati Raj Act of 1994, the rural governance reforms in the context of livelihood activities is not uniform across all district of Assam. This is particularly true of the Sixth Schedule Areas of Assam, which grants a separate territorial Autonomous Council in districts like Karbi Anglong wherein the three-tier PRI system is not adopted. However, the Autonomous Council framework is different from that of the PRIs.

In the context of livelihood activities, PRIs in Assam have recently been mandated with the convergence of Central and State Government schemes and projects. In the year 2014[45], PRIs were mandated to be the nodal point of convergence of several schemes in sync with the respective government line departments such as Agriculture Department, Forest Department, Irrigation Department, etc. Additionally, implementation of the convergence of all livelihood-based schemes have been facilitated through the State Rural Livelihood Mission in Assam (SRLM), which was established under the jurisdiction of the National Rural Livelihood Mission (NRLM). The convergence and facilitation of the SRLM for the implementation of central and state schemes was mandated under the 14th Finance Commission of India[46].

Nagaon

Under the MGNREGA scheme, the Gram and Anchalik Panchayats conduct special meetings within the district of Nagaon wherein the block and village level officials of MGNREGA Commission discuss the scheme, and the scope of work with the village members in the Gram Sabha. The beneficiaries for the scheme are then chosen within the Gram Sabha by the respective Gram or Anchalik Panchayat, after which the names of the respective village residents are forwarded to the MGNREGA Commission, who then conduct direct transfers to the villagers bank account.

In this case the Gram Sabha is attended by block and village level officials of the Agriculture Department regarding information dissemination of the scheme, following which the PRIs select the beneficiaries and forward the list to the department wherein the benefits of the scheme are directly transferred to the farmers through banks.

In the district of Nagaon, implementation of convergence schemes has been relatively slow, wherein the implementation and convergence of

[45] *https://asrlms.assam.gov.in/schemes/detail/panchayati-raj-institutions-community-based-organisation-convergence-project-0*
[46] *http://shodhganga.inflibnet.ac.in/bitstream/10603/29214/12/12_chapter%205.pdf*

livelihood schemes such as MGNREGA, and the Pradhan Mantri Gram Awas Yojana (PMGAY) have just begun in the second half of the year 2017. Insofar within the district of Nagaon, the implementation of livelihood schemes has been actively carried out only in the blocks of Badhampur and Baziagaon in Nagaon.

Karbi Anglong

The Mikir Hill district was rechristened as "Karbi Anglong District" in the year 1976 with its Head quarter at Diphu. The district enjoys autonomy under the provision of Sixth Schedule of the Indian Constitution. As the district was formed under the Sixth Schedule of the Indian Constitution, there was a need to constitute a local governing body as the PRI structure could not apply to these regions. Hence, the Autonomous Council of the Karbi Anglong district came into being with a tripartite agreement signed in 1996 between the Government of India, the government of Assam, and the newly formed Karbi Anglong district Autonomous Council under the Constitutional Amendment Act of 1995[47].

The Constitution of India granted greater autonomy to the Council and entrusted 30 council members out of which 26 were elected from the village level institutions, and 4 were nominated by the chairman of the Autonomous Council who would be elected by the Council Members. Additionally, as per the Sixth Schedule, the respective government line departments would be housed within the District Council building, while the District Commissioner would be responsible for the law and order situation within the district.

The Agriculture Department, Horticulture Department, Forest Department, Animal Husbandry, and Fisheries Department are all currently housed under the District Autonomous Council[48]. Consequently, all state and national government schemes are also routed through the Autonomous Councils district and block level institutions which are the VDC, and the BDC. Schemes such as MGNREGA, Pradhan Mantri Fasal Bima Yojana, and the Pradhan Mantri Gram Awas Yojana are implemented through the Implementing Committees under the VDCs and BDCs of Karbi Anglong. The Implementing Committees work in conjunction with the village and block level officials of the government line departments in the implementing process of the state and central government schemes. The beneficiaries of the schemes are selected by the District Autonomous Council in discussion with the respective VDCs and the BDCs.

[47] *http://karbianglong.co.in/about.html*
[48] *http://karbianglong.co.in/department/*

Bongaigaon

In the district of Bongaigoan, the Gram Panchayats develop their plans also known as 'Our Village Our Scheme' through a participatory approach whereby discussion of such plans were done in the Gram Sabha. This is basically a four day design drafted by State Institute of Rural Development (SIRD) for developing a thorough plan conducted by the Gram Panchayat for assessing the resources and needs of the community. This includes developing community infrastructure, agriculture development and installing tube well, fencing etc. This assistance is mostly provided through MGNREGA which is routed in conjunction with the MGNREGA commission and the Gram Panchayat. Moreover, the Panchayat conducts awareness programs for the villagers on the different schemes such as Rashtriya Krishi Vikas Yojana (RKVY), National Food Security Mission (NFSM), Backward Regions Grant Fund (BRGF) and address grievances on issues related to connectivity, food security, availing schemes etc faced by the villages.

Dhemaji

In the district of Dhemaji the Mishing Autonomous Council (MAC) is functioning alongside with the collaboration and convergence with Gram Panchayat for social, economic, educational, ethnic and cultural advancement of the Mishing and other Scheduled Tribe communities residing in Dhemaji district.

Under the MAC the major scope of work includes agriculture development, Animal Husbandry, Fisheries, Handloom and Textiles, Rural Roads, Sericulture etc. As livestock holds an important key to the economic growth of the district, as majority of the Mishing and other tribal population practice piggery

The further plan of the MAC is to construct more such platforms in all the water pastures of the Brahmaputra river that is adjacent to the district of Dhemaji.

The MAC has been proactive in construction, repairing and maintenance or rural road, culvert and bridges etc. The MAC was actively involved in road construction during the year 2013-14. Due to active road constructions undertaken by the MAC, the farmers now feel relived regarding transport of their produce to markets.

The MAC is actively involved in the promotion of sericulture as a livelihood activity in Dhemaji. The MAC undertakes these promotion activities for both Muga and Eri silkworm rearing. However, owing to scarcity of feeder plant, lack of incentives, and market linkages, the trade of silk cocoons and yarn is gradually dwindling. The MAC is currently in the process of drawing plans to revamp sericulture beginning with restoration of all the Govt. farms and taking up community plantation so that scarcity of feeder plants are reduced.

The latest initiative of the MAC is the Livelihood Mission and Transfer of Technology whereby a collaboration with different technical institutions like KVK, ICAR, for the transfer of technology from scientific and professional institutions in order to use this upgraded technology to intensify crop production. Moreover, specific livelihood schemes have been implemented from time to time for improving the livelihood of the mishing and tribal community in Dhemaji. These include assistance for Banana Cultivation, Fishery development, Piggery farming, Demonstrative of Boro Rice cultivation and skill up gradation for weaver.

4.8 Role of Information Technology in doubling farmers' income:

e-NAM

Background

'e-National Agriculture Market (e-NAM)' is a pan-India electronic trading portal which networks the existing Agricultural Produce Marketing Committee (APMC) to create a unified national market for agricultural commodities.

The e-NAM Portal provides a single window service for all APMCs related information and services creating a unified online trading platform across all registered markets in the country. This includes commodity arrivals & prices, buy & sell trade offers, provision to respond to trade offers, among other services. While material flow (agriculture produce) continue to happen through mandis, an online market reduces transaction costs and information asymmetry. It also promotes transparency in auction processes and nationwide market access for farmers. The farmer receives online payments for his produce depending on the quality of his produce[49]. e-NAM has notified 90 agricultural commodities which will be traded on the e-NAM online portal. Some of these commodities include paddy, onion, bamboo, cotton, turmeric, watermelon, orange, banana, etc.[50]

[49] http://www.enam.gov.in/NAM/home/about_nam.html
[50] http://www.enam.gov.in/NAM/home/commodity.html#

The state governments in India are actively working to register the APMCs, mandis, and haats within the states, on the e-NAM portal. However, there have been some issues with the model draft of e-NAM by-laws. In the year 2003 e-NAM circulated its first model draft across the states with its prescribed by-laws. The model draft clearly stated the pre-requisites that state governments need to undertake in order to register mandis and haats on the e-NAM portal. However, in the year of 2016 there was a revised model draft for e-NAM which was disseminated to the states with a revised set of by-laws. The model draft was re-drafted with new nomenclature in the year 2017. In its current status the pre-requisites of e-NAM are as follows:

1. The provision of basic e-NAM prescribed infrastructure for the market must be carried out by the state. The infrastructure includes brick and mortar construction for market boundary and fencing. The market is also required to have assaying, sorting and grading facilities, electronic and online market services for inquiry, trade, auctions etc., within the market place itself. Additionally, the markets must adhere to the standardization norms for certification and quality checks of the agricultural produce, as prescribed by e-NAM. The central government has also made a provision of Rs. 30 Lakhs per market place for the development of infrastructure and online services for the market, provided all the 3 pre-requisites are met.
2. The second pre-requisite of e-NAM requires traders to secure a single one-time license in order to conduct trade in all the registered mandis across the state.
3. Similar to the license pre-requisite, e-NAM also has a pre-requisite of a one-time, single point levy of market fee in order to conduct trade in all the registered mandis across the state[51].

Challenges for e-NAM in Assam

In its current form, e-NAM has 585 markets enrolled and registered across the country. However, in the case of Assam there have been some major challenges, which is why Assam is still in the process of registering merely 6 mandis/haats on a pilot test basis, which have not been officially enrolled on e-NAM yet[52].

[51] http://www.enam.gov.in/NAM/home/about_nam.html
[52] http://www.enam.gov.in/NAM/home/mandis.html

According to the Assam Agricultural Produce Market (AAPM) Act 1972, the state permits traders to be charged multiple market fees, which is levied separately at multiple points for every mandi or haat that the traders conduct their trade. Additionally, under the Act, the traders also have to secure multiple licenses at various APMCs, also known as Regulated Market Committees in Assam (RMCs) within the state in order to conduct trade. As this is diametrically opposed to the non-negotiable pre-requisites for the registration of the mandis on e-NAM, the state of Assam has not yet been able to successfully register any active mandis under e-NAM. However, the state of Assam has currently scheduled the amendment of the AAPM Act of 1972[53], in order to integrate the pre-requisites for the registration of mandis and haats on e-NAM. The new Act is will be taken up in the monsoon session of parliament and state legislative assembly. The new amended Act which was proposed in the Assam State Legislative Assembly is called, the Agricultural Produce and Livestock Marketing(Promotion and Facilitation) Act, 2017[54] which is currently undergoing legislative and parliamentary discussions and due process.

Recommendations:

As the registration of RMCs of Assam is currently in its legislative process, it is important for the state government to take up the development of the pre-requisite infrastructure for the market places in Assam. The state of Assam is still lacking in the provision of the adequate infrastructure market place. The state government must simultaneously develop this pre-requisite in the duration of the legislative process which permits the e-NAM pre-requisites as amendments to the previous Act.

The RMCs in Assam must create infrastructure and capacity for the certification process which is still wanting in the state of Assam. Under the infrastructure pre-requisite of e-NAM, certification such as organic certification is mandated. This component needs to be integrated into markets in Assam as the don't exist in several district markets such as Karbi Anglong and Dhemaji (wherein the agricultural produce is largely organic) resulting in farmers getting sub-optimal prices for their organic produce due to a want of organic certification.

The state government of Assam must also conduct efficient awareness drives amongst farmers and traders, on the benefits of e-NAM as a unified online national market. The state government must also conduct awareness drives and campaigns on the production of demand-oriented quality produce in accordance with the norms and quality standards of e-NAM, as without it, the farmers would not be able to gain a high price in this online market for their produce.

[53] http://extwprlegs1.fao.org/docs/pdf/ind82520.pdf
[54] http://agricoop.nic.in/sites/default/files/APLM_ACT_2017_1.pdf

4.8.1 Krishi Lakshmi-Digital Game for farmers' and for the rural development professionals:

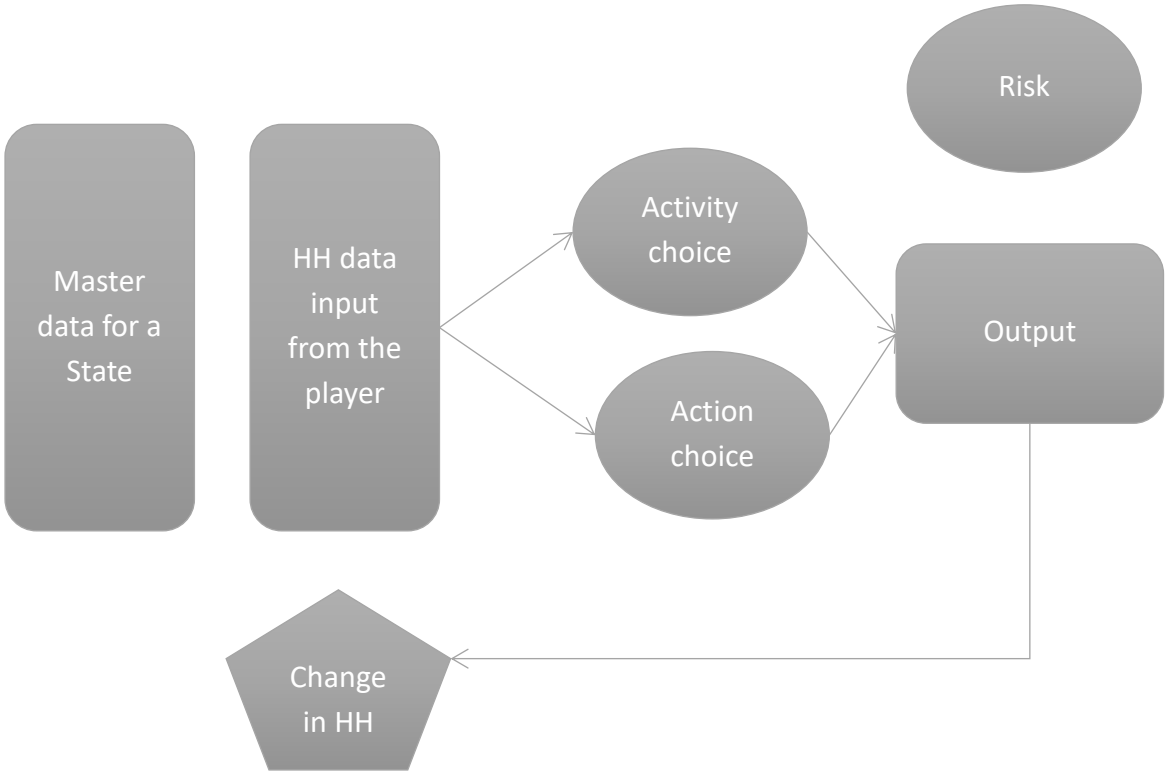
A large number of Institutions and Government bodies is engaged in enhancing the livelihood for the poor. Educating farmers and beneficiary is the key aspect of the effort such that they (target members) makes the right choice knowing the associated benefit and risk. It reduces the risk and enhances the chances of success.

This game and its computation model is based on helping individuals to understand cost and benefits of different kinds of inputs (seeds, fertilizers, pesticides) and practices (deep ploughing, irrigation, weeding). This will be a simple game in which the player who will be a marginal or small farmer who may be facing the harsh realities of agriculture and understand whether crop insurance would be helpful for them in the long run or not. Game aims to highlight the importance of crop insurance to deal with externality, uncertainty and risk involved in crop production and crop production as an enterprise. It helps in realizing the importance of Good practices and extra cost associated with adopting good practices but at the same time it protects the farmers from various risks which farmers commonly face.

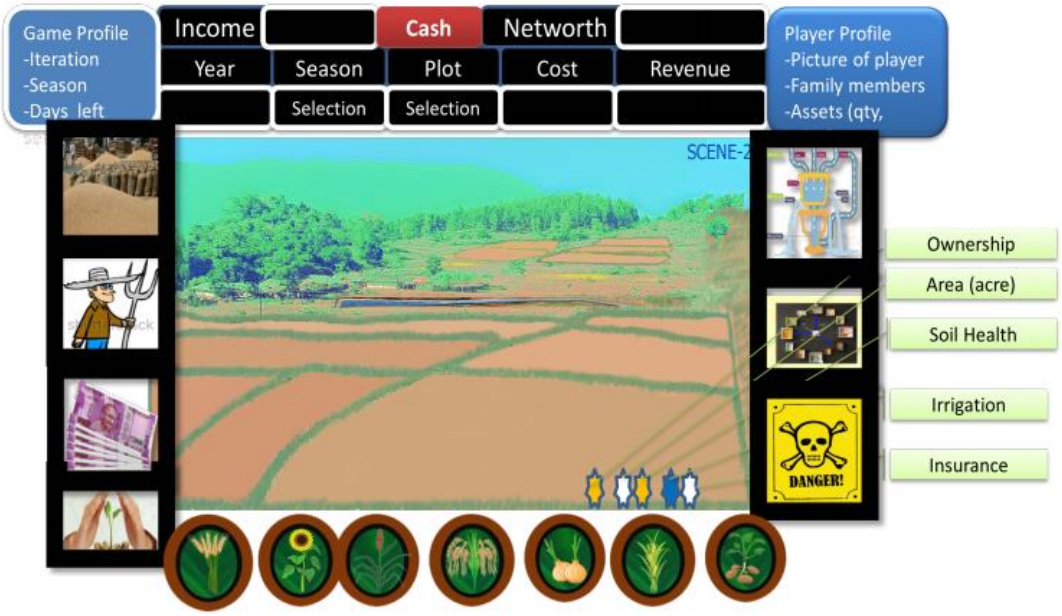
It is well established and practiced fact that games played effective role in happy learning. ILRT had built digital games that can be played on Smart phone and laptop to strengthen its capability to strengthen its training vertical.

Goal of the game:

- To enhance the understanding of choices such as crop, season and crop input that the farmer takes and its impact on the production, net profit and net worth over several iterations of production
- To enhance the understanding of agriculture student or livelihood professional to understand the impact of choices a poor farmer on its net worth over several iterations in different climatic zones.



Basic Framework design for Krishi Laksmi Simulation Game



Dashboard of Krishi Laksmi Game

Game Board (GB) has six sections – one game-board and five feature tools.

- Game Board: Central portion, the land on which the player grows crop. Agriculture package of practices are shown on these land. Crop is selected, grown and harvested. He/she can play many iterations. Each plot has been given number as identity. Same is used in displaying on the score board.
- Score Board: This is a tool shown at the top of the GB. Technically this is a separate object can be placed anywhere. Score Board always show the current data as on. Score Board has the option to see the data from each plot.
- Score Board: This is a tool shown at the top of the GB. Technically this is a separate object can be placed anywhere. Score Board always show the current data as on. Score Board has the option to see the data from each plot.
- Crop Selection: Bottom of the GB is the crop selection bar. Player can choose a crop. However there is a rule for the selection. He can select crop that is suitable for the season. He can grow the crop only when the land is free.
- Game Environment: Right side of the game board is the game environment tools. It has cash flow simulation tool. It simulates the cash as water in pipe flow. There is crop clock. It shows where the game as of now is. There is an icon for all external variables such as pest attack, rain, hailstorm, flood and drought.
- Status Star: There are five stars on each of the land. Color of these star describes the status of the land or crop. These are – a) ownership: Blue (owned), Yellow (leased), Red (Others); b) Area: a) Blue (quarter of an acre), Yellow (Half an acre), Red (one acre); c) Soil Health: Sandy white (poor), Brown (Good), Black (Rich); d) Irrigation: Green (Irrigated), Brown (Unirrigated); e) Insurance: Red (Insured), Black (Not insured)

Game cycle is modelled as crop clock in the game. Smallest cycle is a crop season that can be of 4/5/3 months durations. In the scene locations such as Plots and Markets, there is a concept of time. We have designed Crop clock. Each hour on the clock is one month. Depending on the level of the game, different time is allotted for the month. When it comes to crop, there are different varieties that take different number of days to grow. In Paddy, there are varieties that takes 70-90days and some takes 110-140 days. They give yield advantage and pest attack resistance. The present version of the game does not take care of this dimension of the crop.

4.9 Role of Government in doubling farmers' income

The role of government as a regulator and enabling agency is critical in the doubling of farmers' income. The need for government to conceive conducive market and production policies are imperative for doubling farmers' income. The government needs to facilitate and capacitate its departments from a state to a village level in order to achieve the desired outcomes.

In the case of agriculture, with the establishment of collectives, the government needs to capacitate and facilitate agencies such as the Assam State Agriculture Marketing Board (ASAMB), with financial and human resources in order to enable the agency to ensure adequate procurement chains for high levels of production that would result out of collectives. While the collectives would work on the production, agencies such as ASAMB would also find direct linkage with a collective easier to work with in order to draw market and marketing linkages for the collectives produce.

Due to poor agricultural infrastructure provision in the districts, farmers are compelled to invest large sums of money on production, such as diesel for motor pumps required in irrigation due to irregular electricity supply. This expense could be avoided if the government ensures adequate supply of electricity, hence increasing farmers' income by reducing input costs.

Additionally, the empowering of ASAMB to act as an enabling agency would allow collectives to gain access to larger and more distant markets for the sale of their produce.

The government also needs to capacitate its line departments in the provision of extension services more effectively to the farmers. The government must also encourage awareness of relevant schemes to relevant commodities being produced by the farmers, through the line departments. There are huge potential of intervention in dairy sector in Assam. According to the Economic Survey of Assam (2015-16) per capita /per day milk consumption in Assam is only 74 ml. The availability of crossbred cattle is very limited hence the production is also minimal. The present production of pigs are also not sufficient in the state and pigs are being supplied from the states viz. Jharkhand. The potential also lies for pig breeding farms. While intervention on dairy and piggery are obvious but it is equally important that the government ensures strong extension services to flourish these interventions resulting into farmers significantly increasing their incomes.

The line departments must also undertake an active role in the adoption and promotion of modern scientific techniques especially for farm and off-farm activities. For instance, the line departments could take up the establishment of pig breeding farms, poultry farms, and hatcheries for fish within the proximity of the farmers who are producers of the commodity. This must be carried out while simultaneously raising awareness of these proposed facilities to the farmers.

Irrigation has been a very large challenge that a majority of the farmers face in the districts. The government must undertake the effective implementation and awareness generation of irrigation schemes that already exist, and the schemes that would be newly introduced. Gravity based drip irrigation has been practiced on a very small scale in spite of the high efficiency rate of this practice. This method could be more actively encouraged by the irrigation department in convergence with the agriculture department.

In addition to irrigation, the government must work on road connectivity and networks, as it is crucially lacking, especially with regards to remote villages and blocks. The road connectivity is crucial to encourage trade by linking the primary producers of a commodity directly to the desired market.

The districts are also challenged in terms of the supply of electricity. With an erratic and inadequate supply of power to the villages, farmers face easily avoidable challenges, especially with regards to irrigation. Farmers are compelled to irrigate their fields through motor-pumps that are run by diesel and kerosene, which increases the cost of production, and in turn, the cost of the produce. This works against the farmers' best interest.

Financial inclusion, especially in the context of credit linkage and banking of farmers in remote rural parts of the four districts has been a mounting challenge. Rashtriya Grameen Vikash Nidhi, North East Small Finance Bank and Bandhan has proven that there are huge demand of credit by farmers and government banks have not been addressed it due to limited outreach. There are also private banking institutions that have set up operations in the districts. The oversight and regulation of financial policy by the government in these districts is critical in order to protect the farmers' financial interests. The government must also promote government banks to commence operations with the vital mandate of promoting secure credit linkage for farmers as the four districts in Assam suffers from a shortage of capital and credit facilities.

Chapter V

Conclusion

In the collective history of human kind as a species, the age of agriculture heralded a new age in the evolution of the species as we know it. Ever since then, one of the oldest vocations has been our source of livelihood, and the backbone of our existence. However, in this post-modern world the role of agriculture has been ebbing away, in part due to mismanagement of resources, and the persistent industrialization of our world.

Persistent low income of farmers have been dissuading the youth from taking it up as a profession thus creating an additional strain on the already existing farmers' distress and the danger of a void of farmers in the coming generations.

Looking back a couple of decades, it is evident that for right reasons, agriculture sector in India has focused primarily on raising agricultural output and improving food security. This involved a multi-pronged approach of use of technology to increase in productivity, improved quality of seed, fertiliser, irrigation and agro chemicals on one hand and remunerative prices for some crops and subsidies on farm inputs on the other. This strategy was able to address severe food shortage that emerged during mid-1960s. While this took care of the food basket of the country, it was not able to completely and adequately address the livelihood basket of the smallholders.

The low level of farmers' income and year to year fluctuations was the main point of distress which eventually got severe over time. This in turn, significantly impacted the population of the country that is dependent on farming for livelihood through consequent ramifications. Persistent low levels of farmer income can also cause serious adverse effects on the future of agriculture in the country.

The same holds true for the agriculture and allied sector in Assam. While the production rate of agriculture and allied activities has witnessed a gradual growth, there still is a deficit in terms of production of several commodities. Amongst several other factors the negative income growth of farmers in the state of Assam is especially challenging. This highlights the vitality that the role this study could play in the context of resolution for the current situation of farmers. The importance of the goal of doubling farmers income in the state of Assam is paramount as it would not only bring about an increase in income, but would also give rise to social empowerment, and would contribute largely to the state's income, and in turn, the nations.

In the current context of this study vis-a-vis., in the districts of (Nagaon, Bongaigaon, Karbi Anglong, and Dhemaji), farmers are engaged in farm, off-farm, and non-farm activities as a means of their livelihood. Farm activities include the cultivation of several crops, vegetables, and horticultural commodities.

These include crops like paddy, pulses (black gram), oilseeds (mustard), vegetables such as Okra, Brinjal, Cauliflower, Cabbage, Pumpkin, etc., and horticultural commodities such as Pineapple, Papaya, Banana, Mango, etc.

The rearing of pigs, fish, cows for milk, ducks, silkworms, and goats constitute the off-farm space, while trades, activities and services such as weaving, handicraft, the trade of agriculture and allied commodities constitute the non-farm activities. Through the course of this study, we have witnessed the growing dependence of farmers on wage labor in the districts of the study. While wage labor does generate income for the rural communities within the districts, it is also laborious, and creates a strain on human resources to produce other agricultural and allied commodities.

Farm

As mentioned during the course of this study, paddy is the predominant crop that is cultivated in all villages in the district. In spite of paddy being the primary produce, a large number of farmers still cultivate the commodity on leased land as a means of self-subsistence, and not trade. This highlights the urgent requirement of interventions to be taken up by the government and civil society organizations to create favorable policy and innovative methods to enhance and enable profitability of farmers from their paddy produce.

The focus on horticulture products can prove to be a vital source of additional income to farmers in the districts of Assam.

During the course of the study, it was concluded that the cultivation of paddy through the SRI method would create an increase in income by 1.36 times, and an increase in production by 1.5 times the current status. The intervention of SRI in paddy production substantially reduces over heads such as tractors and seeds that the farmers are currently strained with.

Even though the use of SRI in paddy cultivation is a sound technique that must be used by farmers to increase their income, the method in itself is not a silver bullet that could resolve the issue of doubling farmers' income.

Along with the introduction of the SRI technique of cultivating paddy, there must be a conducive governance mechanism in terms of policy at a macro level, and direct farmer capacity building and handholding support for the farmers. The role of CSOs and the government does not merely end at capacity building and handholding support. There are also several policy level interventions that are imperative to secure the goal of doubling the farmers' income. For instance, there is an urgent need in the revisal of policy with regards to the procurement of paddy in these 4 districts.

The focus on horticulture products is also a vital source of added income to farmers in the districts of Assam. Pineapple and oranges are produced in significant quantities in the district of Karbi Anglong, and Bananas in Nagaon. While the production of these horticulture products exists, the farmers find it challenging to reach out to appropriate markets in order to attain the best price. The government must focus on linking these farmers to the appropriate markets.

In addition to increasing farmers' income, horticulture products also play a vital role in climate mitigation solution. Horticulture features in the National Agroforestry Policy of 2014 of India as one of the key activities to be taken up in order to increase the carbon sink by sequestering carbon in non-forest areas, in turn, reaching India's global pledges towards climate change.

A successful example of drip irrigation in off-season vegetable cultivation can be witnessed in the Janum village of the Angara block in Ranchi, Jharkhand wherein farmers have successfully begun cultivating off season vegetables with support from Jharkhand State Livelihood Promotion Society (JSLPS).

Additionally, focus on agricultural infrastructure, especially irrigation, is in dire need of attention from the government of Assam. Farmers are enthusiastic about cultivating paddy for three seasons in the year (and other vegetables), however the lack of irrigation facilities preclude farmers from doing so. The potential of drip irrigation must be explored and implemented for the production of agricultural products. A successful example of drip irrigation in off-season vegetable cultivation can be witnessed in the Janum village, of the Angarra block in Ranchi, Jharkhand wherein farmers have begun successfully cultivating off season vegetables with support from Jharkhand State Livelihood Promotion Society (JSLPS). This intervention requires convergence from the irrigation and agriculture department to enable the achievement of this goal.

The study identified a shortage of procurement centers for paddy in the district of Karbi Anglong. Unless this bottleneck is resolved, the establishment of a Minimum Support Price itself would not be entirely helpful. In the case of SRI as an intervention, there will also need to be a provision for the amendment of the procurement policy for paddy considering the potential increase in production. If these interventions are not undertaken at a governance level, the technical intervention in itself would be unfruitful.

The organization of producer collectives are another vital intervention that needs to be addressed on a policy level, and implemented by government and Civil Society Organizations (CSOs) at a grass root level. Producer Collectives can enable and empower several communities to take up value chain interventions within the chosen livelihood vocation, through collective power. Primary processing units with simple technical input can be set up under the jurisdiction of collectives. If producer collectives are enabled with primary processing units such as rice and mustard mills, they would be able to collectively process rice and mustard oil, securing adequate production of the commodity.

In the case of commodities like Jute, as existing Jute mills do not procure directly from farmers due to the insufficient quantity, the collectivization of farmers and their produce would allow them direct access to Jute mills for the sale of Jute thus increasing their income through quantity sale. This would be highly beneficial in the districts of Bongaigaon and Nagaon wherein there exist a substantial number of jute farmers.

The intricate process of the formation of collectives also requires detailed attention. The mere formation of collectives in itself must not be viewed as the sole motive. The government and CSOs must establish ethical and efficient frameworks for the formation of producer collectives centred around a commodity. The role of the collectives must be definitive, and the stakeholders involved in the formation of collectives must also ensure the federation of collectives into producer companies.

In the case of agriculture, with the establishment of collectives, the government needs to capacitate and facilitate agencies such as the Assam State Agriculture Marketing Board, with financial and human resources in order to enable the agency to ensure adequate procurement chains for high levels of production that would result out of collectives and innovative methods of production such as SRI. While the collectives would work on the production, agencies such as ASAMB would also find direct linkage with a collective easier to work with in order to draw market and marketing linkages for the collectives produce. Additionally, the empowering of ASAMB to act as an enabling agency would allow collectives to gain access to larger and more distant markets for the sale of their produce.

In addition to agriculture policy such as irrigation, the government also needs to focus on fertilizer and pesticide regulation. In the district of Karbi Anglong, a substantial portion of the tribal population that reside in the hill zone of the district practice shifting cultivation. This results in a low dependency on fertilizers and pesticides. In fact, paddy, ginger, turmeric, and some of the other produce cultivated in these hill regions of Karbi Anglong are organic. However, due to the lack of an organic certification the farmers here are unable to sell their produce as organic produce. This is a policy intervention that requires urgent attention from the government.

Off-farm

In the case of off-farm activities, the four districts of Assam within which the study was conducted, practice most of the off-farm activities. The rearing of goats, cattle, pigs, poultry, and fisheries is cultivated extensively, albeit community specific. In the case of off-farm activities, the rearing of specific livestock is limited to the community of the region. For instance, pig rearing is specific to the tribal community, and is not witnessed much amongst other communities. Fish rearing is largely carried out by the Muslim community, but is not exclusively restricted to them alone.

Fish farming is undertaken in large part in the districts of Nagaon (also informally known as the fish capital of the North-East of India), and Bongaigaon. In spite of the existing production volumes of fish in the districts, there still is a deficit in fish production. Fish is still imported into the state from neighboring states like West Bengal and Andhra Pradesh.

This indicates the need for an intervention in the production practices of fish. While fish is produced by several farmers in Bongaigaon and Nagaon, the productivity of fish in the districts does not exceed 350 kilograms per bigha, wherein with the best scientific practices of culture fisheries has the potential to produce 600 kilograms of fish per bigha annually. This has been detailed within the study.

In the existing condition, several farmers are unaware of best practices for fish farming, in terms of fish feed and medication. In addition to this, farmers also face a challenge with regards to the access of good quality fish seeds. The government must explore opportunities to establish an additional number of hatcheries in the district, but more importantly the government along with NGOs and CSOs must work on awareness building and improving the access of farmers to the existing hatcheries as well. The farmers rearing fish must also be capacitated in order to implement these best practices for fish farming.

As pig rearing is a natural livelihood activity for tribal farmers, the intervention of scaling up pig production is imperative in the districts of Dhemaji and Karbi Anglong.

Piggery

Pig rearing is a vocation that is almost entirely undertaken by the tribal communities, who are in a large number in the districts of Dhemaji and Karbi Anglong. As pig cultivation is a very natural livelihood activity conducted by tribal farmers, the intervention of scaling up pig production is imperative in the districts of Dhemaji and Karbi Anglong. Pig fattening, wherein farmers purchase piglets for fattening and selling is a common practice amongst tribal farmers. The study depicts a piggery model wherein farmers can be involved in a more streamlined process of increasing their income through pig fattening and sale.

Despite the rearing of pigs being carried out by a large number of the tribal farmers, the farmers still face a major challenge with regards to the acquiring of quality piglets, and more importantly the access to adequate healthcare for the pigs. Vaccines for swine flu have been a compounded challenge that the tribal farmers have faced for a few years. The shortage of these vaccines results in farmers procuring these vaccines from informal markets whose effectiveness cannot be validated. This causes a less than desirable mortality rate amongst pigs. The government must conceive and administer policy that makes access of swine flu vaccines more accessible to farmers at regular intervals.

The government could also explore opportunities to tie up with veterinary colleges in the region in order to provide high quality piglets for fattening or breeding. A successful example of this could be witnessed in the state of Jharkhand wherein the Veterinary College of Birsa Agriculture University have established a pig breeding farm in order to supply high quality cross-bred pigs to farmers for rearing and sale. A model of increasing farmers' income through pig fattening is also indicated in this study.

Dairy

The rearing of cows for milk was noticed as a common practice across several OBC, SC, and General class farming communities across the 4 districts in Assam. However, as most cows reared are a local breed of cows, the milk production does not exceed 2.5-3 litres a day. The scaling up of milk production in the four districts of Assam is a much needed urgency, as markets for milk consumption do exist, and so does the potential. The study demarcates the model for scaling up milk production in the state which would lead to increased income of dairy farmers. The model depicts the rearing of 2 cross-bred cows which would more than double the milk production per day, from 2 litres to 10 litres. The adoption of this model leads to one of the highest contributor in increasing farmers' income within off-farm activities.

The scaling up of milk production of dairy farmers is not possible without the direct intervention, assistance, and capacity building of farmers by the government and CSOs. In order for the increase of milk production, the dairy farmers must focus on rearing cross-bred cows as opposed to the current situation of rearing local breeds. This would require an overhaul of policy to conceive schemes that would enable the provision of cross-bred cows to farmers at a subsidized rate.

In addition to the provision of cross-bred cows, the government also needs to ensure the sound implementation of healthcare policy and extension services. Farmers rearing cows often face challenges with regards to extension services for the healthcare of cattle. This has resulted in a low maintenance of cattle which also leads to a low productivity of milk, and increased mortality rate of cattle. The farmers in the 4 districts currently view cattle for their vital role in the ploughing of fields, and much less in dairy production. This perception can be overcome only with awareness and capacity building of farmers by line departments.

Government departments must ensure the adequate coverage of extension services for medication and vaccination of cattle amongst cattle farmers. If the introduction of cross-bred cattle had to work, it would only be possible through the rigorous handholding and training support of the government.

Sericulture and Yarn production:

The state of Assam is renowned for the cultivation of silk all across the country. Sericulture is an innate, and age-old practice by tribal populations in the state of Assam. The state played a vital role in the production of silk in ancient times during the age of the Kushan Empire which were the glory days of the silk route.

There are three types of silk cocoons that are cultivated in the state of Assam, namely; Eri, Mulberry, and Muga. While Eri is the lowest remunerative silk cocoon, it is cultivated in the largest quantity as the rearing process of Eri silk worms are easier, and can be done so in a lesser amount of time. This is largely due to castor (the eri worm) host tree being a fast-growing plant (6-8 months). The rearing of Muga and Mulberry silk is more time consuming as the host trees take a longer duration (3-5 years) to be used for silk production.

Sericulture is not merely beneficial in terms of increasing farmers income as a livelihood activity, but is also highly beneficial as a climate friendly and mitigative livelihood practice. For sericulture to be practiced the existence of host trees is imperative. The plantation of host trees play a role in sequestering carbon emissions by increasing the carbon sink in non-forested areas. The focus on promoting sericulture is imperative for desirable climate outcomes.

Despite the importance of sericulture in tribal culture, the practice is gradually reducing amongst tribal communities. Beside the practice of sericulture not being viewed as an entrepreneurial activity, and a self-subsistence one, the dearth of host trees for silk worms is one of the major challenges that is faced by tribal farmers. While castor (the host tree for eri), is a fast growing plant, it does not survive in water logged regions. Some tribal blocks and villages within the district of Nagaon and Dhemaji which are flood prone, are unable to effectively rear silk worms.

The challenge of the existence of host trees has been a major contributor to the scaling up of silk production in these tribal villages. The government needs to play a critical role in ensuring the plantation and survival rate of castor plants. Plantation drives need to be conducted to increase the number of castor plants. Additionally, awareness regarding this opportunity needs to be built amongst the silk rearing tribal communities.

Besides the provision of host trees for the production of silk cocoons, the government needs to ensure a value chain intervention that is possible through already existing government schemes. Farmers currently sell silk cocoons at the rate of RS. 650 per kilogram. If the cocoons were to be spun into yarn and sold, this increases the income to RS. 2,350 per Kg. Yarn spinning from silk cocoons are a tedious and time-consuming process. However, the sericulture department provides yarn spinning machines.

The average silk yarn production of Assam for 0.47 bigha is 3.9 Kg of cocoon which is roughly 3.1 Kg of yarn production ability. This can be scaled up with producer collectives as an intervention. If collectives were to become a medium of convergence of government schemes, the collective bargaining power would enable the farmers to gain access to sericulture schemes such as the acquisition of yarn spinning machines from the department. The formation of collectives would also result in the timely processing of yarn from silk cocoons by the members of the collective.

The Central Silk Board's Research Institute (CSTRI) is the only research institute in the country dedicated to the Research & Developmental activities related to silk technology and recognised as one of the Textile Research Associations in the country[55]. The research focus at CSTRI covers all the four commercially known varieties of silks viz., Mulberry, Tasar, Muga and Eri. In spite of the similarities, non-mulberry silks differ from the mulberry, thereby necessitating separate interventions adoptable under the techno-economic and social conditions prevailing in the sector. ***The CSTRI has modified the existing power operated spinning machine into a Solar Operated Spinning Machine***, which works with the following accessories viz., (a) Solar Panel – 10 Watts, 12 Volts SPVM (b) Motor – 12 Volts (D.C.), 5,200 rpm (c) Battery – 7.6 AH, 12 Volts. The production and quality parameters of the yarn produced using solar power solar operated hand spinning machine is as follows :-

"If agriculture goes wrong nothing else goes right. Younger people will join agriculture if it is technologically driven"
-Dr M S Swaminathan.

a). Flyer Speed : 750 rpm.	**c). Count of the spun yarn: 10's to 12's**
b). Production/ 8 hours: 200 gms	d). Cost of the machine: Apx. Rs. 10,000.00

This spinning machine can be operated by a foot pedal as well as by DC motor of 5200 rpm. The flyer speed is approximately 750 rpm. The motor operates with the backup power of 4 – 5 hours.

The government needs to build awareness amongst farmers regarding the availability of such schemes. As sericulture has largely been an activity practiced by tribal women, the scaling up of sericulture in the tribal livelihood basket would also ensure the involvement and integration of women in the household as an income generation source. The integration of tribal women and their rights are a crucial component that can be achieved through sericulture.

[55] http://csb.gov.in/assets/Uploads/pdf-files/press-note-on-eri-silk-spinning-solar-device.pdf

Weaving

Weaving has been typically perceived as an activity that can be undertaken only for self-use, as very few farmers possess the time to undertake weaving on an individual scale in order to gain large returns. However, the setup of producer collectives could enable and ensure the timely production of adequate quantity and quality woven cloth if the work were to be distributed amongst the members of the collective.

Weaving has also been an activity that has largely been practiced by tribal women. However, this activity has now extended to non-tribal women as well. If government interventions can be planned to setup producer collectives of women which exist in some parts of the district, this could be a very useful intervention to increase farmers income. The handloom and textile department could also provide high quality looms to collectives to undertake the large-scale production of woven cloth. Additionally, the government must also work towards the establishment of markets for the woven cloth.

Financial Inclusion

Farmers in the four districts suffer from a shortage of working capital to invest in their livelihood activities. This calls for the urgent attention of the government to facilitate financial inclusion amongst the farmers of these districts.

Financial inclusion, especially in the context of credit linkage and banking of farmers in remote rural parts of the four districts has been a mounting challenge. As there are very few government promoted credit linkage and micro-finance institutions in the four districts, private micro-finance institutions have effectively commenced operations.

There are also private banking institutions that have set up operations in the districts such as Bandhan Bank and North East Small Finance Bank. The oversight and regulation of financial policy by the government in these districts is critical in order to protect the farmers financial interests. The government must also promote government banks to commence operations with the vital mandate of promoting secure credit linkage for farmers as the four districts in Assam suffers from a shortage of capital and credit facilities.

Financial Inclusion in Assam-An Overview, Nishi Borgohain, Research Scholar, Dept. of Economics, Dibrugarh University, Assam -786004. Volume No. : 7, Issue No. : 2 , Year : 2016, ISSN Print : 2321-5828, ISSN Online : 0975-6795

Table 83: District-wise distribution of households' access to banking services in 2011

District	Rural		Urban		Total	
	%	Rank	%	Rank	%	Rank
Baksa	33.3	22	58.2	25	33.3	25
Barpeta	33.4	21	70.7	18	36.9	21
Bongaigaon	54.3	3	81.6	3	58.9	3
Cachar	35.0	17	66.9	22	41.0	15
Chirang	34.8	18	62.7	24	36.9	20
Darrang	34.5	19	64.1	23	36.5	22
Dhemaji	32.7	23	69.0	19	35.7	23
Dhubri	19.3	27	56.8	26	23.3	27
Dibrugarh	46.2	8	80.4	5	53.0	6
Dima Hasao	37.2	13	82.5	2	51.3	7
Goalpara	30.0	26	52.7	27	33.3	26
Golaghat	47.2	7	77.6	9	50.2	9
Hailakandi	69.7	1	78.0	8	70.3	2
Jorhat	49.9	5	78.4	6	56.2	4
Kamrup	42.9	10	66.9	21	45.4	12
Kamrup Metro	58.4	2	83.7	1	80.0	1
Karbi Anglong	36.7	14	73.3	16	41.7	14
Karimganj	33.5	20	75.4	14	37.5	18
Kokrajhar	30.4	25	80.9	4	33.7	24
Lakhimpur	43.9	9	76.8	10	47.4	11
Morigaon	42.1	11	76.3	12	45.1	13
Nagaon	32.3	24	70.7	17	37.8	17
Nalbari	53.2	4	76.2	13	55.8	5
Sivasagar	48.0	6	76.4	11	51.0	8
Sonitpur	36.3	15	78.1	7	40.7	16
Tinsukia	41.6	12	75.4	15	49.0	10
Udalguri	35.3	16	68.9	20	37.0	19
All Assam	38.3		75.2		44.1	

Source: *Census of India, 2011, HH-Series.*

Infrastructure

In addition to the involvement of the government in activities, the government faces a critical role and huge challenges in the context of infrastructure in the state of Assam. In addition to irrigation, the government must work on road connectivity and networks, as it is crucially lacking, especially with regards to remote villages and blocks. The district of Karbi Anglong and Dhemaji face a shortage of road connectivity.

The road connectivity is crucial to encourage trade by linking the primary producers of a commodity directly to the desired market. The districts are also challenged in terms of the supply of electricity. With an erratic and inadequate supply of power to the villages, farmers face easily avoidable challenges, especially with regards to irrigation. Farmers are compelled to irrigate their fields through motor-pumps that are run by diesel and kerosene, which increases the cost of production, and in turn, the cost of the produce. This works against the farmers' best interest.

Recommendations

I. Increase in agriculture/allied productivity, crop intensity and improvement in total factor productivity:

- Promotion of SRI by establishing models and replication by engaging implementing agencies including NGOs should become an important strategy.
- Per household introduction of two crossbred cows for the social classes Muslim, OBC and general has potential to increase incomes at least two folds.
- In the state, meat demand (of which pig meat demand is around 40%) is ten times higher than the existing production. There is huge potential of establishing pig breeding farms of crossbred pigs (viz. T&D variety of Birsa Agriculture University, Ranchi) which can help farmers take up fattening of piglets on a larger scale. This will result in multi-fold increase in farmers' income.
- Lack of irrigation was seen as a major challenge in the study districts being mostly rain-fed. The study area has good potential of vegetable cultivation and homestead garden has been traditional practice. If drip-irrigation practices are piloted, it has huge potential for farmers to take up off-season vegetable cultivation and increase income. As per the vegetable market observation by the study team, it was realized that the need of vegetables during off-season is addressed by the vegetable supply from Meghalaya.

- Pond based fisheries is one of the popular activities among the farmers but the productivity per unit is limited due to lack of scientific knowledge of the farmers on pond based culture fisheries. Fisheries extension services needs to be improved to increase the overall production of fish in the state as there are demand supply gap of 42,000 MT.

II. Diversification towards high value crops:

- Promotion of sticky rice (Joha rice[56] - *Oryza sativa*) in some parts of Nagaon and Karbi Anglong districts, which have established overseas market, needs to be encouraged and scaled up.
- Farmers needs to be skilled on cultivation of high value crop viz. black pepper. Potential of better remuneration through Potato cultivation is already realized in Nagaon by successful value chain intervention by a Farmers Producer Company. The learning needs to be replicated in with larger number of farmers. Vanilla production can also be explored as high value crop. Eurovanille (a French company) is exploring buy-back arrangement with the farmers.
- Horticulture crops viz. banana, pineapple have good production and scope for improved production in the study district. Area under improved high yielding variety viz. G-9 banana plantation needs to be increased for which necessary extension support is required by the farmers.
- The agro-climatic situation of the districts viz. Karbi Anglong, Nagaon and Bongaigaon have potential of medicinal and aromatic plants cultivation and extraction of oil. It is already demonstrated in some parts of the districts. Pilot action research can be taken up to further establish the potential and the results can be replicated with larger number of farmers.

III. Improving terms of trade for farmers:

- At present Assam State Agriculture Marketing Board (ASAMB) has limited capacity to procure agri-produce from farmers. ASAMB needs to be made more financially robust to be able to provide opportunity to the farmers to sell the produce beyond farm-gate market.
    - Paddy is one of the major agriculture commodities in the state but it was found that Food Corporation of India (FCI) has insufficient number of procurement centres therefore the procurement is around 50% of its potential. It is very important to increase the number of paddy procurement centres of FCI.

[56] Joha rice is only grown in the Northeast region of India. A special class of scented rice, it is completely different from the famous Basmati rice. It has a delicate texture and rich in anti-oxidant compounds. According to research done at Assam Down Town University, when the constituents of Joha rice were extracted with ethanol, it was found to contain proteins, phenolic compounds, flavonoids, carbohydrates and volatile oils. The rice has high level of acetyl and pyrroline, which gives it the sweet aroma. It also has more multivitamins than any other variety of rice

- Some examples of better price realization were observed in the study districts through producers collectives viz. GINFED in Karbi Anglong and Farmers Producer Company in Nagaon districts. It is important that more numbers of producers collectives are formed and the learning from the functioning of these producers collectives are incorporated.
- Large number of farmers from Nagaon and Bongaigaon are engaged with Jute cultivation as cash crop. Unfortunately, the market situation is exploitative and in spite of presence of Jute mills in the district, the farmers access is up to farm-gate market only due to the strong influence of middlemen. It was understood during the discussions with the farmers that if the farmers aggregate the produce and try to sell through collectives they stand better chance to receive more remunerative price.
- There are some evidences of the effect of online marketing by farmers using unified market platform (UMP) created by ReMS (joint venture between govt. of Karnataka and NCDEX Spot Exchange Ltd.) The proposed e-NAM (National Agriculture Market) platform needs to be established and used for providing increased market price.

IV. Shifting cultivators to non-farm and subsidiary activities:

- Market for silk yarn promises better remuneration than cocoon (around three times more return). While the farmer needs to be provided with the opportunities to engage more with yarn production, they also need to be supported for market linkages. Assam State Rural Livelihood Mission can take up action research on these and the results can then be scaled up for the larger area.
- Karbi Anglong and Bongaigaon produces good volume of pineapple but due to lack of processing units, the farmers receive sub-optimal price. Moreover, there are around 40% post-harvest loss as well. Vegetable and Fruit processing unit of Mother Dairy (Safal) Ranchi (Jharkhand) has been importing pineapple from Assam for pulp-making. It is important that the enabling environment is made available by the government so that processing units can locally be established.

- Production of traditional Mekhela-Chador and Gamocha is common at almost every household in the study districts. At present the production is through traditional throw shuttle looms which is time consuming and limited production capacity. Due to this reason, the fabric produced are mostly used at an individual household level. Moreover, these products are not able to compete in terms of price with the products from cottage industries. It is suggested that the weavers should be provided with upgraded handlooms viz. fly shuttle looms and they should also be provided trainings to develop better designs of the fabric.
- It was observed in Nagaon district that the farmers are already engaged with production of an aquatic plant Kuhila which provides thermocol like material used in making toys and other decorative items. While the farmers are already producing items made of Kuhila and selling it at local market, a detailed value chain and market study needs to be undertaken to understand the potential in terms of volume of market.

V. Enhanced role of government agencies and civil society

- During FGD with farmers and also during stakeholder's interviews in study districts, lack of irrigation emerged as one of the most important challenges in farm based livelihood activities. Most of the farmers believed that if government can arrange irrigation facility, it alone can significantly improve their income from farming activities.
- The power availability is also severely constrained by network constraints. Electricity is only available to 37% of the total households in the State, which is the third lowest next to Uttar Pradesh and Bihar, and significantly lower than the all-India average of 67%. During the discussion with the farmers, the lack of electricity emerged as another very important constraint after lack of irrigation. Government can plan to encourage the use of renewable sources of energy viz. solar energy by effectively formulating and disseminating the schemes.
- Based on the discussion with the farmers, it was understood that they do not have much awareness therefore limited access to extension services for both farm and off-farm activities. This results into significant crop loss and suffering of cattle. Moreover, there was hardly any awareness about crop and livestock insurance. The government should develop mechanism to make the extension services more accessible to the farmers. Awareness about crop and livestock insurance and accompaniment support to avail the insurance claim need to be planned.

- The access to credit is very limited for the farmers through formal financial sources. Based on the discussion with the farmers, it was realized that the most of the farmers are dependent either on the local moneylenders or they approach micro-finance institutions to avail timely credit. It is important that outreach of RRBs to be increased for farmers to avail credit at affordable rates. Models of Business Correspondence can be explored too, in this regard.

VI. Exploring engagement of youth in doubling farmers income

As per a news by Hindustan Times (8th February, 2017), The Assam Assembly was informed that more than 15 lakh educated youths are unemployed in Assam, of which 1.5 lakh jobless will be given skill development training to make them employable in 2017-18. At present, youth do not have much inclination towards considering farming as an avocation. Their inspiration has been to explore employment opportunity outside the village. This has been resulting into youth migrating to cities, within and even outside the state. One of the reasons that youth are not able to visualize income potential from farming sector is due to their limited knowledge about the sector. It is important that more number of youth is provided opportunities to acquire technical knowledge about the sector through courses on agriculture, animal husbandry, rural non-farm enterprises. Moreover, they also need to be given exposure to observe the successful farming practices in different parts of the country. Alongside, they should be provided skills to develop bankable projects incorporating provisions of crop/livestock insurance, approach banks to avail necessary loan and demonstrate that farming can also be a remunerative avocation. Suitable schemes need to be drafted to address this opportunity.

The mind-set of both the development agencies as well as that of the farmers have to fine tune to see each activity as an 'enterprise' and take it up as a 'business' rather than just a source of income.

The study also suggests that a multi-pronged approach will go a long way as opposed to focusing on a single approach such as only technology or improving farm productivity. In fact, the study goes on to suggest something that has already been realized when NABARD formulated the study – that if the incomes of farmers' have to be increased, they will have to increase farm productivity on one hand and indulge in additional livelihood sources close to or away from the farm but not necessarily farming alone. Additionally, the scaling up of productivity through modern practices and technology cannot be perceived as a silver bullet solution in a silo. The integration of good governance mechanisms, formulation of collective production, and marketing of produce, and also the direct linkage drawn between the community and market.

Dr. M. S. Swaminathan states that there are two major factors that influence the farmers i.e. market and monsoon. Market fluctuates due to uncertainty of monsoon thereby putting farming sector in crisis. Climate change issues are also involved leading to extreme events which are difficult to predict. He also discussed market volatility which is also affecting high production sectors such as rubber. The distress is multidimensional involving social, economic, technological, gender, and ecological aspects and therefore policy changes needs to be incorporated through which agriculture progress can take place by synergy between policy and technology. Emphasising on the role of technology and youth in agriculture his words can be quoted as: "If agriculture goes wrong nothing else goes right." and "Younger people will join agriculture if it is technologically driven".

And if this were true, one of the approaches should be to work around the limitations of uncertain monsoon and market fluctuations. It will, therefore, require a strategy that is doable for the farming household and at the same time maximize the available additional 'working hands' in a given farming household. Taking a cue from the adage that, 'farm diversification is a risk aversion strategy', the study suggests to look beyond the farm to diversify livelihood opportunities on one hand and create enterprises that will require additional 'working hands' – women in the household to take up a more serious role other than being just a helping hand in the farming business.

This will in turn, require increasing farm productivity, improved prices by way of collectives, risk adaptation and mitigation, and a geographical focus vis-à-vis particular commodities (and therefore the social classes). Policy measures aimed at increasing net income of households from animal farming and other enterprises will be one of the key drivers of incomes in farming households.

In the study, the District level data suggests that per unit area of productivity of all crops taken together under largely irrigated conditions is much higher compared to largely rain fed conditions. While diversification towards high value crops offers a great scope to improve farmers' income, it will not suffice, hence the need to engage with newer, smarter, and doable enterprises is of prime importance. The study comes up with the recommendation that increase in productivity of crops and livestock, improvement in efficiency of input use (through collectives) and where feasible, diversification towards high value crops will lead to improved price realization by farmers.

As already suggested earlier in the report, the engagement and involvement of women in the household will be fundamental to help double incomes of farmers since men in the household are fully – almost 100% – engaged with their ongoing work. While this will happen, simultaneously, the role of men in the household – farming and other enterprises – will have to become more efficient and smarter so as to make room for both additional livelihood opportunities as well as improved productivity both on farm and off farm.

Finally, the mind-set of both the development agencies as well as that of the farmers have to fine tune to see each activity as an 'enterprise' and take it up as a 'business' rather than just a source of income.

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Annexures

Annexure 1: Piggery

Economics of fattening of 15 piglets in each batch for six months: Excerpt from a study report on pig-farming in Meghalaya,

by Dr. Pradeep Bose, Consultant, ILRT

Better housing, feeding, management and improved disease control measures will give better survival rate, higher weight gain and low morbidity to the stock. Besides, the risk of losing the entire stock every three or four years, owing to infectious diseases, will be negligible. Though this methodology of fattening will be costlier in feeding and medicating the herds, but all other costs will be marginally higher. Improved methodology of raising piglets will help attain weight of 85 Kg per full grown piglet by the age of eight months or after fattening period of six months.

Fixed cost of raising 15 piglets from two to ten months = 1+2+3 (as mentioned below) = Rs. 4,700

1) Amortised land cost = Rs.750 /half year
   (15 piglets will grow to 90 Kg in weight by the time it is 270 days old. Each 90 Kg pig will require minimum space of 25 sq. ft. Hence it must have 375 sq. ft. of covered space and equal open space. Therefore 750 sq. ft. of prime land shall be required for raising 15 piglets. The opportunity cost of 750 sq. ft. area in a village should be about Rs. 15,000. Amortised over ten years it will stand at Rs. 1,500 per annum).

2) Depreciation of shed = Rs. 3,750 in six months.
   (Cost of building five pig-pens of 75 sq. ft. each, @ Rs. 200 per sq. feet = Rs. 75,000)

3) Apportioned cost of equipment, utensils = Rs. 200 every six months.

Variable cost of buying and fattening 15 piglets = 1+3+5+6+7+8 (as mentioned below) = Rs. 1, 20,700

(37,500+18,000+18,000+14,850+27,000+40,500+3,000+2,100) = 1,60,950

1) Cost of 15 piglets (two month old each), @ Rs.2,500 each piglet = Rs.37,500
2) Daily cost of feeding green feed to 15 piglets = Rs.100(opportunity cost of a labourer for half a day)
3) Cost of feeding green feed to 15 piglets over 180 days = Rs.18,000
4) Daily cost of feeding starch to the piglets (jack-fruits, colocacias, sweet potatoes, tapioca, squash fruits, stems of bananas) = Rs.100 (half day labour cost, over 240 days)
5) Cost of feeding starch to 15 piglets over 180 days = Rs.18,000
6) Cost of feeding starter, rations to the piglets for 45 days; @ Rs.22 per Kg of starter ration, feed @ 1 Kg per piglet = (15x45x22) = Rs.14,850
7) Cost of feeding grower ration to piglets for 60 days, @ 1.5 Kg feed per piglet per day and grower ration costing Rs.20 per Kg = (22.5x60x20) = Rs.27,000
8) Cost of feeding finisher ration to piglets for 75 days, @ 2.0 Kg feed per piglet per day and grower ration costing Rs.18 per Kg. = (30x75x18) = Rs.40,500
9) Cost of medicines, @ Rs.500 per month for six months = Rs.3,000
10) Cost of water and electricity, @ Rs.350 per month for six months = Rs.2,100

Average weight of an eight month old pig = 85 Kg

Revenue received through sale of 15 pigs each weighing 85 Kg, @ Rs.160 Kg for live weight = (15x85x160) = Rs.2,04,000

Gross Profit = Revenue - Variable cost (Rs.2,04,000 - Rs.1,60,950) = Rs.43,050 in 6 months or ROI @ 26.75 % in six months

Annexure 2: Dairy Project

Economics of rearing of two crossbred cows

https://odishavet.com/dairy-farm-project-report-2-cows-page-2/

Dairy farm project of two cows

Project report 2 cows

Crossbred cow dairy project

Dairy farming is a profitable business. It provides an excellent opportunity for self-employment for unemployed youth. It is also an important source of income generation to small/marginal farmers and agricultural labourers. India is the largest milk producer of the world. The demand of milk & milk product is increasing rapidly. There is immense scope of dairy farming in our country. The increasing cost of feed ingredients and its seasonal variability can be reduced by undertaking fodder cultivation.

Government subsidy available for these types of project– Back ended capital subsidy 25% for general category (33.33% for SC/ST beneficiaries) is available under government of India scheme Dairy Entrepreneurship Development Scheme (DEDS.). Subsidy ceiling is Rs.30,000/ for general category & Rs.40,000 for ST/SC category for dairy farm with two animals.

Farmer from Odisha can avail back ended capital subsidy 25% for general category (33.33% for SC/ST beneficiaries) under government of Odisha scheme, Promotion of Dairy Entrepreneurship (PDE).Subsidy ceiling is Rs.25,000/ for general category & Rs.33,333 for ST/SC category for dairy farm with two animals for PDE scheme.

Odisha farmer can avail subsidy either under PDE or DEDS scheme.

Avail Bank loan and subsidy– In order to avail bank loan & subsidy under DEDS/PDE the entrepreneur/farmers are advised to contact local animal husbandry /veterinary officer. Animal Husbandry department is the facilitator deportment for above schemes.

Before starting a dairy farm, the entrepreneurs/ farmers are advised to undergo training on dairy farming. They can contact local Animal Husbandry Department staffs/Veterinary College/Agriculture University etc. for the purpose. They should also visit progressive dairy farmers and Government/ Agricultural University dairy farms in the locality. They must check the following points before starting a dairy farm.

1) Availability of good quality dairy breed cows in nearby livestock market
2) Nearness of the Farm to Veterinary Hospital, Artificial Insemination Center/Livestock Aid Centers, MPCS
3) Marketing facility of milk and milk product in the locality
4) Availability of concentrates, fodder & medicine in that locality.

This project report is based on following assumptions:

1) Freshly calved indigenous dairy breed/ crossbred cows like Red Sindhi/ Sahiwal/ Gir/ Rathi/ Crossbred cows in 1st or 2nd lactation will be purchased in two batches of two animals each at an interval of 5 to 6 months.
2) Availability of 0.5 acre of irrigated land is a prerequisite for the project.
3) Cost of labour has not been taken into consideration since full time labour is not required for the small unit. Family labour will be utilized for maintenance of the dairy farm.

4) Fodder cultivation to be undertaken in 0.5 acre land. Two crops considered per year.

5) Cow dung produced will be utilized as manure for fodder cultivation.

6) Cost of rearing calves is not considered as it will be nullified by their sale value.

7) In case of death of a cow, new cow will be purchased from money received from insurance claim.

8) The scheme is workable based on the above guidelines, if run by the dairy farmer on prescribed PoP.

Housing for cows

Floor – Thatched, smooth strong concrete cemented, impervious to moisture, and have slope 1 in 60 towards gutter. Plinth should be 2ft. higher than ground.

Walls - 3ft. high brick wall on sides, end wall should be made of solid bricks.

Roof – 14-16ft. high at the center and 8ft. high on the side wall. There should be an additional extension of 3ft beyond wall to prevent rain water from entering cow shed. Roof should be made of asbestos, cement asbestos, or tile. Thatched roof can replace asbestos in low cost housing.

Items	Length in Meter
Manger	0.6m
Standing place	1.5m
Gutter	0.4m
Feeding passage	1.2m
Milking place	1.2m

Techno economic parameter

Type of Animal	Indigenous: Milch breed/crossbred/ crossbred Jersey Cow
No. of Animals	2
Cost of Animal (Rs./animal)	30,000/cow
Average Milk Yield (litre/day)	10
Floor space (sq. ft.) per adult animal	40
Floor space (sq. ft.) per calf	20
Cost of construction per sq. ft. (Rs.)	250
Cost of equipment per animal (Rs.)	1,000
Cost of fodder cultivation (Rs./acre/season)	5,000
Insurance premium (% per annum)	5
Veterinary aid/animal/ year (Rs.)	1,000
Cost of concentrate feed (Rs./kg)	16
Cost of dry fodder (Rs./kg)	1
Rate of interest (%)	12
Repayment period (years)	6
Selling price of milk (Rs./kg)	27
Sale price of gunny bags (Rs./bag)	10
Lactation days	280

Type of Animal	Indigenous: Milch breed/crossbred/ crossbred Jersey Cow
Dry days	150

Daily Feeding and Cost Chart for Dairy Cows

Item	Feeding Stuff	Cost/kg Rs.	During lactation period		During dry period	
			Quantity (kg)	Cost (Rs.)	Quantity (kg)	Cost (Rs.)
1	Concentrate feed	16	4.5	72	1.5	24
2	Green fodder	1	20	Home grown	15	Home grown
3	Dry fodder	4	4	11	5	10
4	Total		28.5	83	21.5	34

Lactation chart/Dry chart

Sr. No	Particulars	Years					
		I	II	III	IV	V	Vi
i)	Lactation Days						
a)	First batch	250	280	250	210	210	250
b)	Second batch	180	210	210	210	210	210
	Total	430	490	460	420	420	460
ii)	Dry Days						
a)	First batch	110	80	110	150	150	110
b)	Second batch	–	150	150	150	150	150
	Total	110	230	260	300	300	260

Economics of dairy farming with 2 indigenous dairy breed/ crossbred/cows

	Project cost	Cost. In Rs.
1	Capital cost	
2	Cow shed for 2 cows 40sq.ft/cow @250/sq. ft.	20,000
3	Calf pen for 2 calves 20 sq.ft./calf @250/sq. ft.	10,000
4	Cost of 2 crossbred cows with minimum average 10 liter milk yield /day @Rs.30,000/cow (as per govt. norm @ Rs.3,000/ liter of milk yield/cow)	60,000
5	Cost of transportation @Rs.2,500/cow	2,000
6	Cost of one chaff cutter hand operated	10,000
7	Cost of dairy appliances @ Rs.1,000/cow	2,000
	Total	1,04,000
Recurring cost to be capitalized		
a	Cost of feed for first batch of one cows for one month as per feed chart	2,490
b	Cost of insurance two animals @5% of animal cost	3,000
c	Cost of fodder cultivation in 0.5 acres of land for first session	5,000
d	Cost of medicine vaccine, electricity for the first cow	1,000
e	Contingency	4,510
f	Total recurring expenditure	16,000
g	Total Project Cost	1,20,000

	Project cost	Cost. In Rs.
h	Margin money 10% of project cost	12,000
i	Bank loan 90% of project cost	1,08,000

Cash flow analysis.

Item	Particulars	Project period					
		1	2	3	4	5	6
	Feeding during lactation period vide yearly lactation days and feed cost as per chart	35,690	40,670	38,180	34,860	34,860	38,180
	Feeding during dry period vide dry days and feed cost as per feed chart enclosed	3,740	7,820	8,840	10,200	10,200	8,840
	Medicine vaccine veterinary aid	2,000	2,000	2,000	2,000	2,000	2,000
	Insurance @5% of animal cost /year	3,000	3,000	3,000	3,000	3,000	3,000
	Cost of fodder cultivation	10,000	10,000	10,000	10,000	10,000	10,000
	Other miscellaneous expenditure	1,000	1,000	1,000	1,000	1,000	1,000
	Total	55,430	64,490	63,020	61,060	61,060	63,020
	Income						
	Sale of milk @Rs.27/liter during lactation days with average milk yield /10 liter/day	1,16,100	1,32,300	1,24,200	1,13,400	1,13,400	1,24,200
	Sale of gunny bags	420	460	450	420	420	440
	Manure will be utilized in own farm						
	Value of closing stock of 2cows (Depreciation on animal cost @10%/year)						24,000
	Value of building (depreciation on building@10 %/year)						12,000
	Value of equipment (depreciation on equipment @15%/year)						1,200
	Total income	1,16,520	1,32,760	1,24,650	1,13,820	1,13,820	1,61,840
	Gross profit	61,090	68,270	61,630	52,760	52,760	98,820

Annexure 3: Social class wise livelihood basket summary

Existing livelihood activities social class wise in Nagaon and Bongaigaon

Social Class	Farm based activities	Off-farm based activities	Non-farm based activities	Wage labour
General and OBC	Paddy	Dairy	Weaving	
	Jute	Fisheries	Craft and toy making from the aquatic plant Kuhila	√
	Vegetable	Poultry		
	Mustard	Goatary		
	Pulses			
	Areca nut			
	Beetle leaf			
Muslim	Paddy	Fisheries	Weaving	√
	Jute	Poultry	Trading	
	Mustard	Goatary		
	Pulses			
	Jute			
	Areca nut			
	Vegetable			
Tribal	Paddy	Piggery	Eri cocoon selling	√
	Pulses	Poultry		
	Areca nut	Goatary		
	Jute			

Proposed interventions social class wise for increasing farmers income in Nagaon and Bongaigaon

Social Class	Farm based activities	Off-farm based activities	Non-farm based activities
General and OBC	SRI Paddy	Introducing two crossbred cows for increased milk production	
		Introducing pond based culture fisheries using scientific package of practices to increase fish production	
Muslim	SRI Paddy	Introducing pond based culture fisheries using scientific package of practices to increase fish production	
		Introducing two crossbred cows for increased milk production	
Tribal	SRI Paddy	Fattening of 15 piglets of crossbred variety to earn better income	Spinning of Eri silk yarn from cocoon using yarn spinning machine to get almost three times income

Existing livelihood activities social class wise in Karbi Anglong

Social Class	Farm based activities	Off-farm based activities	Non-farm based activities	Wage labour
Tribal	Paddy	Poultry		
	Ginger	Piggery		√
	Turmeric	Goatary		
	Banana	Eri silk cocoon		
	Pineapple			
	Areca nut			
	Bamboo			
	Broom grass			
	Betel leaf			
OBC	Paddy	Fisheries		√
	Ginger	Goatary		
	Turmeric	Dairy		
	Banana			
	Areca nut			

Proposed interventions social class wise for increasing farmers income in Karbi Anglong

Social Class	Farm based activities	Off-farm based activities	Non-farm based activities
OBC	SRI Paddy	Introducing two crossbred cows for increased milk production	
		Introducing pond based culture fisheries using scientific package of practices to increase fish production	
Tribal	SRI Paddy	Fattening of 15 piglets of crossbred variety to earn better income	Spinning of Eri silk yarn from cocoon using yarn spinning machine to get almost three times income

Existing livelihood activities social class wise in Dhemaji

Social Class	Farm based activities	Off-farm based activities	Non-farm based activities	Wage labour
Tribal	Paddy	Piggery	Weaving	
	Maize	Poultry		√
	Pulses	Fisheries		
	Mustard	Eri silk cocoon		
		Goatary		
OBC	Paddy	Fisheries	Weaving	√
	Ginger	Goatary		
	Turmeric	Dairy		
	Banana	Piggery		
	Areca nut	Poultry		

Proposed interventions social class wise for increasing farmers income in Dhemaji

Social Class	Farm based activities	Off-farm based activities	Non-farm based activities
OBC	SRI Paddy	Introducing two crossbred cows for increased milk production	
		Introducing pond based culture fisheries using scientific package of practices to increase fish production	
Tribal	SRI Paddy	Fattening of 15 piglets of crossbred variety to earn better income	Spinning of Eri silk yarn from cocoon using yarn spinning machine to get almost three times income

Annexure 4: District specific recommendations

Considering the diversity of different districts representing different agro-climatic zones and social class the recommendations will be in consonance with the local context.

Karbi Anglong

- Considering the small land holding size of the farmers and existing challenges related to marketing channel and minimum support price, the scope of increasing farm income is largely around spices, horticultural crops. More farmer needs to be institutionally linked for spices production (especially ginger, turmeric and black pepper). While GINFED model exists but considering the flaws in its functioning alternate model of producer organizations (farmers' producer company) can be explored. Horticulture crops viz. pineapple, banana, Assam lemon have great potential and appropriate value chain interventions are needed in terms of local processing. The political support from the autonomous council is imperative in this regard.
- Need of cold storage is also realized considering good production of some vegetables viz. potato, tomato, brinjal, cauliflower etc.
- As the agriculture production is mostly rain-fed, the farmers largely practice mono-cropping. If irrigation facilities are improved, scope of multiple crops (paddy, vegetables etc.) can be explored which can help increasing farmers income.
- There are a few number of ponds within the district. There are government ponds and beels in the district. The fisheries department believe that pond fisheries is a crucial way through which fisheries can be promoted in Karbi Anglong. There are an estimated 4,300 hectares of ponds in Karbi Anglong. The district of Karbi Anglong is in deficit of fish production and import their fish for consumption largely from the neighbouring district of Nagaon. Unless fisheries feature in the priority list of Autonomous Council, the opportunity ceases to exist for the farmers.
- The farmers (the tribal farmers) are engaged with Eri silk production but only at the primary level of the value chain. They produce silk cocoon and sell it at the rate Rs.650 per kg. While there is scope of getting Eri silk spinning machine from the Department of Sericulture but due to unawareness rural households fail to avail the opportunity. The market price of Eri silk yarn is Rs.2,350 per kg.
- The Assam State Rural Livelihood Mission can take it up as an action research with support from academic institutions.
- Eurovanille (a French company) has been exploring to introduce vanilla cultivation in the region. It has come out with a buy-back arrangement and minimum support price mechanism. The Forest Department has been approached by the company to take up pilot.

Dhemaji

- As the district is flood prone, different cultivation practices needs to be adopted. Centre for Micro-finance and Livelihoods (CML) has demonstrated that late sowing of Boro paddy and Navin variety (flood resistant variety) had reduced the crop loss. They have also successfully introduced SRI for paddy.
- Around 75% farmers do not have irrigation facilities. If irrigation facilities are provided they can definitely practice off-season vegetables cultivation and winter paddy etc.
- Farmers have very low awareness about crop insurance which increases their vulnerability in the wake of natural disasters.

- Production of oil seeds has been marred due to lack of price support from government. There have been instances when the farmers had to sell the produce in less than the cost price. Attention of government is sought is this regard.

While Dhemaji is one of the largest piglets producing district, the farmers do not get sufficient price as they sell the piglets at farm-gate markets. The district has very poor transportation facility which restricts exploring alternate market. Improvement in road connectivity will improve market price potential not only for piggery but also from dried fish which is taken up by many farmers.

- The model of agriculture in 1 bigha+4 pigs+badi in 1 bigha (1 bigha = 0.28 acre) can provide an income of Rs.1 to 1.25 lakh to a household in a year. If the badi is integrated with black pepper and Assam lemon then another 1 lakh is possible. This is a well-tested model by CML.
- Eri silk is very different in Dhemaji than other places in the country. It is called white silk. Due to different colour and texture, the silk from Dhemaji is much in demand in the market. The farmers are engaged with only cocoon production. They need to be made aware about the possibilities of making yarn and exploring better market price. Assam State Rural Livelihood Mission should take it up as action research activity.

Nagaon

- Farmers usually have marketable surplus of black gram but they do not have access to mainstream market the marketable surplus is sold to the intermediaries (traders who are engaged in the trading of black gram are from Uttar Pradesh and Bihar). Institutional arrangements in terms of farmers producer organizations can help in aggregation and selling the produce at appropriate market.
- Jute is another commodity which is undertaken in large area but the farmers are engaged at the primary rung by selling fibres to the traders hence realizing sub-optimal price. If they add value by making handicrafts and ropes the proportion of income will definitely increase.
- There are commodities viz. Kuhila (an aquatic plant whose stem is used in extracting paper like pulp to make toys and decorative items) available aplenty. Its scope needs to be studied.
- Banana production has increased in the recent times in the district, its proper marketing needs to be ensured so that the farmers get competitive price.
- While water is available for irrigation but insufficient electricity and lack of means of irrigation are challenges for the farmers in the district.

Availability of quality piglets is an issue in the district and there are need of pig breeding farms. One of the challenges in promotion of piggery in the state is- the state does not produce sufficient quantity of swine flu vaccine. At the same time, buying swine-flu vaccine from outside the state is illegal. The state also requires commercial feed companies.

- Large number of farmers have been adopting fisheries as one of the important livelihood activities. However, they need to be provided training on scientific methods of culture fisheries in ponds. As of now they overstock the ponds due to their enthusiasm resulting into mortality and small size fish production.

Bongaigaon

- While paddy is one of the major commodity but the availability of rice has not been as per the demand of the district. Efforts are required to increase the productivity per unit area. Adoption of SRI could be one approach.
- The district lack storage facilities for the vegetables and farmers end up losing when there is bumper production. Cold storage units are required in the district.

- Farmers in the district have been using pesticides in an indiscriminate manner. It has resulted into cancellation of big consignment from one of the bigger importer Bhutan which has been taking large volumes of vegetables from the district.
- The district has dual problem of lack of irrigation sources and insufficient electricity resulting into poor irrigation support to the farmers.
- Bamboo is grown extensively in the region but the utilisation of bamboo is not maximised.
- High scope of promoting medicinal fruit like giant apple, etc. Farmers have not been able to capitalised the income from such sources which are available in their own homestead garden. It has been found that Giant apple being famous for treating diabetes is of great demand in the cities and per Kg costRs.60-70 but not utilized in the village
- There is a high scope for scaling up cotton production which happen to be in small pockets of Srijangram Block.

Handloom is practiced at almost all the households in all the four districts but the production is limited to self-use. The reason understood was the price competitiveness from the local entrepreneurs' cottage industries present at district level as well as Sualkoshi (near Guwahati which is the hub of large scale production of Mekhla-Chador, Gamocha and Handkerchief). The only way, handloom product can be made competitive is when the weavers (who are the women of the households) are supported to exchange their traditional handloom with updated handloom. They also need to be provided yarn at wholesale price.

Annexure 5: Questionnaire

Section A: Demography

Details about key respondent:

1. Name:
2. Age:
3. Relationship to head of household:
4. Caste/Tribe:
5. Marital Status:
6. Educational qualification:
7. Vocational skills:
8. District Name:
9. Village name:
10. Gram Panchayat:
11. Block name:
12. Address:

13. Name of head of the HH:
14. Mobile number**:**

Name of the Interviewer…… Date of Interview…….

Questionnaire No……..

1	2	3	4	5	6	7	8
Full name of family members	Relationship with the respondent 1. Husband 2. Wife 3. Son 4. Daughter 5. Father 6. Mother 7. Father-in-law 8. Mother-in-law 9. Brother-in-aw 10. Sister-in-law 11. Daughter-in-law 12. Grand Parent 13. Grandchild 14. Sister 15. Brother 16. Any other relative	Gender 1. Male 2. Female	Age	Marital Status 1. Single 2. Married 3. Widowed 4. Divorced 5. Separated	Qualification 1. Below class 10^{th} 2. Up-to Class 10^{th} 3. Class 12^{th} 4. Graduate 5. Post Graduate 6. literate 7. Functional literate 8. Illiterate	Vocational Skills	Occupation 1. Farming 2. Agriculture labour 3. Non-agriculture labour 4. Migrant labour 5. Weaving 6. Trading 7. Animal husbandry 8. Un-employed 9. Homemakers 10. Others (More than one answers are possible)
NAME							

Section B: Land holding details of family members

Name	Agriculture land (in Bigha)		Homestead land (in Bigha)		Leased Land (in Bigha)		Landless
	Cultivated	Fallow	Cultivated	Fallow	Cultivated	Fallow	

Section C: Income from livelihood activities and expenses

Sources of income as per livelihood:

Sources of Income	**Yes=1, No=2**	**Average annual production (in quintal/kg)**	**Quantity used for self-consumption (kg)**	**Quantity for selling (in kg)**	**Amount realized from selling (INR)**
Farm based					
1. Paddy					
2. Maize					
3. Pulses					

Sources of Income	Yes=1, No=2	Average annual production (in quintal/kg)	Quantity used for self-consumption (kg)	Quantity for selling (in kg)	Amount realized from selling (INR)
4. Vegetables					
5. Areca nut					
6. Black pepper					
7. Ginger					
8. Turmeric					
9. Lemon					
10. Betel nut					
11. Betel leaves					
12. Oranges					
13. Jute					
14. Tea-garden					
15. Silk					
16. Any other commodity in homestead garden (please specify)					
17. Any other commodity (Please specify)					

Annual expenses in farm based activities:

Sr. No.	Items	Amount (INR)
1	Seeds	
2	Fertilizers	
3	Pesticides	
4	Agriculture labour	
5	Electricity bill for irrigation through motor-pump	
6	Cost of diesel for irrigation through motor-pump	
7	Transportation	
8	Any other expenses (Please specify)	

Off-farm activities

Activities	Yes =1, No = 2	No. of units	Quantity sold in the year	Amount realized (In INR)
1. Piggery				
2. Poultry				
3. Fisheries				
4. Bee-keeping				
5. Goatary				
6. Dairy				
7. Any other (Please specify)				

Annual expenses in off-farm activities:

Sr. No.	Items	Amount (INR)
1	Feed	
2	Vaccination	
3	Insurance	
4	Health check-up	
5	Seed (in case of fisheries)	
6	Cost of bee-boxes (in case of bee-keeping)	
7	Any other expenses (please specify)	

Non-farm activities

Activities	Engagement in number of days	Earning year (INR)
1. Agricultural Wage Labour		
2. Non-agriculture wage labour		
3. Migratory Wage Labour		
4. Mason		
5. Auto-rickshaw		
6. Kirana shop		
7. Dhaba		
8. Carpenter		
9. Electrician		
10. Motor pump mechanic		
11. Plumber		
12. Tailor		
13. Mobile repair		
14. Weaving		
15. Tea processing centres		
16. Food processing		
17. NTFP (Amla, broom grass, bamboo etc.)		
18. Land leasing		
19. Any Other (Please specify)		

Annual expenses in non-farm based activities:

Sr. No.	Items	Expenses (INR)
1	Cost of raw material	
2	Cost of equipment	
3	Cost of electricity	
4	Rent	
5	Transportation cost	
6	Any other cost (please specify)	

Section D: Financial inclusion and access to credit

1. Do you have bank account? Yes =1; No =2
2. If the bank branch is accessible in all seasons? Yes =1; No =2
3. If not, what are the constraints?
   a) Village is remotely located
   b) The road connectivity is not good
   c) Lack of conveyance facility
   d) Communication gets disturbed due to:
      i) Flood
      ii) Insurgency
      iii) Any other issue (please specify the issue)
4. How far is the bank from the village?
   a) Within 1 km
   b) Between 1 to 2 km
   c) More than 2 km
5. How often do you go to bank?
   a) Once a month
   b) Once in two months
   c) Once in six months
   d) Do not go to bank
6. Do you save in your bank account?
   a) Save monthly
   b) Save quarterly
   c) Save six monthly
   d) Save irregularly
   e) Do not save
7. Have you availed loan from the bank?
   a) Yes
   b) No
8. If yes for what purpose?

9. Amount of loan sanctioned?

10. If the loan sanctioned was as per your requirement? Yes =1; No =2

11. If no, what was your requirement?

12. If loan was not sanctioned, why?

13. Do you have Kisan Credit Card?

14. Have you availed loan through Kisan Credit Card?

15. If not why?

16. Do you take loan from money-lender? Yes =1; No =2
    a) If yes, what is the rate of interest?
    b) If yes, for what purpose you have taken loan?
17. If any of your family member are member of SHG? Yes =1; No =2
18. Do you take loan from SHG? Yes =1; No =2
19. Do you take loan from micro-finance institution? Yes=1; No =2
    a) If yes, for what purpose you take loan?
    b) Are you regular customer for loans from micro-finance institutions?
20. Do you take loan through Business Correspondence (B.C.)? Yes =1; No =2.
    a) If yes, for what purpose you take loan?
    b) Are you regular customer for loans from BCs?
21. What support you require from the government to get bank loan?

Section E: Distress, mitigative, adaptive and preventive measures:

Sr. No.	Distress faced	Mitigate measures	Adaptive measures	Preventive measures	Support required to address the distress
1	Flood				
2	Land-slide				
3	Insurgency				
4	Human-wildlife conflict				
5	Pest-attack in crop				
6	Crash in market price for agriculture commodities				
7	Not being able to get veterinary care support for livestock				
8	Poor connectivity from market				
9	Any other (please specify)				

Section F: Gender (to be asked only to the female members of the family)

1. How do you contribute in the family income?
    a) Engagement in agriculture
    b) Rearing of livestock
    c) Engagement in homestead garden
    d) Engagement in handicraft
    e) Engagement in kirana shop
    f) Any other (Please specify)
2. Do you own any land in your name? Yes =1; No =2
3. If yes, then give details:
    a) Agriculture land
    b) Homestead land
4. Do you have any loan in your name? Yes =1; No=2
5. If yes from which source:
    a) SHG
    b) Bank
    c) Micro-finance institution
    d) Any other loan (please specify)

6. What was the purpose of the loan?
    a. Agriculture
    b. Buying a productive asset
    c. Livestock
    d. Consumption purpose
    e. Health related
    f. Any other
7. Who takes major decisions at home? (Insert A=Head of the family, B=Woman of the house, C=Man of the house, D=Jointly)

Decision area	Who takes them?	
Decisions related to livelihood activities viz. agriculture, rearing of livestock, non-farm activities		
Financial decision viz. taking loan and investment, asset buying		
Any other (Please specify)		

Section G: Institutional linkages

Are you a part of any group? Yes =1; No= 2

Types of Groups	**Chose (Multiple answers are possible)**	**What support do you get?**
1. SHG		
2. Sanchay Group		
3. Farmers' Club		
4. Producers' Organization		
5. Co-operative		
6. Any other		

Section H: Market

1. What are the markets you are currently engaged with?

For agriculture produce:

a) Farm-gate market (nearest market)
b) Commodity specific market
c) Mandi
d) Doorstep market
e) At village collection point
f) Traders
g) Any other (Please specify)

For livestock

a) Farm-gate market (nearest market)
b) Commodity specific market
c) Mandi
d) Doorstep market
e) At village collection point
f) Traders
g) Any other (Please specify)

For non-farm activities

a) Farm-gate market (nearest market)
b) Commodity specific market
c) Mandi
d) Doorstep market
e) At village collection point
f) Traders
g) Any other (Please specify)

1. How far is the nearest market to sell your farm produce?
   a) Less than 1 km
   b) Between 1-5 km
   c) Between 5-10 km
   d) More than 10 km
2. What challenges do you face related to market?
   a) Location of market is very far
   b) Problem of conveyance to reach market
   c) Market is exploitative
   d) Market is for limited commodities
   e) Any other

Section I: Government schemes and PRI Support

	Awareness, Yes=1, No=2	Availed, Yes=1, No=2	Challenges
Farm Based 1. Kisan Credit Card 2. Agriculture loan 3. Subsidy on seeds 4. Subsidy on fertilizers 5. Subsidy on agriculture equipment 6. Pradhan Mantri Fasal Bima Yojna 7. Training 8. Any other (Please specify)			
Off-Farm 1. Cattle loan 2. Veterinary services 3. Bee-keeping 4. Cattle insurance 5. Cattle shed 6. Pond 7. Fisheries 8. Inputs viz. Feed 9. Plantation 10. Training 11. Any other (Please specify)			
Non-Farm 1. Pradhan Mantri Kaushal Vikas Yojna 2. Deen Dayal Upadhyay Grameen Kaushal Yojna 3. Loan for small and micro enterprises 4. Skills training 5. Subsidy on equipment 6. Subsidy on processing unit 7. MGNREGA 8. Wage labour 9. Warehouse 10. Any other (Please specify)			

Section J: Extension services

	Availability, Yes=1, No=2	Accessibility, Yes=1, No=2	Cost of services Free=1, Paid=2	If paid, how much? (INR)
Agri-extension services 1. Krishi Vigyaan Kendra 2. Agriculture Department 3. NGO 4. ASRLM 5. Common Service Centre 6. Any Other (Please specify)				
Horticulture Extension Services 1. Horticulture Department 2. NGO 3. ASRLM 4. Common Service Centre 5. Any Other (Please specify)				
Veterinary Services 1. Animal Husbandry Department 2. NGO 3. ASRLM 4. Common Service Centre 5. Any Other (Please specify)				
Yarn Bank 1. Sericulture Department 2. NGO 3. ASRLM 4. Common Service Centre 5. Any Other (Please specify)				
Any other service providers (Please specify)				