Republic of India

Republic of India
Data Collection Survey on
Agriculture Sector in Northeast India

Final Report

May 2015

Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd.

ID
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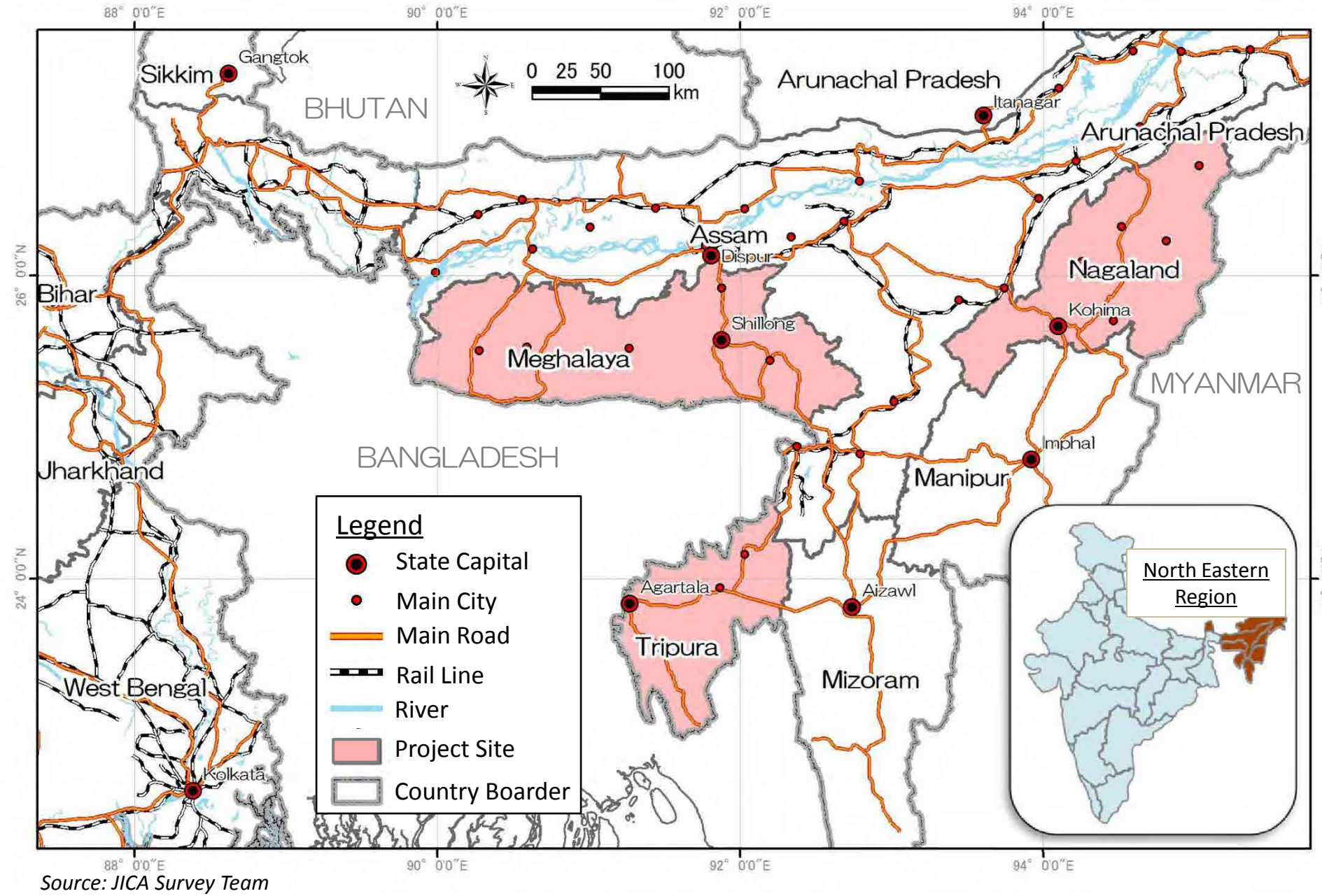
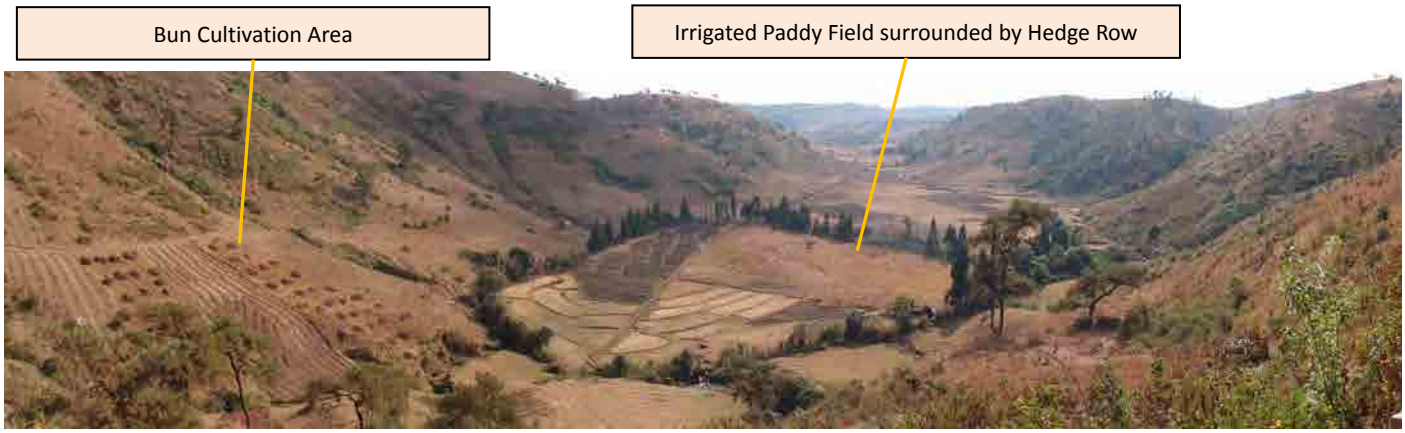


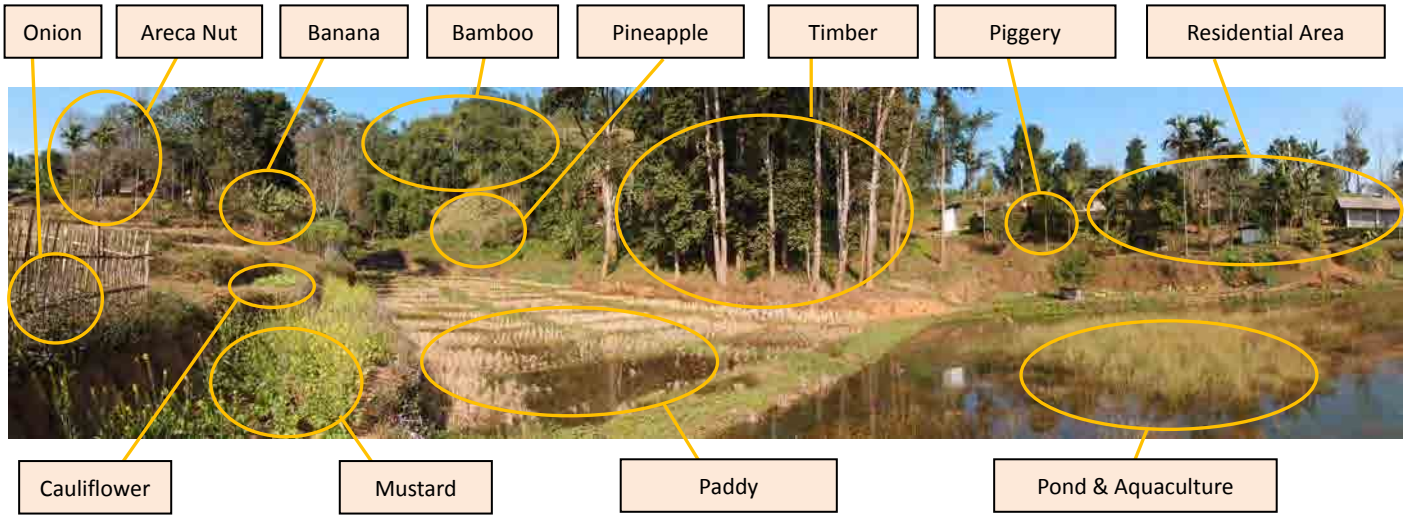
Source: JICA Survey Team

Location Map of Data Collection Survey on Agriculture Sector in Northern India

Meghalaya



Soil Conservation Methods in Hilly Area with Heavy Rainfall
(Jongksha Village, Mawkynrew Block, East Khasi Hills District)



Integrated Farming System in Village Area
(Puranggang Village, Nongpoh Block, Ri Bhoi District)

Shifting Cultivation in Rocky Plateau Area
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Source: JICA Survey Team

Jhum Cultivation Area

(Jaintia Hills District)

Existing Paddy Field in Government Irrigation Scheme

(Mawtneng Irrigation Project, Mawtneng Village, Umsning Block, Ri Bhoi District)

Multi Purpose Reservoir

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Source: JICA Survey Team

Bora Bazaar (Shillong)

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Cow Dung Application for Fertiliser (East Khasi Hills)

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Farmers Organisation (Ri-Bhoi)

Farm Pond (Ri-Bhoi)

Source: JICA Survey Team

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Chathe Minor Irrigation Project (Dimapur)

Dzuza Medium Irrigation Project (Dimapur)

Rice Terraces at Khonoma Village (Kohima)

Rice Terraces at Pholami Village (Phek)

Alder-based Cultivation at Khonoma Village (Kohima)

Alder-based Cultivation at Khonoma Village (Kohima)

Source: JICA Survey Team

Jhum (Phek)

Soil Conservation Practice using Timbers (Mokokchung)

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Banana Farm introduced Integrated Farming System (Wokha)

Source: JICA Survey Team

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Backyard Piggery (Kohima)

Pineapple Growers (Dimapur)

A Border Line between Pineapple Field and Forest (Dimapur)

Source: JICA Survey Team

Paddy Field in Plane Area (Dimapur)

Multi-purpose Reservoir (Phek)

Mithun (Kohima)

Orange Production (Mokokchung)

SHG Members (Mokokchung)

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Source: JICA Survey Team

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<Agriculture Production and Forestry>

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ICAR Model Farm (West Tripura)

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Fishery (South Tripura)

Rubber Plantation (South Tripura)

Bamboo Plantation (West Tripura)

Source: JICA Survey Team

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Source: JICA Survey Team

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Fresh Market at Agartala (West Tripura)

<Farm Infrastructure>

River Basin Forest Conservation Project (West Tripura)

Source: JICA Survey Team


Khowai Middle-sized Irrigation Project (Khowai)


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Source: JICA Survey Team

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Abbrebiations

AAI	:	Actual Area Irrigated
AAY	:	Antyodaya Anna Yojana
ACA	:	Additional Central Assistance
AGMARKNET	:	Agricultural Marketing Information Network
AI	:	Artificial Insemination
APL	:	Above Poverty Line
APMC	:	Agricultural Produce Marketing Committee
ARDD	:	Animal Resource Development Department
ASEAN	:	Association of Southeast Asian Nations
BCR	:	Balance from Current Revenues
BPL	:	Below Poverty Line
BRO	:	Border Road Organisation
CCA	:	Community Conserved area
CDG	:	Community Development Group
CDMU	:	Crop Development and Marketing Unit
CDP	:	Community Development Plan
CIG	:	Common Interest Group
CMSRDF	:	Chief Minister's Rural Development Fund
CO	:	Certificate of Origin
CRRP	:	Construction of Rural Roads Programme
CSS	:	Centrally Sponsored Scheme
CVD	:	Countervailing Duty
DoA	:	Department of Agriculture
DPR	:	Detailed Project Report
DRDA	:	District Rural Development Agency
DTW	:	Deep Tube Well
DUDA	:	Department of Under Developed Areas
DWS	:	Drinking Water and Sanitation
EAP	:	Externally Aided Project
ECS	:	Eleutheros Christian Society
EDC	:	Eco-Development Committee
FCI	:	Food Corporation India
FHS	:	Farm Household Survey
FPO	:	Fruit Products Order
FRA	:	Forest Right Act
FY	:	Fiscal Year
GAP	:	Good Agricultural Practice
GDP	:	Gross Domestic Product
GHADC	:	Garo Hills Autonomous District Council
GIZ	:	Gesellschaft für Internationale Zusammenarbeit
GOI	:	Government of India
GoM	:	Government of Meghalaya
GoN	:	Government of Nagaland
GoT	:	Government of Tripura
GSDP	:	Gross State Domestic Product
GWh	:	Giga Watt Hour
HH	:	Household
HP	:	Horse Power
HRD	:	Human Resource Development
HYV	:	High Yielding Variety
IBDLP	:	Integrated Basin Development and Livelihood Promotion Programme
ICAR	:	Indian Council of Agricultural Research
ICDP	:	Integrated Cooperative Development Programme
ICP	:	Integrated Check Point
IFAD	:	International Fund for Agriculture Development
IFCD	:	Irrigation and Flood Control Department
IGA	:	Income Generation Activities
IGC	:	Industrial Growth Centre

IGDC	:	Indo-German Development Cooperation
IKSL	:	IFFCO Kisan Sanchar Limited
INR	:	Indian Rupee
IPC	:	Irrigation Potential Created
IRP	:	Iron Removal Plant
ITI	:	Industrial Training Institute
IWMP	:	Integrated Watershed Management Project
JFM	:	Joint Forest Management
JFMC	:	Joint Forest Management Committee
JHADC	:	Jaintia Hills Autonomous District Council
JICA	:	Japan International Cooperation Agency
JLG	:	Joint Liability Group
JPY	:	Japanese Yen
KCC	:	Kishan Credit Card
KfW	:	Kreditanstalt für Wiederaufbau
KVK	:	Krishi Vigyan Kendras
LAMPS	:	Large Size Agriculture Multipurpose Cooperative Societies
LCS	:	Land Customs Station
LDA	:	Landscape Development Authority
LI	:	Lift Irrigation
LIFCOM	:	Livelihood Improvement Finance Company of Meghalaya
MAMB	:	Meghalaya Agricultural Marketing Board
MBMA	:	Meghalaya Basin Management Authority
MDF	:	Moderately Dense Forest
MDR	:	Major District Road
MGNREGA	:	Mahatma Gandhi National Rural Employment Guarantee Act
MGNREGS	:	Mahatma Gandhi National Rural Employment Guarantee Scheme
MIE	:	Meghalaya Institute of Entrepreneurship
MIS	:	Management Information System
MIS	:	Minor Irrigation Scheme
MKWH	:	Million Kilowatt Hour
MNREDA	:	Meghalaya Non-Conventional and Rural Energy Development Agency
MOA	:	Ministry of Agriculture
MoDONER	:	Ministry of Development of North Eastern Region
MPEDA	:	Marine Products Export Development Authority
MRLS	:	Meghalaya Rural Livelihood Society
MSME	:	Micro-Small and Medium Enterprise
MSRLS	:	Meghalaya State Rural Livelihood Society
MT	:	Metric Tonne
MU	:	Mega Unit
MW	:	Mega Watt
NABARD	:	National Bank for Agriculture and Rural Development
NABCONS	:	NABARD Consultancy Services
NaRM-G	:	Natural Resource Management Groups
NDC	:	National Development Council
NEC	:	North Eastern Council
NECCAP	:	North East Climate Change Adaptation Programme
NEGAP	:	National E-Governance Action Plan
NEHD	:	North Eastern Hill Development
NEIDA	:	North East Initiative Development Agency
NEIIPP	:	North East Industrial and Investment Promotion Policy
NEPED	:	Nagaland Empowerment of People through Economic Development
NER	:	North Eastern Region
NERAMAC	:	North Eastern Region Marketing Corporation Ltd.
NERCORMP	:	North Eastern Region Community Resource Managment Project
NERLP	:	North Eastern Rural Livelihood Project
NGO	:	Non-Government Organisation
NH	:	National Highway
NITI	:	National Institute for Transforming India
NLCPR	:	Non-lapsable Central Pool of Resource

NPGL	:	Non-Plan Grants and Loans
NRLM	:	National Rural Livelihood Mission
NSDP	:	Net State Domestic Product
NSI	:	National Specialisation Index
NSRLM	:	Nagaland State Rural Livelihood Mission
NTFP	:	Non Timber Forest Product
ODA	:	Official Development Assistance
ODR	:	Other District Road
OF	:	Open Forest
PDS	:	Public Distribution System
PHED	:	Public Health Engineering Department
PPP	:	Public Private Partnership
PRI	:	Panchayat Raj Institution
PWD	:	Public Works Department
PWD WR	:	Public Works Department (Water Resources)
PWD R&B	:	Public Works Department (Road and Bridge)
RoFR Act	:	Recognition of Forest Rights Act
RRTC	:	Rural Resource and Training Centre
RSETI	:	Rural Self Employment Training Institute
RSI	:	Regional Specialisation Index
SAFTA	:	South Asian Free Trade Agreement
SAMB	:	State Agricultural Marketing Board
SARS	:	State Agriculture Research Station
SC	:	Scheduled Caste
SCA	:	Special Central Assistance
SCS	:	Special Category State
SCT	:	Share in Central Tax
SDP	:	State Domestic Product
SE	:	South East
SEZ	:	Special Economic Zone
SGSY	:	Swarnajayanti Gram Swarojgar Yojna
SHG	:	Self-Help Group
SLEM	:	Sustainable Land and Ecosystem Management
SMR	:	Small Multi-purpose Reservoir
SMS	:	Short Message Service
SPA	:	Special Plan Assistance
SRI	:	System of Rice Intensification
SRTT	:	Sir Ratan Tata Trust
SRWP	:	Special Rural Works Programme
ST	:	Scheduled Tribes
STW	:	Shallow Tube Well
SWCD	:	Soil and Water Conservation Department
SWOT	:	Strength, Weakness, Opportunity, Threat
TAPMB	:	Tripura Agricultural Produce Market Board
TFEIPAP	:	Tripura Forest Environmental Improvement and Poverty Alleviation Project
TRC	:	Terrace Rice Cultivation
TRLM	:	Tripura Rural Livelihood Mission
TSCB	:	Tripura State Cooperative Bank
TTAADC	:	Tripura Tribal Areas Autonomous District Council
UNDP	:	United Nations Development Programme
VDB	:	Village Development Board
VDF	:	Very Dense Forest
VDPIC	:	Village Development Planning Implementation Committee
VO	:	Village-level Organisation
WDPSCA	:	Watershed Development Project in Shifting Cultivation Areas
WRC	:	Wet Rice Cultivation
WTRC	:	Wet Terraced Rice Cultivation
WUA	:	Water Users' Association

Measurement Unit

kg	:	kilogram
t, MT	:	Metric tonnes = 1,000 kg
qt	:	quintal (100 kilogram)
bigha	:	12.5 bigha = 1 ha / 1 bigha = 0.08 ha
h	:	hour
mm	:	millimetre
cm	:	centimetre
m	:	meter
km	:	kilometre
ha	:	hectare
HP	:	Horsepower
INR, Rs.	:	Indian Rupee
km^2, sq.km	:	square kilometre
m^3	:	cubic meter
MCM	:	million cubic meter
MSL	:	Mean Sea Level
MW	:	mega Watt
LPS, l/s	:	litters per second
mg/L	:	milligram per litter
mm/mon	:	millimetre per month
mm/d	:	millimetre per day
m/s	:	meter per second
mS/cm	:	millisiemens/centimetre
m^3/s	:	cubic meter per second
$^{\circ}$ C	:	degrees centigrade
%	:	percent
US$	:	United States of America Dollar
Crore	:	10 Million
Lakh, Lac	:	100 Thousand

Currency Exchange Rate

USD 1.0 = JPY 119.64 = Rs. 62.54 (Rs 1.0 = JPY 1.913)
(as of April 2015)
JPY = Japanese Yen, Rs. = Indian Rupee

CHAPTER 1 OVERVIEW OF THE SURVEY

1.1 Background of the Survey

The north eastern region of India is located in a remote area and connected to the main part of the country by a narrowly-shaped mountainous area known as the "Chicken's Neck". While being surrounded by China, Bhutan, Myanmar, and Bangladesh, the area is isolated in terms of logistics as the road network to reach the border has not been developed well, and due to security reasons, India has not signed the road transportation agreement with all its neighbouring countries. In addition, the scope for large-scale agriculture is limited in the region as the steep mountains are dominant.

On the other hand, such geographical conditions and variations in altitude have created the rich biodiversity in the region. Taking advantage of it, upland rice cultivation by shifting cultivation and production of fruits, wild vegetables, etc., are widely practised.

In the vast part of the region, anti-government movements induced by the ethnic identity have been active in half a century. Repeated road blockages and strikes by anti-government organisations, etc., have hindered regional economic development. However, in the recent years, peace negotiations with the Government of India have progressed, and thus the security situation has shown a drastic improvement. The number of visitors from other regions of the country has increased as well as investments. Especially after the meeting of the prime ministers of Japan and India, discussions towards enhancement of support for the north eastern region between the two countries are underway. There is growing expectation towards support in forest and agriculture.

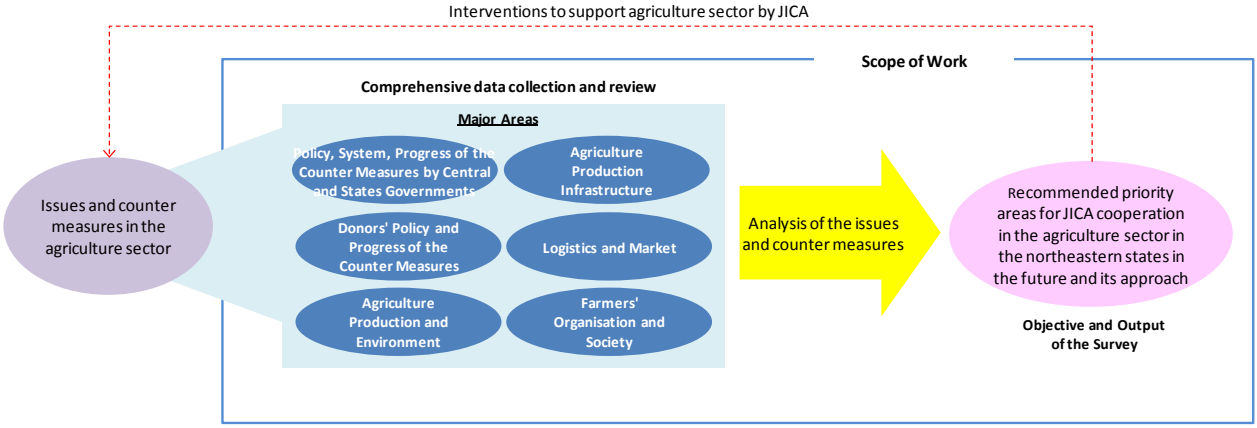
The gross domestic product (GDP) of the agriculture sector in India is on the decline. In the 1950s, it accounted for approximately 50%, whereas the same has decreased to 24% in FY 2001/02 and 15% in FY 2009/10. On the other hand, about 70% of its population lives in rural areas and the sector employs about 60% of the total working population. Thus, the development of the agriculture sector is critical in achieving "sustainable and inclusive growth" in India. For this reason, the 12th Five-Year Plan targets a growth rate of 4% in the agriculture sector, which is much higher than the average growth rate of 2.9% in the 10th and 11th Five-Year Planning Periods (FY 2002-2012). Although the scale of the agriculture sector in the north eastern states also indicates the declining trend, the sector wise GDP is still higher than the national average and contributed 23.9% (FY 2008/09). In the north eastern region, 80% of the total population lives in rural areas where the scope for the development of other industries including manufacturing is limited. For many in the region, agriculture is the main source of livelihood, and thus, the dependency of people towards agriculture is still high.

Based on the above, the Japan International Cooperation Agency (JICA) conducted a survey for the following purposes: to gather and confirm basic information relevant to the identified bottlenecks in agricultural production, distribution, processing, and marketing/sales; and to develop possible options for cooperation in the agriculture sector in the north eastern states aiming at livelihood improvement of farm households and agriculture-related industries in the north eastern states, where its geography, history, and society significantly differ from those of the rest of India.

1.2 Objectives and Scope of the Survey

The objectives of the survey, keeping poverty alleviation interventions in India into account, include

the following: to undertake comprehensive data collection and review on the government policy, system, progress of countermeasures, etc., in the agriculture sector in the north eastern states; to analyse the issues and countermeasures in the agriculture sector in the north eastern states; and to recommend priority areas for JICA cooperation in the agriculture sector in the north eastern states in the future and its approach (system and institution development, human resource development, facilities and equipment, etc.). The objectives and scope of work are illustrated in Figure 1.2.1 below.



Source: JICA Survey Team

Figure 1.2.1 Objectives and Scope of Work

1.3 Survey Area

The survey area includes three states, namely, Meghalaya, Nagaland, and Tripura in the north eastern region of India. Furthermore, in order to develop possible interventions to support the agriculture sector in these states, Assam, as an important market for agriculture produce of these states and the distribution network hub, was also surveyed from marketing and distribution perspectives.

1.4 Concerned Authorities and Departments

The survey was conducted mainly with the authorities and departments shown in Table 1.4.1. Besides, additional information/data were collected from the National Bank for Agriculture and Rural Development (NABARD), the Indian Council of Agricultural Research (ICAR), societies, cooperatives, village councils, self-help groups (SHGs), non-government organisations (NGOs), processing and marketing companies, traders, and so on.

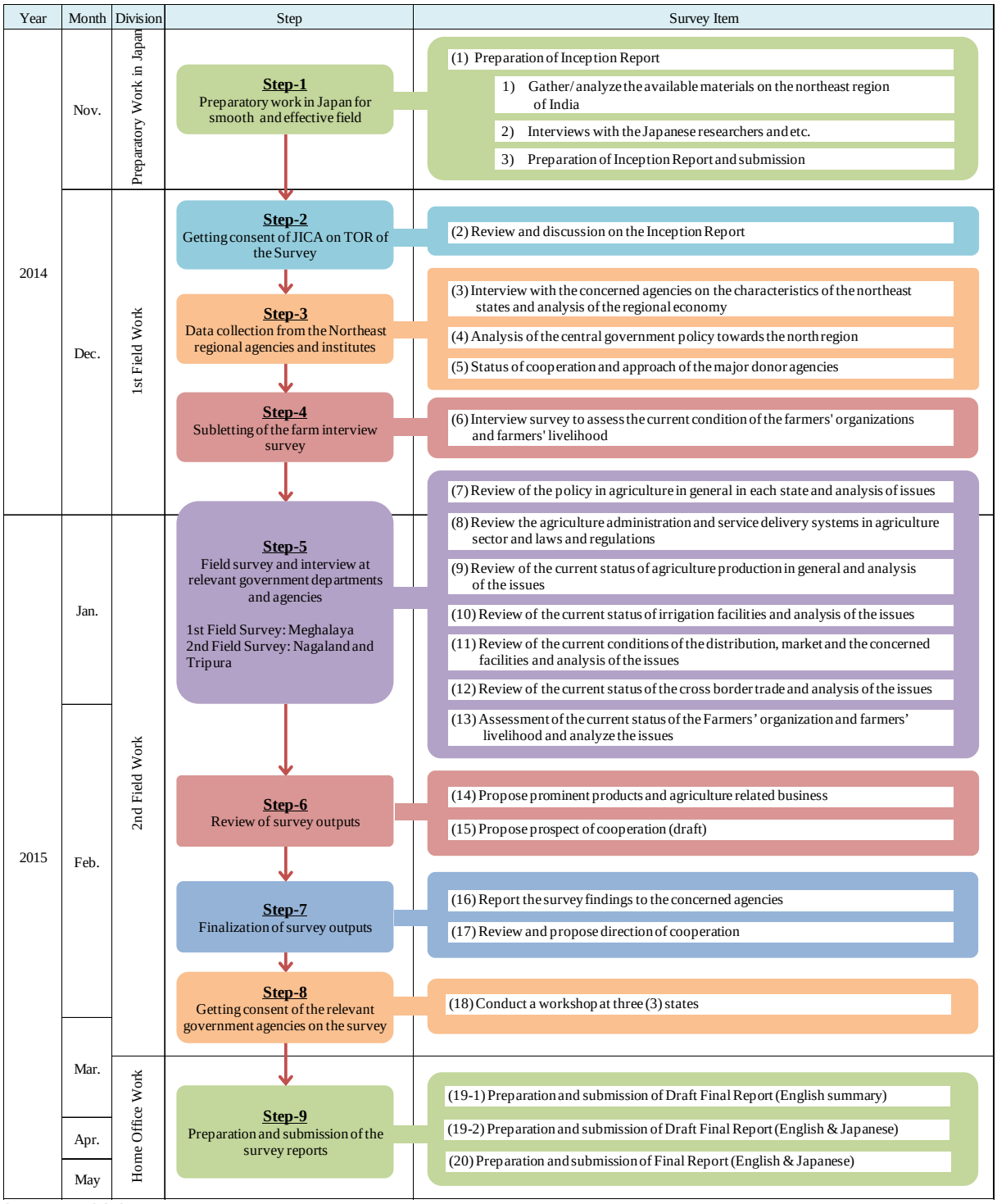
Table 1.4.1 Concerned Authorities and Departments

Central Government	・ Ministry of Development of North Eastern Region (MoDONER) ・ North Eastern Council (NEC)	
Departments in the State Government of the Survey Area	・ Planning Department ・ Agriculture Department ・ Horticulture Department ・ Animal Husbandry Department ・ Water Resources/ Irrigation Department	・ Forest Department ・ Soil and Water Conservation Department ・ Rural Development Department ・ Industry and Commerce Department ・ Other concerned departments, agencies, societies, cooperatives, SHGs, NGOs.

Source: JICA Survey Team

1.5 Work Plan of the Survey

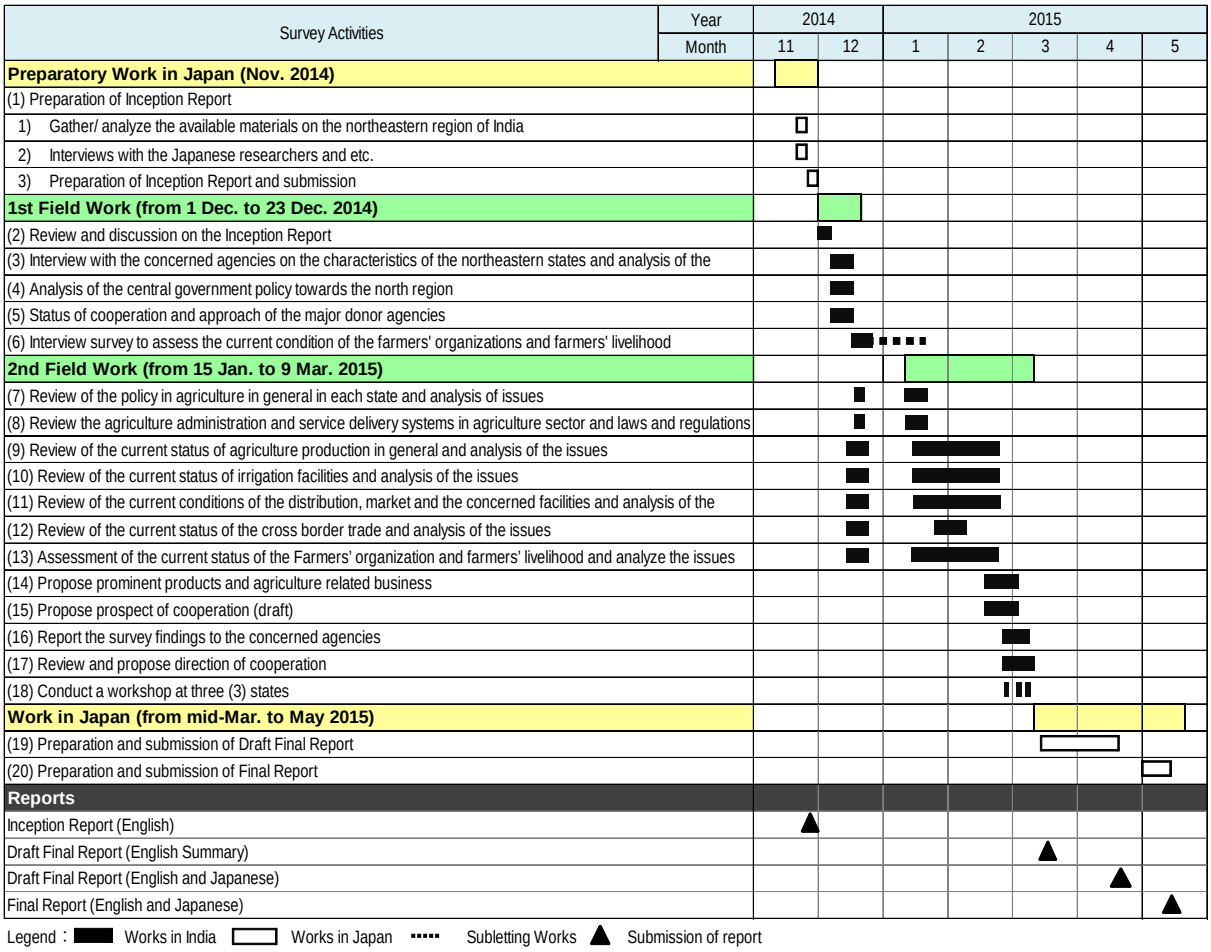
The survey work was executed efficiently based on the basic approach as per the instruction in the survey work. The work duration was six months between November 2014 and May 2015. The overall work flow is illustrated in Figure 1.5.1.



Source: JICA Survey Team

Figure 1.5.1 Overall Work Flow

The actual timeline of the survey work is shown in Figure 1.5.2.



Source: JICA Survey Team

Figure 1.5.2 Overall Work Schedule

During the first field work, the JICA Survey Team went ahead with the survey work in Meghalaya, in addition to the original activities taking into account work efficiency and time saving for the second field work. Meanwhile, the farm household survey was sublet to NABARD Consultancy Services (NABCONS), targeting 100 farm households each in the three abovementioned states, as shown in Attachment-1.5.1.

Based on the above work schedule, the JICA Survey Team conducted field works in the target states in the following order:

Table 1.5.1 Field Work Schedule

State	Period of Survey	Date of Workshop
Meghalaya	3 to 21 December 2014	4 March 2015
Tripura	15 January to 1 February 2015	2 March 2015
Nagaland	3 to 28 February 2015	27 February 2015

Source: JICA Survey Team

The JICA Survey Team went around the three target states, and then made presentations on the survey findings and recommendations for the development of the agriculture and allied sectors in the target states instead of the originally planned joint workshop due to difficulty of gathering a large number of key state government officials, who are busy for the annual budget allocation 2015. The proceedings of the workshops are annexed in Attachment-1.5.2.

CHAPTER 2 OVERVIEW OF THE NORTH EASTERN REGION

2.1 Development Policy and Plan for the North Eastern Region

The development policy and plan for the north eastern region are consolidated in the North Eastern Region Vision 2020 and 12th Five-Year Plan. The summary of the policy and plan is as follows:

2.1.1 North Eastern Region Vision 2020

The Ministry of Development of North Eastern Region (MoDONER) is responsible for matters relating to planning, execution, and monitoring of development schemes and projects in the north eastern region consisting of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim. Its vision is to accelerate the pace of socioeconomic development of the region so that it may enjoy growth parity with the rest of the country.

The ministry together with the North Eastern Council (NEC) prepared the "North Eastern Region Vision 2020", which was adopted at the NEC's 56th Plenary Session in May 2008. The vision explains that the region has remained one of the most backward regions of the country. It is remote, its access for movement of goods and people is constrained, and its governance is poor. In the vision, the following components of the strategy were raised for bridging the gap between the region and the rest of the country in terms of productivities, capacities of people and institutions for making the region peaceful, strong, confident, and ready to engage with the global economy:

- Empowerment of the people by maximising self-governance and participatory development through grassroots planning.
- Rural development focused on improving agricultural productivity and creation of non-farm avocations and employment.
- Development of comparative advantage agro-processing industries and sericulture, investment in manufacturing units, utilising the large hydroelectric power generation potential and focus on developing services such as tourism.
- Augmentation of capacity of the people and institutions both in government and private sectors.
- Augmentation of infrastructure (rail, road, inland water and air transportation) to facilitate movement of the people and goods, communication networks, utilising vast power generation potentials, which will open up markets for produce from the region, attract private investment, and create greater employment opportunities. To make the Look East Policy meaningful, the sea route through the Chittagong Port and the land routes through Myanmar, China, and Bangladesh for connectivity of the region with the ASEAN shall be opened up.
- Ensuring adequate flow of resources for public investments in infrastructure, a framework for private participation, and an enabling environment for the flow of investment to harness the physical resources of the region for the welfare of the people.

2.1.2 North Eastern Region Development in National 12th Five-Year Plan (2012-2017)

The north eastern region has achieved substantial improvement for the last decade with large plan investments for infrastructure development, recording a GSDP growth rate of 9.8% under the 11th Five-Year Plan. The expected GSDP rates for the National 12th Five-Year Plan are set by the Planning Commission, as shown in Table 2.1.1.

Table 2.1.1 State-wise and Sector-wise Expected GSDP Growth Rates for 12th Five-Year Plan

State	Sector-wise Growth Rate (%)				Growth Rate Proposed by States (%)
	Agriculture	Industry	Services	Total	
Arunachal Pradesh	5.7	10.3	9.0	8.5	9.02
Assam	4.8	4.6	8.9	7.0	8.33
Manipur	6.0	4.5	8.4	6.5	6.6
Meghalaya	2.8	8.5	9.2	8.0	11.0
Mizoram	6.9	9.3	9.8	9.0	11.0
Nagaland	4.8	9.0	7.5	7.0	8.0
Sikkim	4.0	8.3	9.8	8.5	8.5
Tripura	5.0	8.0	9.7	8.2	8.5
All-India	4.0	7.6	9.0	8.0	-

Source: Planning Commission; Chapter 11, Volume I of 12th Five-Year Plan

Under the 12th Five-Year Plan, the central government will continue to support the development of physical and social infrastructure in the north eastern region so that the region can become strong, confident, and capable of engaging with external markets. The priority is infrastructure development in respect of connectivity (road, rail, air) and power, agriculture development, human resources development, and so on. Special attention to the agriculture and allied sector is discussed below.

- The growth has to be more rapid and inclusive; the focus has to be on better performance in agriculture, irrigation, drinking water, health services, better education in rural and remote areas, rural connectivity, improved delivery system and governance. Farm-based economic activities - horticulture, animal husbandry, fisheries, poultry, and so on, have to be the prime drivers.
- Post-harvest management and marketing infrastructure required to be attended to by dovetailing of programmes/schemes between central ministries and the state governments for filling up gaps in infrastructure.
- There has to be continued emphasis on creation of employment opportunities. During the 11th Plan, there is a general feeling of improvement in the security and law and order scenario. Efforts have to continue to further improve the scenario. The initiatives so far have created some momentum of development as may be seen from the above analysis. This has to continue with all possible support from the centre.

The Look East Policy, which was first launched in 1991, is an important factor in promoting economic and cultural ties of the north eastern region with its neighbouring countries. The 12th Five-Year Plan will continue to support the Look East Policy putting the immediate priority on the following:

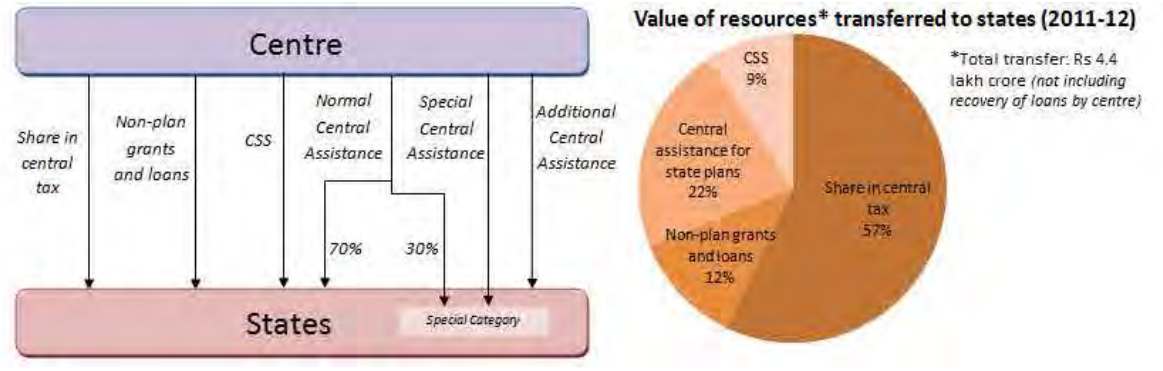
- Focus on strong relationship with Bangladesh to ensure effective connectivity by different transport modes. Access to Chittagong Port, declaring Ashuganj (Bangladesh) as port of call, Kolkata - Agartala - Dhaka bus service.

- Connecting the north-east by road to south-east (SE) Asia through Tri-lateral Highway - Moreh (Manipur) - Mandalay/Bagan (Myanmar) - Mae Sot/Chiang Mai (Thailand).
- Focus on development of all land customs stations (LCS) for strengthening border trade and business communication.
- Expeditious implementation of multi-modal transport using the Kaladan River as alternate connectivity to the north-east.

2.2 Central Assistance to the North Eastern States

The north eastern states together with Jammu and Kashmir, Himachal Pradesh, and Uttarakhand are granted special status, because of inherent features, namely; (i) hilly and difficult terrain, (ii) low population density or sizable share of tribal population, (iii) strategic location along border with neighbouring countries, (iv) economic and infrastructure backwardness, (v) non-viable nature of state finances, and so on. The central government gives preferential treatment to the special category states (SCSs) in finance to bring them up to the same development level of other states. Resources transfer from centre to states is simply illustrated in Figure 2.6.1.

The Finance Commission and the Planning Commission are the two institutions responsible for centre-state financial relations.



Source: Finance Commission, Planning Commission, Budget Documents, Parliament Related Stuff (PRS)

Figure 2.2.1 Resources Transfer from Centre to States

2.2.1 Central Assistance for Expenditure Budget

The Planning Commission has allocated funds to states through the central assistance for expenditure budget (state plan), which are summarised in Table 2.2.1. It should be noted that the National Institute for Transforming India (NITI) will take over the roles and functions of the Planning Commission under the Narendra Modi's Administration that started in May 2014.

Table 2.2.1 Central Assistance for Expenditure Budget

No.	Plan Scheme	Remarks
1.	Normal Central Assistance (NCA)	NCA, the main assistance for state plan, is split to favour special category states; the 11 states get 30% of the total assistance, while the other states share the remaining 70%. The nature of the assistance also varies for special category states; NCA is split into 90% grants and 10% loans for special category states, while the ratio between grants and loans is 30:70 for other states.

No.	Plan Scheme		Remarks
2.	Special Central Assistance (SCA)		100% grants. SCA is allocated only to special category states.
3.	Special Plan Assistance (SPA)		90% grants and 10% loans. SPA is allocated only to special category states.
4.	Additional Central Assistance (ACA)		
	1)	Externally Aided Project (EAP)	EAP is split into 90% grants and 10% loans for special category states, while back-to-back (100% loans) for other states.
	2)	Mission Mode Project under National E-Governance Action Plan (NEGAP)	Central grant up to 90% of project cost subject to Rs.90 lakh per districts for the north eastern states, and up to 75% of project cost subject to Rs.75 lakh per district for other states.
	3)	Assistance from the North Eastern Council (NEC) through MoDONER	90% grants and 10% loans. It is applicable only for the north eastern states.
	4)	Non-lapsable Central Pool Reserve (NLCPR) through MoDONER	90% grants and 10% loans. It is applicable only for the north eastern states.
5.	Centrally Sponsored Scheme (CSS)		CSS is split into 90% grants and 10% loans for special category states, while the ratio between grants and loans is 30:70 for other states.

Source: Terms and Conditions for Transfer of Central Plan Assistance to States from Ministry of Finance, Ministry of Finance

For allocation amongst special category states, there are no explicit criteria for distribution; and funds are allocated on the basis of the state's plan size and previous plan expenditures. Allocation between non-special category states is determined by the Gadgil Mukherjee Formula accounting for population in 1971 (60%), per capita income for states lower than national average (20%) and for all states (5%), performance (7.5%), and special problems (7.5%).

2.2.2 Central Assistance for Receipts Budget

On the other hand, the Finance Commission decides the central allocation for receipts budget (share in central taxes and non-plan grants and loans) on the following basis:

Table 2.2.2 Central Assistance for Receipts Budget

No.	Non-Plan Scheme	Remarks
1.	Share in Central Taxes (SCT)	100% grants. 32% of central tax revenue is distributed amongst states through a formula accounting for population (25%), area (10%), taxation capacity (47.5%), and fiscal discipline (17.5%) determined by 13th Finance Commission.
2.	Non-Plan Grants and Loans (NPGL)	100% grants. NPGLs are transferred in 30% to 11 special category states and 70% to 17 non-special category states in 2011-12.

Source: Terms and Conditions for Transfer of Central Plan Assistance to States from Ministry of Finance, Ministry of Finance

Unlike the Planning Commission, the Finance Commission does not distinguish between special and non-special category states in its allocation.

2.2.3 Total and Per Capita Central Assistance in 2012-13

Table 2.2.3 compares the total central assistance to the state plan outlay (budget estimates) in 2012-13. It accounts for 98% on average for special category states and only 15% for non-special category states. Amongst the north eastern states, Tripura is the highest in dependency on central assistance, followed by Nagaland, Manipur, and Mizoram. It is attributable to a deficit account in the state government's own funds in these states. As for the per capita central assistance to the states, Sikkim is the highest, followed by Arunachal Pradesh and Mizoram.

Table 2.2.3 Total and Per Capita Central Assistance 2012-13 to the North Eastern States

State	State Plan*1 Approved Outlay in Rs. Crore	Total Central Assistance *2 in Rs. Crore	Total Central Assistance to State Plan Outlay in %	Population (Census 2011)	Per Capita Total Central Assistance in Rs.
Arunachal Pradesh	3,535.00	3,311.24	94	1,383,727	23,930
Assam	10,500.00	7,861.07	75	31,205,576	2,519
Manipur	3,500.00	3,433.57	98	2,570,390	13,358
Meghalaya	3,939.00	2,698.45	69	2,966,889	9,095
Mizoram	2,300.00	2,246.68	98	1,097,206	20,476
Nagaland	2,300.00	2,689.00	117	1,978,502	13,591
Sikkim	1,877.00	1,614.01	86	610,577	26,434
Tripura	2,250.00	2,919.06	130	3,673,917	7,945

*Note: *1= Figures are in Annual Plan 2012-13*
**2= Central Assistance for 2012-13 does not include allocation under NEC & NLCPR*
Source: FR Brief for Annual Outlay 2012-13 of Each State

It is noted that the balance from current revenues (BCR) is greatly affected to the percentage of total central assistance to state plan outlay; for instances, BCR is minus Rs.228 crore for Tripura and minus Rs.940 crore for Nagaland, on the contrary, plus Rs.109 crore for Meghalaya, as shown in Attachment-2.2.1.

2.2.4 Financial Soundness of the State Governments in 2011-12

Table 2.2.4 shows the fiscal profile of the state governments with some indicators.

Table 2.2.4 Fiscal Profile of State Governments in the North Eastern States

State	Fiscal Deficit as % of GSDP		Own Tax Revenue as % of GSDP		Outstanding Liabilities as % of GSDP		Revenue Deficit as % of GSDP	
	2011-12 (pre-Actual)	2011-12 (Target)	2011-12 (pre-Actual)	2011-12 (Target)	2011-12 (pre-Actual)	2011-12 (Target)	2011-12 (pre-Actual)	2011-12 (Target)
Arunachal Pradesh	7.80	3.00	2.45	2.91	30.93	58.20	-10.52	0.00
Assam	1.09	3.00	5.77	4.90	24.53	28.30	-0.94	0.00
Manipur	10.04	3.50	3.54	2.81	62.16	62.90	-6.21	0.00
Meghalaya	6.59	3.00	4.31	4.08	31.47	32.70	1.12	0.00
Mizoram	9.39	6.40	2.42	2.95	59.94	85.70	-0.79	0.00
Nagaland	4.39	3.50	2.48	2.50	55.08	55.80	-5.79	0.00
Sikkim	2.14	3.50	3.50	6.69	29.52	65.20	-5.27	0.00
Tripura	1.30	3.00	4.31	4.53	33.35	44.90	-8.38	0.00
All-India	2.49	3.10	7.19	8.58	24.53	32.50	0.21	0.20

Source: 1. Directorate of Economics & Statistics of Respective States Government and for All-India, CSO Data from 2004-05 Series based on Base Year 2004-05; CSO Data as on 01 March, 2014 in Databook for DCH; 3 June 2014; Planning Commission
2. Target set by 13th Finance Commission (http://fincomindia.nic.in/ShowContentOne.aspx?id=28&Section=1)

The 13th Finance Commission recommended that (i) all special category states should achieve a fiscal deficit of 3% of GSDP by 2011-12 and maintain such thereafter except that Manipur, Nagaland, Sikkim, and Uttarakhand have to reduce their fiscal deficit to 3% of GSDP by 2013-14, and Mizoram, Jammu and Kashimir by 2014-15, and (ii) all the states should maintain revenue balance or attain a surplus (December 2009).

The state governments of the north eastern region have continued making efforts to improve the fiscal condition. Amongst the eight states, Assam shows a relatively good performance in 2011-12, followed by Tripura and Sikkim. Other states, especially, Manipur and Mizoram need to reduce fiscal deficit. The targets of revenue deficit and outstanding liabilities have been achieved by the states. Out of

several measures to make the financial status better, enhancement of state own tax revenue will be a key for the north eastern states. In this context, the growth and development of the agriculture and allied sector shall be first strengthened in an efficient and effective manner.

2.3 Conditions of Agriculture and Irrigation

2.3.1 Land Utilisation Pattern

Land use in the north eastern states is summarised in Table 2.3.1. The north eastern states as a whole is characterised as having a large forest of 57% and small net area sown of 19% as compared with the average of all of India. The forest covers over 80% of the three states, namely; Arunachal Pradesh, Manipur, and Sikkim, in contrast, the net area sown covers over 20% of the three states, i.e., Assam, Tripura and Nagaland.

Table 2.3.1 Pattern of Land Utilisation in the North Eastern States

State	Total Reporting Area ('000 ha)	Forest	Barren Land	Pasture and Tree Crops*1	Cultivable Waste Land	Fallow	Net Area Sown
Arunachal Pradesh	5,660	91%	1%	1%	1%	2%	4%
Assam	7,850	24%	33%	4%	1%	2%	36%
Manipur	2,010	87%	1%	0%	0%	0%	12%
Meghalaya	2,229	42%	10%	7%	18%	10%	13%
Mizoram	2,101	75%	5%	2%	0%	12%	6%
Nagaland	1,621	53%	5%	7%	3%	10%	22%
Sikkim	693	84%	2%	1%	1%	1%	11%
Tripura	1,049	58%	13%	2%	0%	0%	27%
All-India	305,611	23%	14%	4%	4%	9%	46%

*Note: Data in 2009-10; *1= Total area of pasture, grazing, miscellaneous tree crops, and groves.*
These figures are taken from the latest forestry statistics publication and agriculture census. Totals are not always tallies due to rounding off of the figures.
Source: Directorate of Economy and Statistics, Ministry of Agriculture

2.3.2 Agriculture Land Holdings

Land use in the north eastern states is summarised in Table 2.3.2. The average land holding size per farmer is 6.03 ha in Nagaland, 3.52 ha in Arunachal Pradesh, 1.43 ha in Sikkim, 1.37 ha in Meghalaya, 1.14 ha in Manipur and Mizoram, 1.10 ha in Assam, and 0.49 ha in Tripura. The number of medium and large holdings taken together constitutes 57.8% in Nagaland; meanwhile the number of small and marginal holdings constitutes 95.8% in Tripura.

Table 2.3.2 Status of Agriculture Land Holdings in the North Eastern States

State	Total		Marginal (below 1 ha)		Small (1 ha to 2 ha)		Semi-medium (2 ha to 4 ha)		Medium (4 ha to 10 ha)		Large (over 10ha)	
	Number ('000)	Area ('000 ha)	Number (%)	Area (%)	Number (%)	Area (%)	Number (%)	Area (%)	Number (%)	Area (%)	Number (%)	Area (%)
Arunachal Pradesh.	109	384	19.63	3.09	17.69	6.75	31.14	24.47	25.56	40.34	5.97	25.34
Assam	2,720	2,999	67.31	25.83	18.25	22.91	11.16	27.27	3.12	14.58	0.15	9.39
Manipur	151	172	50.95	23.36	32.43	36.47	14.76	32.11	1.83	7.80	0.03	0.26
Meghalaya	210	287	49.01	16.08	27.56	26.75	19.35	39.40	3.97	16.41	0.11	1.37
Mizoram	92	105	54.65	28.79	32.38	36.00	10.80	22.94	1.88	8.47	0.29	3.80
Nagaland	178	1,074	3.63	0.31	11.40	2.15	27.16	11.62	43.70	44.75	14.11	41.17
Sikkim	75	107	54.02	13.88	22.61	19.12	14.43	25.24	7.90	30.22	1.04	11.53

State	Total		Marginal (below 1 ha)		Small (1 ha to 2 ha)		Semi-medium (2 ha to 4 ha)		Medium (4 ha to 10 ha)		Large (over 10ha)	
	Number ('000)	Area ('000 ha)	Number (%)	Area (%)	Number (%)	Area (%)	Number (%)	Area (%)	Number (%)	Area (%)	Number (%)	Area (%)
Tripura	578	285	86.27	49.03	9.52	26.60	3.72	19.04	0.48	4.89	0.01	0.43
All-India	138,348	159,592	67.10	22.50	17.91	22.08	10.04	23.63	4.25	21.20	0.70	10.59

Note: Data in 2010-11
Source: Agriculture Census 2010-11, Ministry of Agriculture in 2014

2.3.3 Irrigation Coverage

Irrigation coverage in the north eastern states is summarised in Table 2.3.3. The average net and gross irrigation coverage in the north eastern region as a whole are estimated at only 11.9% and 14.3%, respectively, which are far below the average of all of India. As shown in Table 2.3.3, the net irrigated area is largest in Assam and the net irrigation coverage is highest in Arunachal Pradesh in the north eastern region.

Table 2.3.3 Irrigation Coverage in the North Eastern States

State	Net Area Sown ('000 ha)	Total Cropped Area ('000 ha)	Crop Intensity (%)	Net Irrigated Area ('000 ha)	Gross Irrigated Area ('000 ha)	Net Irrigation Coverage (%)	Gross Irrigation Coverage (%)
	(1)	(2)	(3)=(2)/(1)x100	(4)	(5)	(6)=(4)/(1)*100	(7)=(5)/(1)*100
Arunachal Pradesh	212	271	127.8	56	56	26.4	26.4
Assam	2,811	4,099	145.9	197	225	7.0	8.0
Manipur	233	233	100.0	52	52	22.3	22.3
Meghalaya	283	336	118.7	62	74	21.9	26.1
Mizoram	123	123	100.0	10	10	8.1	8.1
Nagaland	361	486	134.6	73	85	20.2	23.5
Sikkim	77	144	187.0	14	18	18.2	23.3
Tripura	280	309	110.4	58	106	20.7	37.9
All-India	140,022	192,197	137.3	63,256	86,423	45.2	61.7

*Note: Data in 2009-10; *1= Total area of pasture, grazing, miscellaneous tree crops, groves, and cultivable waste land.*
Source: Directorate of Economy and Statistics, Ministry of Agriculture

The net area under irrigation by crops in the north eastern states is summarised in Table 2.3.4. Canal irrigation is popular in Meghalaya, Mizoram, and Assam; other sources are common in Arunachal Pradesh, Manipur, Nagaland and Sikkim. Tank irrigation and groundwater irrigation are practised to a small extent in Tripura and Assam.

Table 2.3.4 Net Area under Irrigation by Sources in the North Eastern States

State	Net Irrigated Area ('000ha)	Canals			Tanks	Tube-Wells and Other Wells	Other Sources
		Government	Private	Total			
Arunachal Pradesh	56	-	-	-	-	-	100%
Assam	197	82%	-	82%	1%	4%	13%
Manipur	52	-	-	-	-	-	100%
Meghalaya	62	29%	71%	100%	-	-	-
Mizoram	10	20%	80%	100%	-	-	-
Nagaland	73	-	-	-	-	-	100%
Sikkim	14	-	-	-	-	-	100%
Tripura	58	15%	-	15%	3%	13%	69%
All-India	63,256	26%	1%	27	2%	62%	9%

Note: Data in 2009-10
Source: Directorate of Economy and Statistics, Ministry of Agriculture

The gross irrigated area by crops in the north eastern states is summarised in Table 2.3.5. In the north eastern region, irrigation is made available to 84% of rice area, 10% of spices, fruits and vegetables area, and 6% of non-food crops on the average.

Table 2.3.5 Gross Irrigated Area by Crops in the North Eastern States

State	Gross Irrigated Area ('000ha)	Rice	Wheat	Coarse Cereal	Total Pulses	Sugar-cane	Spices, Fruits and Vegetables	Total Food Crops	Total Non-Food Crops
Arunachal Pradesh	56	91%	2%	-	-	-	7%	100%	0%
Assam	225	79%	-	-	1%	-	9%	89%	11%
Manipur	52	100%	-	-	-	-	-	100%	0%
Meghalaya	74	68%	-	-	-	-	28%	96%	4%
Mizoram	10	100%	-	-	-	-	-	100%	0%
Nagaland	85	92%	1%	-	-	-	-	93%	7%
Sikkim	18	61%	5%	-	-	-	28%	100%	0%
Tripura	106	89%	-	-	1%	-	9%	99%	1%
All-India	86,423	29%	30%	5%	4%	5%	10%	83%	17%

Note: Data in 2009-10
Source: Directorate of Economy and Statistics, Ministry of Agriculture

2.3.4 Shifting (*Jhum*) Cultivation

Shifting (Jhum) cultivation is a primitive practice of cultivation in the States of North Eastern Hill Region of India. Shifting cultivation involves clearance of forest on sloppy land (usually before December), drying and burning debris (mid-February to mid-March before onset of monsoon) and then cropping. After harvest, land is left fallow and cultivators repeat the process in a new plot designated for the year for Jhum cultivation. First plot remains fallow and vegetative regeneration takes place till the plot is reused for same purpose in a cycle. Farmers involved in Jhum cultivation are called Jhumia. Initially, it worked well, as Jhum cycle ranged from 20 to 30 years, but with the increase in human population and increased demand on land, this Jhum cycle has been reduced to 5-6 years. Jhum cultivation causes serious land degradation and ecological problems, resulting in low yield.

According to the report of the task force on shifting cultivation in 1983, about 1.466 million ha is affected by shifting cultivation mainly in states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura as per the state-wise extent given in Table 2.3.6. Since then, several government programmes have been launched to minimise the shifting cultivation. Amongst others, the Watershed Development Project in Shifting Cultivation Areas (WDPSCA) is a remarkable scheme implemented in seven states of the North Eastern Region, namely, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura with 100% special central assistance to the states as per the directions of National Development Council (NDC) in 1994-95. The sample evaluation study conducted in Nagaland and Tripura revealed that around 30% decrease in shifting cultivation and also about 27% Jhumias have stopped Jhum practice.

Table 2.3.6 Shifting (*Jhum*) Cultivation in the North Eastern States

State	Annual Area under Shifting Cultivation (ha)	Fallow Period (Years)	Minimum Area under *Jhum* at a Given Time (ha)	Number of *Jhumias* Families	Annual *Jhum* Land per Family (ha)	Achievement of WDPSCA up to Jan. 2009 (ha)
Arunachal Pradesh	70,000	3 to 10	210,000	54,000	1.29	32,700
Assam	69,600	2 to 10	139,000	58,000	1.20	44,500
Manipur	90,000	4 to 7	360,000	70,000	1.29	83,300
Meghalaya	53,000	5 to 7	265,000	52,000	1.01	62,400
Mizoram	63,000	3 to 4	189,000	50,000	1.26	98,300
Nagaland	19,000	5 to 8	191,000	116,000	0.16	104,800
Tripura	22,300	5 to 9	112,000	43,000	0.51	40,400
Total	386,000	-	1,466,000	443,000	0.87	466,400

Source: Report of the Task Force on Shifting Cultivation, Ministry of Agriculture (1983), Government of India
*(*http://planningmanipur.gov.in/pdf/MSDR/Chapter%206_Land.pdf*)*
Brief of Watershed Development Project in Shifting Cultivation Area (WDPSCA) as of March 2009
*(*http://www.agricoop.nic.in/Nrm/WDPSCA.pdf*)*

According to the field information, the average *Jhum* cycle at present seems to be three to four years in Meghalaya and Tripura, and nine to ten years in Nagaland.

2.4 Conditions of Agriculture Marketing and Processing

2.4.1 Marketing of Agricultural Products

(1) Outline

The economy of the north eastern region is predominantly agriculture, having over 70% of the working population engaged in farming, and the role of the agricultural marketing system is getting more important for the overall economy of the region.

Source: JICA Survey Team
Bora Bazaar (Shillong, Meghalaya)

There are a large number of unorganised rural markets and private traders in the region. A major part of marketable surplus flows to weekly village markets. The transactions in the village markets are generally small in quantity, dealing with agricultural products and commodities for daily requirements. The private traders, middlemen, commission agents, and petty retailers dominate these markets. Few producers in villages along the main roads transport their products to urban markets using public transportation services.

The bargaining power of farmers is very weak mainly because of: (i) their small sales quantities, and (ii) heavy indebtedness of farmers to private traders, commission agents, and middlemen. In some cases, traders have established market cartels. Under such conditions, important factors in marketing such as pricing, backward and forward linkages, demand and supply of commodities are not yet properly developed, resulting in a disadvantage position for both producers and consumers.

On the other hand, the marketing of agricultural commodities in the north eastern states is dominated by private traders due to the weakness or absence of proper implementation of market regulation act by the state agricultural marketing boards. Besides, the organisational and functional dimensions of the marketing system, the flow of commodities in the NER is restricted and localised to certain specific areas due to geophysical conditions as well as lack of infrastructures.

(2) Actors and Roles in Agriculture Market Chain

The major actors and their roles in the agricultural market chain in the north eastern region are summarised in Table 2.4.1 below.

Table 2.4.1 Actors and their Roles in the Agricultural Market Chain

Major Actors	Roles
Producers	Producers are the main actors in the rural market and behave as traders and retailers. They sell their products and some buy products directly from other producers and sell them to other traders or to e local markets. They are mostly small-scale seasonal floating traders, and some combine farming with trading.
Middlemen and collectors	Middlemen are small-scale wholesalers who collect products from small markets and send them to big markets, or sell to nearby traders. Collectors are rural assemblers who collect from producers or local markets and export to wholesale and retail markets or distant urban wholesale markets.
Commission agents	They are rural assemblers organised by wholesalers in big markets who collect mainly from producers and transport to wholesalers.
Wholesalers	These are permanent shopkeepers and commission agents having their own premises and staff in the markets, mainly in urban markets. They are the middle functionary between traders and retailers. They manage far distant distribution of products through their network with wholesalers in production areas and other urban markets beyond the state. This group of traders mostly offers cash as loans to producers, in return for buying the product at a pre-fixed price, which may be well below the market level.
Retailers	These traders feed the customers. They buy products from the wholesalers and sell directly to the consumers. In rural market, there are retailers who buy products directly from producers. Retailers may be transient mobile vendors or sell from permanent shops or stalls in retail markets

Source: Field Interview by the JICA Survey Team (2014)

(3) Model Agricultural Produce Market Committee (APMC) Act

The argument put-forth by the states in the north eastern region is that it is rather difficult to implement the reform process initiated by the Government of India (GOI) in the absence of uniformity in the functionality of the markets. It is also argued that, implementation of the Model APMC Act is not localised effectively in these states.

The state-wise condition for provision of the major vital areas of reforms is shown in Table 2.4.2. Almost all reforms have been provided by their state APMC Act already in Nagaland and Tripura states but not been approved by the cabinet yet in Meghalaya State.

Table 2.4.2 Status of Reforms in Identified Major Areas

No.	Vital Area of Reforms	Name of Reformed States Providing the Provision in their APMC Act
1.	Establishment of private market yards / private markets managed by a person other than the Market Committee	Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Mizoram, ***Nagaland***, Orissa, Rajasthan, Sikkim, ***Tripura,*** and Uttarakhand .
2.	Establishment of private yards and direct purchase of agricultural product from agriculturist by a person other than the Market Committee (Direct purchasing from producer).	Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Mizoram, ***Nagaland***, Rajasthan, Sikkim, ***Tripura,*** and Uttarakhand .
3.	Establishment of consumer / farmers market by a person other than the Market Committee (Direct sale by the producer to the consumers).	Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Mizoram, ***Nagaland***, Orissa, Rajasthan, Sikkim, ***Tripura,*** and Uttarakhand
4.	Provision of contract farming	Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Mizoram, ***Nagaland***, Orissa, Rajasthan, Sikkim, ***Tripura,*** and Uttarakhand .
5.	Single registration / license for trade transaction in more than one market.	Assam, Goa, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Mizoram, ***Nagaland***, Rajasthan, and Sikkim.
6.	To promote and encourage e-trading	Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Mizoram, ***Nagaland***, Odisha, Rajasthan, Sikkim, ***Tripura,*** and Uttarakhand

No.	Vital Area of Reforms	Name of Reformed States Providing the Provision in their APMC Act
7.	Single point levy of market fee	Andhra Pradesh, Arunachal Pradesh, Goa, Himachal Pradesh, Jharkhand, Karnataka, Mizoram, ***Nagaland***, Rajasthan, Sikkim, ***Tripura,*** and Uttarakhand

Source: "Agricultural Marketing Policy Roadmap", Sanjay Sharan, Director (Marketing), DAC, MOA, 22 March 2013

(4) Market Information through Short Message Service (SMS)

Market information is needed by farmers in planning the production and marketing, and is also equally needed by other market stakeholders to make optimal trading decisions. Towards this end, the Ministry of Agriculture launched the Central Sector Scheme of Agricultural Marketing Information Network (AGMARKNET) in March 2000, to link important agricultural product markets spread over the country. In order to strengthen the interface with farmers and other beneficiaries, AGMARKNET portal (http://agmarknet.nic.in) has been established. The prices and related data of over 600 markets are regularly updated on the portal.

However, it does not become widely used because (i) only a limited number of farmers and small traders in rural areas can access to the internet portal and (ii) the system is not user-friendly dealing with so many data covering all India. To cope with this, SMS Portal was developed and inaugurated in July 2013 by the Central Department of Agriculture and Cooperation. Since then, nearly 500 million messages or more than 1,520 million SMSs have been sent to farmers throughout the country. In addition to the above, SMS market information services have been expanding in India as discussed below.

(a) Price information available on the AGMARKNET portal is shared with IFFCO Kisan Sanchar Limited (IKSL) and Nokia. IKSL is providing the price information to the farmers through voice mail and SMS through mobile phones free of cost in 11 regional languages who have registered with them.

(b) Price information can also be obtained through e-Alert on AGMARKNET portal (http://ealert.agmarknet.nic.in). Farmers can register his mobile number giving personal details requesting price information of three commodities in three markets of his choice. Market information sent by SMS is updated at 6:00 p.m. In case the markets/commodities/varieties combination is selected, previous day price with other data is sent. SAMBs, Marketing Department, APMCs have to take a proactive role in popularising this facility. This system has been tried in Meghalaya (http://megamb.gov.in/SMS_Registration.aspex) and Tripura states recently.

(5) Guwahati Wholesale Market

The Guwahati Wholesale Market is the biggest market in the north eastern region, and the gateway for distribution of agricultural products to the states in main land India. Information regarding major long-distance distribution of agriculture products were collected through interview with traders in the market, as shown in Table 2.4.3 and 2.4.4.

Source: JICA Survey Team

Guwahati Wholesale Market (Shillong)

Table 2.4.3 Major Long-distance Distribution of Horticulture Produces at Guwahati Market

Item	Arrival from and Origin of Production, etc.
Vegetables	Summer: Shillong area (Meghalaya State) Winter: Barpeta area and Kharupatia area (Assam State)
Potato	Summer: Shillong area is the major producer. Good quality. Winter: Bihar and West Bengal Products in W. Bengal arrive in the lean season after keeping in cold storages.
Onion	Nashik, Maharashtra products are in greater number through a year. Seasonally, the products arrive from Bihar in June and from Madhya Pradesh in October.
Tomato	Shillong area (June-November), Barpeta area (December-May)
Garlic	Uttrar Pradesh, Madhya Pradesh Chinese products arrive via Bangladesh
Ginger	North eastern region products. The products from Meghalaya State are in good quality and exported to Delhi.
Turmeric	North eastern region products are in greater number and little come from main land of India.
Others come from outside of the north eastern region	West Bengal: okra, parbel, green chili, capsicon, mung bean Deli area: carrot China: apple Other various vegetables arrive seasonally.
Others go outside of the north eastern region	Export to Main land of India: Potato, tomato, chili, ginger, turmeric, bloom, areca nuts and other various vegetables Bangladesh: Potato, tomato, areca nuts/leaves, citrus fruits, pineapple, jackfruit, bloom and other various vegetables/fruits.
Findings at the survey time (Dec. 2014), transitional period to winter season	Shillong area: squash, capsicum Kharupatia area: green bean, french bean, chili, carrot, cauliflower, cabbage Barpeta area: eggplant, Assam lemon, beat Sikkim: pumpkin Delhi area: carrot

Source: Field Interview by the JICA Survey Team (2014)

Other major agricultural products, except for horticultural products, come into the north eastern region as follows:

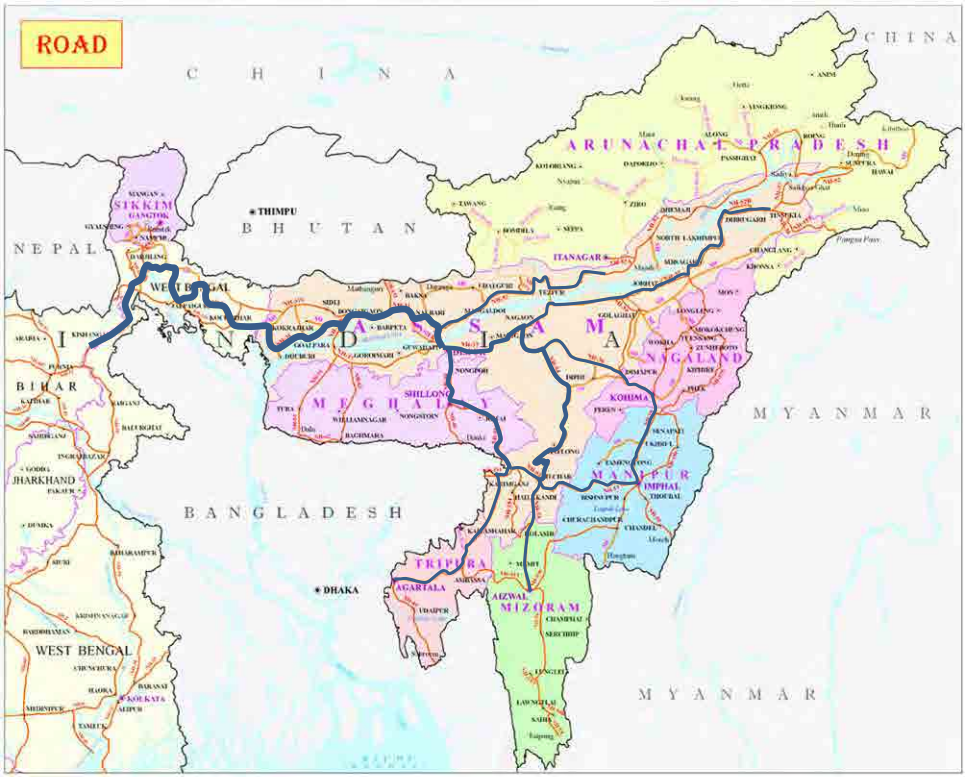
Table 2.4.4 Major Long-distance Distribution of Other Produces at Guwahati Market

From Main Land of India	Fish (Andhra Pradesh), broiler/eggs (Andhra Pradesh), dairy/beef (West Bengal), and swine (Bihar, Madhya Pradesh, Jharkhand, Utter Pradesh)
From Bangladesh	Fish (fresh / dried)

Source: Field Interview by the JICA Survey Team (2014)

(6) Distribution Route

The long-distance distribution route of agriculture products mentioned above connects the main land of India and each state in the north eastern region by the national highways No.31, 37, and 54, the so called East-West Corridor from the main land of India to Shilchar via Guwahati, along with some by-pass roads as indicated in Figure 2.4.1.



Source: Prepared by the JICA Survey Team based on the Map of M/o DONER (http://mdoner.gov.in/node/1260#)

Figure 2.4.1 Main Distribution Route of Agriculture Produces in the North Eastern Region

(7) International Trade

About 98% of the north eastern region border forms India's international boundaries; which shares borders with China, Bangladesh, Bhutan, and Myanmar. Given its strategic location, the region can be developed as a base for India's growing economic links not only with neighbouring countries, viz. Bangladesh, Bhutan, and Nepal but also with the Association of Southeast Asian Nations (ASEAN).

Source: JICA Survey Team
Border Gate (Dawki, Meghalaya)

According to the official records in 2009-2010, the trade between India and two neighbours, i.e., Bangladesh and Myanmar shares only about 0.6% with Bangladesh and about 0.3% with Myanmar. The official records may not include informal trades practised at several places along the border, since it has not been systematically recorded so far. People living in the border areas have had economic and cultural links since the ancient time. The interdependence of people on both sides of the border has traditionally maintained informal channels of trade in goods and services. Thus, informal trade has provided sustenance to the economies of the region.

There are a total of 39 land custom stations (LCSs) along the border line in the north eastern region; 31 locations to Bangladesh, 4 to Myanmar, 3 to Bhutan, and 1 to China. However, 23 LCSs are only functioning amongst all. (Refer to Attachment-2.4.1)

Table 2.4.5 shows the import and export records of selected states in the last five years. Since trade with Bhutan shares 10-15% in all trade in Assam State while almost no trade result in both Manipur and Mizoram, it can be seen that most of total Rs.100 crores in the region is shared by the trade with

Bangladesh. More than 90% of export to Bangladesh are mineral products like coal and marble and some agricultural products like fruits and vegetables share only a few percentage. In the contrast, import commodities from Bangladesh are mainly industrial products and very little agricultural products like fresh and dried fish, processed drinks, and snacks.

Table 2.4.5 Import and Export by the North Eastern States

(in Cr. Rs.)

	2009-10		2010-11		2011-12		2012-13		2013-14		Average	
State	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
Assam	550.88	45.72	463.44	39.88	638.25	64.27	781.22	75.11	923.26	37.13	671.41	52.42
Manipur	2.15	8.31	0.26	3.8	1.49	1.36	28.03	20.55	17.81	52.05	9.95	17.21
Meghalaya	840.91	9.87	383.94	9.49	600.98	7.96	863.77	12.21	1385.8	14.93	815.09	10.89
Tripra	0.4	169.78	1.57	251.34	1.41	326.8	0.98	335.71	0	183.38	0.872	253.40
Mizoram			0	0.03	0	0.14	0	0	0	0.33		
Total	1394.3	233.68	849.21	304.54	1242.1	400.53	1674	443.58	2326.9	287.82	1497.32	334.03
Source: Commissioner of Custom, NER, Shillong										(%)	81.76	18.24

As mentioned earlier, such official record does not show the actual conditions of border trade, and it is estimated that many more agricultural products are traded informally. Additionally, the Bangladeshi government raised import tax of agricultural products up to 65% at minimum a few years ago, then informal export to Bangladesh may be increasing while stagnancy of formal export.

2.4.2 Agro-processing

(1) Outline

The north eastern region in India is endowed with various sorts of fruits, vegetables, and other agro-products, and has the potential to be a sunrise zone for food processing and other agri-businesses. The present paper deals with immense opportunities in food processing in the region. It is observed that simple value addition like cleaning, sorting, and packaging can increase income of farmers by 42.8% per kg (“Food Processing Industry: Opportunities in North Eastern Region of India”, The NEHD Journal, Vol. XIINo. 1, January-June 2014).

Then, the central government provides various promotion and incentive schemes in this fields but the agro-processing industry in the north eastern region has not established the movement for development yet due to poor infrastructure such as road network and power supply, inadequate supply chains, bad accessibility to markets, lack of entrepreneurs, etc.

(2) Food Processing Industry

The food processing industry is mainly operated on a small scale and in small numbers. In 2009, in the north eastern region, only 85 units received licenses under the Fruit Products Order (FPO) Act and out of these only 32 units are functional (MSME, 2009). The number of food processing industry is highly erratic in different years for the north eastern region. In 2001, the total number of applications for registered food processing industries in the north eastern

Source: JICA Survey Team
Products of Small Enterprise (Guwahati)

region was 21. Later on, the implementation of the North East Industrial and Investment Promotion Policy (NEIIPP) was enforced in 2007, the number was less than in the previous years.

In tune with the rest of India, the food processing industry in the north eastern region is mainly unorganised and works on a smaller scale, and own-account enterprises hold the highest share in the unorganised sector according to the MSME census in 2006-07. The huge presence of the unorganised sector can be attributed to the fact that most of the units in the unorganised sector are less capital intensive, and the easy availability of raw materials makes it more attractive for small entrepreneurs. It is expected that the high presence of own account enterprises indicated in Table 2.4.6 could serve to mitigate unemployment to a large extent, but this sector is responsible for the low level of income generation and low level of productivity in the region.

Table 2.4.6 Number of Own Account Enterprises of Food Processing in the North Eastern Region (2010-11)

State	Nos. of Enterprises
Arunachal Pradesh	186
Assam	22,874
Manipur	1,093
Meghalaya	946
Mizoram	1,224
Nagaland	804
Tripura	13,782
Sikkim	12

Source: National Sample Survey Organisation (NSSO) 67th round, Nov. 2012

Additionally, the MSMEs in the north eastern region shares 2.25% in micro enterprises, 1.05% in small enterprises, and 1.05% in middle enterprises against all MSMEs in India that shows the behind area for development.

(3) Potential of Food Processing Industry

Amongst all the sectors in the food processing industry, the sector which has an advantage in the north eastern region over the rest of India is the horticulture industry. Diverse agro-climatic conditions ranging from temperate to tropical, fertile soils, and abundance of rainfall offer immense scope for development of this sector.

Table 2.4.7 Major Horticultural Products for Food Processing

Category	Products
Tuber crops	Potato, onion, tapioca, sweet potato
Spices	Ginger, turmeric, chili
Fruits	Banana, pineapple, citrus, mango, litchi, jackfruit, coconut, areca nut (Less surplus yet) apple, pear, apricot, peach, passion fruit
Vegetables	(Less surplus yet) cabbage, eggplant, cauliflower

Source: "Food Processing Industry: Opportunities in North Eastern Region of India", The NEHD Journal, Vol. XII No. 1, January-June 2014

(4) North Eastern Region Marketing Corporation Ltd. (NERAMAC)

NERAMAC was set up to support farmers/producers in the north eastern region getting remunerative prices for their products and thereby bridge the gap between the farmers and the market, and also to enhance agricultural, procurement, processing, and marketing infrastructure in the north eastern region. Presently, it is under the administrative control of the Ministry of Development of North Eastern Region (MoDONER), Government of India, New Delhi, with its registered office in Guwahati. The major activities of NERAMAC are as follows:

- Purchase surplus of products from the horticultural producers.
- Process and sale the products purchased.

- Provide inputs to producers by the support programmes of the central government aiming at improvement of productivity, such as Horticulture Mission for North East and Himalayan States, National Horticulture Mission, Bamboo Mission, National Food Security Mission, Integrated Child Development Services Programme, etc.

Amongst the above activities, NERAMAC buys and sells ginger, cashew nuts, pineapple, bay leaves, orange, kiwi fruit, turmeric, and cardamom, and selling seeds, fertiliser, feeds for animal, etc.

(a) Details of food processing activities

The major horticultural products for food processing by NERAMAC are described in Table 2.4.8.

Table 2.4.8 Current Activities in Food Processing

Activity	Place	Details
Production of pineapple concentration juice	Nalkata, Tripura State	Started in 1988. By processing surplus pineapple produced in Tripura and Barak Valley, NERAMAC supported growers and created jobs to 20 permanent workers and 20,000 man/day for temporary workers annually. But the factory was closed due to aging of machines. NERAMAC is looking for funds for rebuilding the factory equipped with integrated processing plant used not only for pineapples but also other fruits.
Cashew nut processing	Agartala in Tripura State	Started in 1994. NERAMAC supported producers and created jobs to 1 permanent worker and 7,500 man/day for temporary workers annually. Now, the factory is non-operational due to smoke pollution to neighbouring residence, and planned to restart in a new location of industrial area.
Ginger processing	Byrnihat, Meghalaya State	Started the operation of the plant for washing, waxing, chopping, grinding, and extraction of oil in 2006. But they stopped their operation due to difficulty of purchasing raw materials due to high market price and low demand of extracted oil.

Source: Field Interview by the JICA Survey Team

Regarding the unsatisfactory conditions of the factories mentioned above, NERAMAC explained that the skilled staff who know the business and marketing are indispensable for success, however there is still not enough skilled staff.

2.5 Natural Condition in the North Eastern Region

Natural condition in the north eastern region is summarised in Attachment-2.5.1.

2.6 Socio-economic Condition in the North Eastern Region

Socio-economic condition in the north eastern region is summarised in Attachment-2.6.1.

CHAPTER 3 AGRICULTURE SECTOR IN MEGHALAYA

3.1 State Agriculture Development Plan

3.1.1 Vision and Strategy

(1) General

The State Government of Meghalaya has a long-term vision of achieving happiness through peace and prosperity in sustainable manner without harming the land and nature as taken up in the Vision Document for the State of Meghalaya 2030 (subtitled as Toward Building Capabilities, Enhancing Freedom, and Accelerating Development: Meghalaya Vision 2030) published in 2013. In concrete terms, it targets to uplift the income level of the people in Meghalaya to the national average (per capita gross state domestic product (GSDP) = Rs.218,061 estimated) by 2030. To realise it, Meghalaya should achieve 9.02% growth rate of GSDP and 7.92% growth rate of per capita GSDP on the average from 2012 to 2030 as shown below.

Table 3.1.1 Meghalaya Required Average Annual Growth Rate to Reach India's Per Capita GDP Level in 2029-30

Five-Year Plan Period	Years	Required GSDP CAGR (%)	Projected GSDP (Rs. Crores)	Derived Per Capita GSDP at Year End (Rs.)	Implied Per Capita GSDP Growth (%)
11th	2010-11 to 2011-12	7.78	62,488	55,306	6.96
12th	2012-13 to 2016-17	9.02	95,301	80,479	7.79
13th	2017-18 to 2021-22	9.02	146,767	117,386	7.84
14th	2022-23 to 2026-27	9.02	226,028	171,669	7.90
15th	2026-27 to 2029-30	9.02	190,626	218,055	8.15
Average Annual Growth Rate (%) from 2012 to 2030		9.02	-	-	7.92

Note: GSDP is at fixed cost at 2009-10 prices.
Source: National Institute of Public Finance and Policy (NIPFP) Estimates in Meghalaya Vision 2030

In order to realise the vision, the following seven interdependent development strategies need to be implemented.

- Empowerment of the people for inclusive growth;
- Promoting market friendly policies and institutions;
- Sustainable development based on comparative advantage;
- Infrastructure development for manufacturing and markets;
- Expanding trade with the neighbours and beyond, and creating enabling conditions for investment;
- Capacity development of people and institutions; and
- Ensuring opportunities to vulnerable sections of population.

(2) Agriculture and Allied Sector

Future prospects for economic development of Meghalaya lie in strengthening and developing the agriculture and allied sector of its economy. This is primarily because nearly two-thirds of the total work force depends on agriculture and allied activities for its livelihood, while the contribution of

agriculture to the state's gross domestic product (GDP) is a little over 20%. The role of the modern industrial sector in the economy is insignificant, and given the state's geographical constraints and size, the scope for large-scale industrialisation is limited. Hence, the strategy for development should be to gradually transform the self-subsistence structure of the rural sector to a commercial commodity-producing one by creating opportunities for generating marketable surplus which can be exported. This will, in turn, raise the levels of rural income and enable farmers to extend their activities to non-farm production based on processing agricultural surpluses. As a result, dependence on agricultural farm production will decline and there will be a rise in people's engagement in non-farm economic activities. The long-run impact will be to raise agricultural productivity and create an agro-based industrial structure.

The Meghalaya State Development Report 2008–09 points out: "Pattern of land holdings and the myriad of land tenure systems, extensive practise of '*Jhum*' cultivation (shifting cultivation), other traditional agricultural practices including aspects of production for consumption rather than creating marketable surpluses for profitable returns, high cost of inputs and production are some of the realistic dimensions of agriculture in Meghalaya". As a result, despite the large percentage of population engaged in agriculture, the state is still dependent on imports from other states for most food items such as meat, eggs, and food grains.

Taking the above into account, the Meghalaya Vision 2030 identifies strategies for the development of agriculture and allied sector as follows:

Table 3.1.2 Development Strategies for Agriculture and Allied Sector in Meghalaya

Subject	Development Strategies
(1) Natural Resources and Their Use	A comparative picture of resource endowments and land occupational patterns between Meghalaya and the other north eastern states with India shows that Meghalaya has 42% forest land, slightly less than the forest coverage for the north eastern region (57%) as a whole, but certainly above the Indian average of only 23%. The net sown area is only 13% in Meghalaya, which is not only significantly lower than the country average which is 46%, but also much lower than the north eastern region as a whole. The area sown more than once is relatively low in Meghalaya, suggesting the severity of the impact of *Jhum* cultivation in Meghalaya. Meghalaya has a very high percentage of cultivable wasteland compared with the total net sown area, indicating the scope for expansion of crop cultivation in the state. It is next to Mizoram in terms of the availability of forests to net area sown area, which means that forestry income should play a much bigger role in the GDP of Meghalaya. Interestingly, it has a very high percentage of land under trees and groves not included in the net sown area. Meghalaya seems to have a comparative advantage in livestock products in comparison with both the north eastern region and India. This means it can specialise in production for export to other regions and can also develop meat processing industries to increase value addition to its GSDP.
(2) Productivity	Agricultural productivity in the state is fairly low. Specialisation is limited by the extent of the markets, which has forced every village into self-sufficiency, producing everything they need to survive irrespective of their comparative advantages in production. This means that no village has the incentive to produce a marketable surplus because of the limited scope of markets, a direct consequence of the lack of mobility of goods due to the lack of connectivity. Thus, a third possible way to increase land and labour productivity is from specialisation in crop cultivation, which can only be achieved by intensifying trade, first within Meghalaya and subsequently, with other states. There is considerable scope for increasing agricultural productivity from specialisation in production. There will be several impacts of such an increase in productivity. First, Meghalaya will have to depend less on the outside world for food, and hence, there will be a lower rate of leakage of income from the state. The direct consequence of this will be the increased multiplier effect on income generation. Second, it will raise the income of farmers, enabling them to invest more on land development and skill formation. Third, it may help develop some agro-based industry in Meghalaya.

Subject	Development Strategies
(3) Specialisation of Agriculture Produces	In the discussion on the agricultural sector in the north eastern region, the North Eastern Region Vision Document 2020 has observed that there is wide variation across the north eastern states in agricultural productivity. Further, there is very little trade amongst the states of the north-east, and hence a lack of specialisation in production. According to the Regional Specialisation Index (RSI)*1, Meghalaya has a production advantage in maize, small millet, sesamum, coffee, natural rubber, bananas, potatoes, chillies, ginger, turmeric, pineapple, and especially ginger. In relation to the National Specialisation Index (NSI)*2, Meghalaya has a comparative advantage in rice, maize, small millet, wheat, coffee, natural rubber, bananas, potatoes, chillies, ginger, turmeric, pineapple, and especially pineapples.

*Notes: *1: RSI = Xij / Xj / XiNE / XNE, where Xij is the net sown area of the product "i" in state j, Xj is the net sown area in state "j", XiNE is the net sown area of the product "i" in the NE and XNE is the total net sown area in the NE.*
**2: NSI = Xij / XiNE / Xil / Xl, where Xij is the net sown area of the product "i" in state j, XiNE is the net sown area of the product i in the NE, Xil is the net sown area of the product "i" in the India and Xl is the total net sown area in India.*
Source: Meghalaya Vision 2030

The Meghalaya Vision 2030 recommends the following countermeasures for the agriculture and allied sector development in Meghalaya.

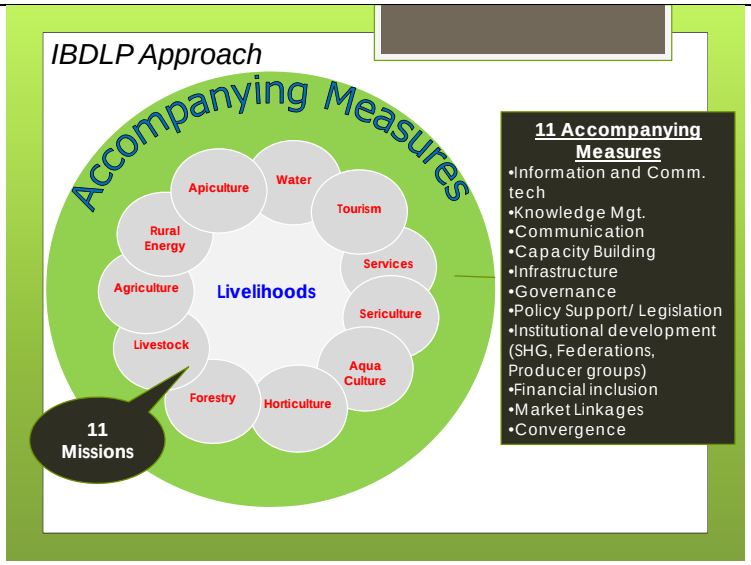
Table 3.1.3 Countermeasures for Agriculture and Allied Sector in Meghalaya

Subject	Countermeasures
(1) Appropriate Crop Production	An issue of significance is appropriate crop choice to maximise productivity in agriculture. Meghalaya's demand for meat, fish, and eggs is far higher than the national demand, and so is its demand for beverages. Its demand for rice is marginally higher than that of the country. Dependency indices for the state indicate a high dependency on 'imports' in all the districts for several products such as cereals, pulses, oilseeds, total food grain, and fish. Consumption demands could be used as indicators for increased cultivation for local consumption. With the development of markets, instead of cultivating traditional crops, Meghalaya can exploit its climatic advantage to cultivate certain high-value horticulture and floriculture products for export to neighbouring markets.
(2) Modernisation of Agriculture	Almost any effort to increase productivity will require phasing out of *jhumming* and replacing it with settled cultivation. The indirect benefits from the replacement of *jhumming* will be that the percentage of fallow land to overall cultivable land will be progressively reduced. Production of horticulture and floriculture products will also require modernisation of farm techniques and expansion of irrigation facilities.
(3) Water Management	Because of the state's high altitude and mountainous terrain, water run-off is very high, which makes multiple cropping almost impossible. Thus, water harvesting and water retention, along with major irrigation based on river and stream water, may be the sine qua non of agricultural development in Meghalaya. Such steps also will increase both land and labour productivity in agriculture.
(4) Developing Forest Resources	The abundance of forest resources could contribute significantly to the income growth of the state. However, the share of income from logging and forestry in GDP is abysmally low, indicating that the state still has unexploited potential in realising income from forestry.
(5) Cluster-based Development	The short-run development approach will be cluster-based to realise greater economies of scale and specialisation. For this, the cultivated area of the state can be divided into crop-wise clusters based on comparative advantages, with each cluster defined as a Crop Development and Marketing Unit (CDMU) which emphasises the marketing aspects of the cluster. Collection centres will need to be set up near the clusters, which will have linkages with clusters in other regions to promote economic linkages with wholesale markets. Marketing intervention, especially for horticultural produce, with a full complement of post-harvest infrastructure and market network is fundamental. These CMDUs would be given appropriate managerial and financial flexibility for assisting producers realise reasonable profits from their efforts.
(6) Transportation Network	An efficient transport network allows farmers to expand their business horizon, resulting in specialisation in production and trade. In the absence of such networks and markets, villages have to become self-sufficient, where each farmer is essentially forced to produce everything he requires, without being able to create marketable surplus. The value of surplus production can be realised in the context of trading opportunities.
(7) Creating Market Framework	The highly perishable nature of agricultural goods becomes an issue when there are several small farmers and little inter-state coordination. Farmers need some support in marketing their products if they are to be induced to make the shift to cash crop production. Further, unless states coordinate their production and storage plans, excessive production can lead to a market crash, as recently observed in the case of ginger production in some of the north eastern states. The large demand for food items created by the 'captive markets' of the region, such as the army and security forces, could be tapped into to expand the regional market.

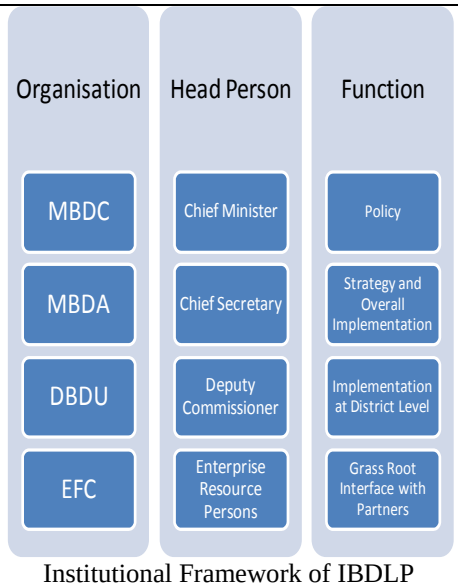
Subject	Countermeasures
(8) Agro-based Industry	There is a link between productivity, trade, and urbanisation. The rate of urbanisation crucially depends upon the rate of industrialisation. Thus, in order to increase labour productivity in the relatively backward districts, one should focus on creating agro-based industrial clusters in backward districts having strong forward and backward linkages. The success of such agro-based industrialisation will depend upon (i) the creation of markets and (ii) efficient and reliable transport connectivity. The important initiatives in this regard will have to include a thrust on improving the value chains. The private sector will have to play a crucial role in making investments not only in agro-based industries but also in building the infrastructure for improving the value chain through public-private partnerships (PPP).
(9) Cold Chains	Establishment of a cold chain along major arterial highways is critical if the region is to exploit its rich horticulture potential and market these products to the rest of the country. The operation of the cold chain could be based on a PPP model or on a lease basis with private entrepreneurs.

Source: Meghalaya Vision 2030

In states like Meghalaya where over half the population is below the poverty line[1], harnessing water is at the heart of alleviating poverty by providing livelihood opportunities to the rural poor. Therefore, the Government of Meghalaya has launched a programme called 'Integrated Basin Development and Livelihood Promotion (IBDLP)' Programme during the State 12th Five-Year Plan, wherein harnessing water has been designated as the central focus. The thrust areas of the IBDLP include integrated water resources management, creation of small multipurpose reservoirs (SMRs), and generating water-centric livelihoods such as fisheries and aqua tourism. The objective is not only to capture surface run-off and water along the drainage lines and reduce erosion but also to formulate a water policy and aim at better river governance. The SMRs will be used for various productive purposes like aquaculture, drinking water supply, mini-hydro irrigation, aesthetic value, tourism, and eco-system promotion. Considerable investments are supposed to be made in this flagship programme.



IBDLP Approach



Institutional Framework of IBDLP

Notes: MBDC= Meghalaya Basin Development Council, MBDA= Meghalaya Basin Development Authority, DBDU= District Basin Development Units, EFC= Enterprise Facilitation Centres.

Source: Integrated Basin Development and Livelihood Promotion Programme (IBDLP) Meghalaya, A Report to Citizens December 2012 and Presentation Material on IBDLP.

Figure 3.1.1 IBDLP Approach and Institutional Framework

[1] Refer to Table 2.6.9 of the Attachment-2.6.1

3.1.2 Development Budget and Expenditure under the State 12th Five-Year Plan

The state plan budget under the State 12th Five-Year Plan (2012-2017) is broadly divided into 11 items as shown in Table 3.1.4 below. The plan budget with respect to agriculture and rural development (items 1 to 4) will share only 20.8% of the total budget. However, it will practically occupy about 50% as other items except for items 10 and 11, which also include more or less agriculture and rural development components. Thus, agriculture and rural development is an important sector in Meghalaya. The approved outlay, however, is not being fully utilised; only 57% was used in 2012-13 and 86% in 2013-14.

Table 3.1.4 State Plan Budget and Expenditure under the 12th Five-Year Plan

SN	Sector	12th Plan Proposed Outlay	Annual Plan 2012-13		Annual Plan 2013-14		Annual Plan 2014-15 Tentative Budget
			Approved Outlay	Expenditure	Approved Outlay	Anticipated Expenditure	
1	Agriculture and Allied Services	2,904.00	427.50	231.72	452.57	388.45	579.25
2	Rural Development	1,534.00	207.45	171.36	285.06	264.44	539.64
3	Special Area Programme	140.00	46.19	81.42	46.50	54.48	39.50
4	Water Resources, Irrigation and Flood Control	1,038.00	230.15	137.53	208.70	151.70	221.20
5	Energy	3,680.00	517.80	237.51	488.93	498.93	104.15
6	Industry and Minerals	293.00	48.70	61.96	38.00	63.00	48.00
7	Transport	2,045.00	492.56	265.41	438.43	384.13	436.34
8	Science, Technology and Environment	461.00	120.14.	57.94	112.03	112.03	116.80
9	General Economic Services	5,812.00	440.96	314.95	771.64	624.63	528.75
10	Social Services	8,412.00	1,274.25	636.40	1,225.82	955.47	1,573.60
11	General Services	708.00	133.30	58.37	83.32	84.24	102.77
	Total (State Plan)	**27,027.00**	**3,939.00**	**2,254.57**	**4,151.00**	**3,580.50**	**4,290.00**

Notes: Unit: Rs. crore
Source: Plan Supplement 2014-15 Meghalaya

3.2 Social Institution and Local Governance

3.2.1 Social Institution

Around 86.1% of the total population of Meghalaya comprised of tribal communities such as Khasi, Jaintia (*Synteng*), and Garo[2]. Khasi is the dominant tribal community, accounting for 56.4% and Garos comprise 34.6% of the total population[3]. These tribal communities have their own language, tradition, governance system, and social order; and are matrilineal. The properties are passed from mother to daughter in a family and the brother of the mother functions as the manager of such properties. On the other hand, the community affairs and village administration are the responsibilities of men, which means that the participation of women in the Village Council (*durbar/ nokma*) is limited. About 70.3% of the total population of Meghalaya are Christians followed by Hindus (13.3%), and the remaining population are identified with other religions/religious communities[4].

[2] Census of India, 2011, Refer to Table 2.6.12 of Attachment-2.6.1.
[3] Census of India, 2001 in Meghalaya Vision 2030.
[4] Census of India, 2001, Refer to Table 2.6.10 in Attachment-2.6.1.

The landholding system in Meghalaya is complex owing to the prevalence of the community and clan-based land ownership. Specific community arrangements are made for land administration. Individual land ownership and tenancy are also emerging.

In the case of community-owned land, the head of village council will have control over the decision where one should cultivate and what crops to be planted. Land owned by a clan is managed by the clan members collectively. Some families belonging to a *clan* may not be staying in the village but they have the ownership over the land. In the recent years, there are efforts by individuals to own land. Some of the families have applied for land *pattas*[5] and have also been given the entitlement[6]. Land transfer and mortgaging can also be done under the administration of the village council.

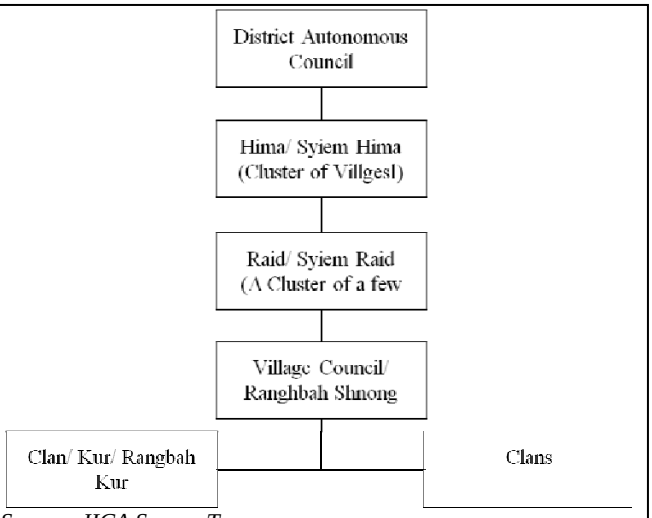
Tenancy Arrangement in Meghalaya

Land owners may give their land to different fellow villagers for cultivation. The terms and conditions vary from place to place. In some places, a rent is fixed; in other places, the harvests are to be shared. There are also cases where there is no rent or share of harvest; the land owner simply wants to maintain the soil fertility and thus, allow others to cultivate his/her land.

Source: Field Interview, JICA Survey Team.

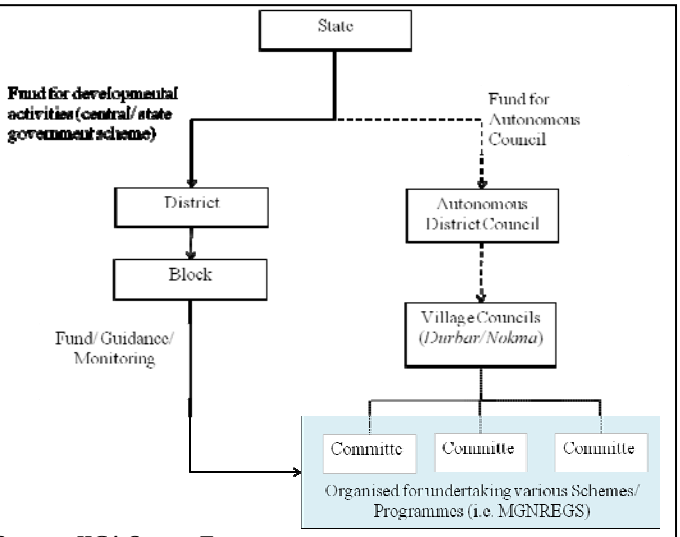
3.2.2 Local Governance

In Meghalaya, the traditional governance system is legally recognised under the 6th Schedule of the Constitution of India. It is basically a three-tier system, i.e., a) village councils at the village level, b) area council at a cluster constituted by a multiple number of villages, and c) Autonomous District Council at the district level. The District Autonomous Councils are empowered by the Indian Constitution to make laws and rules. There are three District Autonomous Councils; one each for Garo Hills, Khasi Hills, and Jaintia Hills. The District Autonomous Councils are responsible for managing natural resources including land, forest other than reserved forest, use of waterway for agriculture, and regulation of *Jhum*. They



Source: JICA Survey Team

Figure 3.2.1 Local Governance Structure in Meghalaya



Source: JICA Survey Team

Figure 3.2.2 Administration Structure and Fund Flow in Meghalaya

[5] A document showing the ownership of the property issued by the Autonomous District Council.

[6] Land tenure originally was not documented. The emergence of document-based individual land ownership or tenancy has created confusion amongst the community members.（Working Paper 1: Population, Land and Traditional Institutions in Meghalaya: Livelihoods and Access to Markets Project: Final design report. (2014). International fund for Agriculture Development.

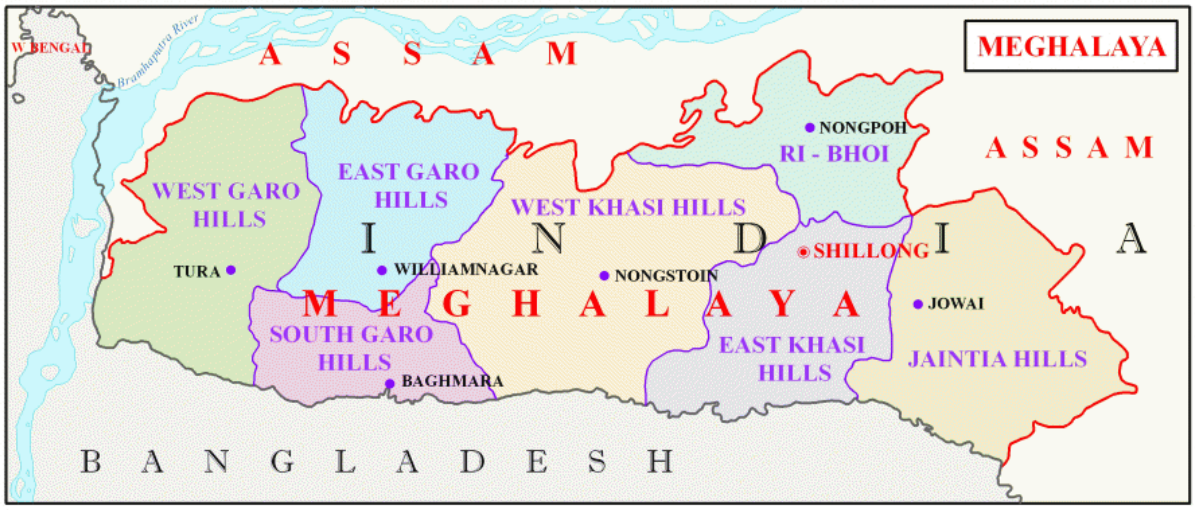
also establish public infrastructures including health and education facilities, markets, cattle ponds, and roads. The councils can also levy taxes on various goods and services including the incoming goods to the local market.

On the other hand, the central and state government funded development programmes in the districts, which are implemented through the District Rural Development Agency and other line departments at the district level and through Community and Rural Development Blocks at the block level. At the village level, the programmes are implemented through the traditional village councils and scheme specific institutions such as the Village Employment Council to implement the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), which have been created at the village level for smooth implementation of programmes. In Meghalaya, there are 11 districts with 39 blocks comprising 6,839 villages.

Table 3.2.1 Administrative Divisions in Meghalaya

Level	District Autonomous Council	Subdivision	District	Blocks	Villages
No. of Divisions	3	4	11	39	6,839

*Note: *There are towns, municipal boards, and other divisions in Meghalaya.*
Source: Government. (http://meghalaya.gov.in:8080/megportal/government. accessed in March 2015).



Source: MoDONER

Figure 3.2.3 District Map of Meghalaya

3.3 Agricultural Resources

3.3.1 Land

Meghalaya State has a total geographical area of 22,430 km^2 and the reported area for land utilisation is 22,270 km^2 [7].

District-wise land use classification is shown in Table 3.3.1. Comparing the land use of the districts with one another, the net area sown is higher at 25.8% in West Garo Hills District and lower at 6.1% in West Kashi Hills, and overall, it is 12.8% in the whole of Meghalaya. Fallow area is lowest at 3.9% in East Khasi and highest at 13.4% in South Garo Hills, and it is 9.7% in entire Meghalaya. Cropping intensity is highest at 126% in West Garo Hills and lowest at 101% in Jaintia Hills, and

[7] Source: Land Use Statistics MOA, GOI, 2008-09

that of the whole Meghalaya is 119%. Fallow area in West Khasi Hills District is more than twice of its net area sown. The ratio of fallow area to the net area sown is 43:57 in the entire Meghalaya.

Table 3.3.1 District-wise Land Use Classification in Meghalaya (%)

	District		Jaintia Hills	East Khasi Hills	West Khasi Hills	Ri-Bhoi	East Garo Hills	West Garo Hills	South Garo Hills	Meghalaya
Area reporting for Land Utilization	Area under Forest	(1)	40.4	39.3	40.3	35.7	48.1	45.0	54.6	42.6
	Land not available for cultivation	(2)	8.1	18.7	13.6	13.7	4.0	5.9	4.4	10.1
	Other un-cultivated land excluding fallow land	(3)	34.9	24.0	27.2	35.4	24.0	10.8	14.0	24.9
	Fallow land	(4)	7.1	3.9	12.7	6.2	10.1	12.5	13.4	9.7
	Net area sown	(5)	9.5	14.1	6.1	9.1	13.9	25.8	13.6	12.8
	Total: sum of (1) - (5)	(6)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Area sown more than once to(5)	(7)	1.0	20.0	20.6	13.0	14.7	26.4	22.0	18.7
	Gross cropped area to (6)	(8)	9.6	16.9	7.4	10.3	15.9	32.5	16.5	15.1
	Cropping intensity: (8)/(5)	(9)	101	120	121	113	115	126	122	119

Source: JICA Survey Team, based on Directorate of Economics & Statistics, Meghalaya (Statistical Abstract 2009)

Recorded forest area in the state is 9,496 km^2, which is 42% of the geographical area. This consists of reserved forests (11.72%), protected forests (0.13%), and unclassed forests (88.15%)[8].

District-wise forest cover is presented in Table 3.3.2. In East Khasi Hills and Jaintia Hills, the forest cover is comparatively low at less than 70%.

Table 3.3.2 District-wise Forest Coverage in Meghalaya

District	Geog. Area (km2)	Forest Cover (Area in Km2)					Scrub land (kn2)
		VDF	MDF	OF	Total	%	
East Garo Hills	2,603	68	1,104	1,045	2,217	85.2	92
East Khasi Hills	2,820	0	1,084	716	1,800	63.8	110
Jaintia Hills	3,819	99	1,578	839	2,516	65.9	53
Ri Bhoi	2,376	131	1,092	898	2,121	89.3	10
South Garo Hills	1,849	44	1,005	590	1,639	88.6	27
West Garo Hills	3,715	0	1,361	1,613	2,974	80.1	129
West Khasi Hills	5,247	91	2,551	1,366	4,008	76.4	64
Total	22,429	433	9,775	7,067	17,275	77.0	485

Note: VDF= Very Dense Forest, MDF= Moderately Dense Forest, OF= Open Forest
Source: "SMCFBCLIM, DoEF, GoM"

As shown in Table 3.3.3, total forest cover areas below and over 500 m in altitude are almost the same.

Table 3.3.3 Forest Coverage by Altitude Zone in Meghalaya

Altitude Zone		Very Dense Forests (VDF)	Moderately Dense Forests (MDF)	Open Forests (OF)	Total	
					(km2)	(%)
0-500m		229	4,341	4,037	8,607	49.8
500-1000m		197	2,839	2,192	5,228	30.3
1000-2000m		7	2,595	838	3,440	19.9
Total	(km2)	433	9,775	7,067	17,275	100.0
	(%)	2.5	56.6	40.9	100.0	

Source: "SMCFBCLIM, DoEF, GoM"

Forest type by district is presented in Table 3.3.4.

[8] Source: Department of Environment and Forests, Government of Meghalaya.

Table 3.3.4 District-wise Forest Types in Meghalaya

Class	East Khasi	West Khasi	Jaintia	West Garo	South Garo	East Garo	Ri Bhoi	Total (km2)	(%)
Sub tropical pine forest	112	341	55				35	542	3.1
Tropical semi-evergreen	171	222	503	481	292	454	337	2,460	14.2
Tropical moist/ Dry deciduous	782	1,569	828	1,257	716	956	860	6,968	40.3
Tropical dry deciduous and bamboo mix	128	677	382	317	177	110		1,792	10.4
Degraded	577	852	463	656	111	360	364	3,384	19.6
Misc	30	347	285	263	343	337	525	2,130	12.3
Total (km2)	1,800	4,008	2,516	2,974	1,639	2,217	2,121	17,275	100.0
(%)	10.4	23.2	14.6	17.2	9.5	12.8	12.3	100.0	

Source: "SMCFBCLIM, DoEF, GoM"

3.3.2 Water

Meghalaya is known as an extremely wet state, since Sohra (*Cherrapunji*) holds the world record of the highest annual rainfall of 26,461 mm. Average annual rainfall is more than 11,800 mm in Mawsynram, East Khasi District, near Sohra. However, rainfall is concentrated during the monsoon season and rainfall amount varies widely by places as shown in Table 3.3.5 (1,160 – 3,640 mm). Although the amount of rainfall is ample, water shortage is still experienced in the state.

Table 3.3.5 Annual Rainfall by District in Meghalaya (mm)

District	Station	2006	2007	2008	2009	2010	2011	2012	Average
South Garo Hills	Baghmara	1919	-	2322	-	-	2161	1821	**2056**
West Garo Hills	Sangsanggiri Tura	2629	5335	4429	3382	-	4003	2935	**3785**
East Garo Hills	Williamnagar	2101	-	3247	3252	-	1909	-	**2627**
West Jaintia Hills	Rymphum Seed Farm	2903	4572	4831	2623	3943	2956	3597	**3632**
West Khasi Hills	Nongstoin	2366	4778	3309	3507	3316	3032	3481	**3398**
	Mairang	-	2713	-	-	-	-	-	2713
	Riangdo	-	-	-	-	-	-	-	-
East Khasi Hills	Vegetable Research	1687	2889	1857	-	1994	2096	2103	**2104**
	Upper Shillong	857	1740	1284	-	957	1007	-	**1169**
	Sohra	-	12234	-	5704	-	8732	-	8890
Ri Bhoi	Nongpoh	-	-	-	-	-	1496	1761	1628
	Patharkhmah	-	-	-	-	-	-	-	-
	Umsning	2144	3087	2079	1961	2695	2248	-	**2369**
	Byrnihat	1334	1746	1419	1401	2038	1166	-	**1517**

Source: JICA Survey Team using data from website
http://megagriculture.gov.in/PUBLIC/agri_scenario/RainFallStats.aspx

3.4 Agriculture Production

Agriculture is the dominant sector of the economy of Meghalaya. 70% of the total population depends on agriculture sector directly or indirectly. It is reported that the gross cropped area is 336,416 ha while the net area sown is 282,939 ha (13% of total geographical area) in Meghalaya[9]. The rest are rugged and rocky terrain, waste and fallow lands. Generally heavy rainfall during the monsoon period causes erosion and removal of fertile top soil layer. Besides it is said that destruction of forests by *jhum* cultivation which mainly prevail in Garo hills and uncontrolled grazing are the major causes of low productivity of agriculture in Meghalaya. The central part of Meghalaya between the elevations of 900 m to 2,000m has favourable rainfall with different forest types although the entire region is unsuitable for agriculture.

Source: JICA Survey Team
Plateau Area in East Khasi Hills

[9] Statistical Abstract Meghalaya 2012, Directorate of Economics & Statistics, Gov. of Meghalaya

Bun Cultivation

Bun Cultivation in East Khasi Hills

Bun cultivation is a characteristic farming system of Meghalaya and it is also called as a modified *jhum* system. This system is indigenous practice mainly in Khasi Hills and Ri-Bhoi Districts for cultivation of crops such as potato, sweet potato, ginger, vegetables etc. on a series of beds formed along the slopes of the hills. This system involves: cutting of shrubs and grasses, putting of dried vegetation in the form of raised beds along the slopes and covering with soil collected from surroundings, burning of the covered vegetation and planting in the soil afterwards. Although good yields of crops have been obtained in the system yet it leads to large amount of soil erosion. Such bun fields usually accommodate two or three cropping seasons in a year.

3.4.1 Food Grain

The principal food grains in Meghalaya are paddy, maize, wheat, millet and pulses and those crops are grown all over the state. In Meghalaya, food grains are mainly grown for self consumption, but such crops are also sold if they are found to be surplus.

Source: JICA Survey Team

Paddy Fields in East Khasi Hills

The rice is the most important food crop of Meghalaya. The distribution of rice cultivation is seen an over the state. The total area under rice cultivation is reported to be about 109,000 ha and about 266,000 MT of rice was produced annually in 2012-13. Rice is cultivated both in high and low altitude regions mainly in altitude below 700m. The yield of rice in the *jhum* fields is quite low compared to paddy field. It is observed that rice is grown in three different seasons like autumn, winter and spring in Meghalaya. In the *jhum* fields, upland rice is grown on the hill slopes during the spring season. Winter rice is generally cultivated on a limited scale on the low lying fields of the districts like West Khasi Hills, East Khasi Hills, Ri-Bhoi and Jaintia Hills Districts. Spring rice in Meghalaya is not very significant and the winter is the most important season for rice cultivation and about 38% of the agricultural lands are used for rice cultivation in the winter seasons.

Source: JICA Survey Team

Rice in Plain Field in Ri-Bhoi

Maize is the second important food crop of Meghalaya and it occupies an area of 18,015 ha with an annual production of 38,732 MT in 2012-13. Maize is not evenly distributed and is mainly produced in Jaintia Hills District. Maize is generally grown with the two or three crops combination like paddy and potato.

Source: JICA Survey Team

Rice dried in Open Field in Ri-Bhoi

Wheat is not a traditional crop in North East India including Meghalaya and it is yet to be popular in the region. However it is being introduced in Meghalaya and a section of farmers grow it over the higher grounds as a supplementary crop. Now wheat is successfully grown in the higher altitudes up to 1,200 m in

Meghalaya. About 406 hectares of land in Meghalaya is under wheat and its annual production was about 742 MT in 2012-13.

Millets can be made in flour for human consumption or used as a fodder crop in Meghalaya. In the hills of North East India, millets are not only used as staple but also used to prepare a kind of local alcoholic drink. The millet plants are grown in all parts of the state of Meghalaya.

Pulses also are the most important staple food after rice in the eastern part of India. But these crops are not well grown in any state of the North Eastern region. The common varieties of pulses grown in the states of North East India are tur, urd, matikalai, magu, Bengal gram, soybean etc. The area under pulse crops of Meghalaya was 7,936 ha and production was 10,645 MT in 2012-13. Pulse production has been gradually expanded to the plain area of Garo hills.

Area, production and yield of major food grains in Meghalaya are summarised in the following table.

Table 3.4.1 Area, Production and Yield of Major Food Grains in Meghalaya

Crop	Item	2008-09	2009-10	2010-11	2011-12	2012-13	Average Yield of Last 5 Years	Average Yield of All India* (2007/08-2011/12)
Rice	Area (ha)	108,045	108,162	108,285	108,875	109,751	-	-
	Production (MT)	203,862	204,129	207,021	222,731	265,653	-	-
	Yield (ton/ha)	1.89	1.89	1.91	2.05	2.42	2.03	2.23
Maize	Area (ha)	17,117	17,209	17,276	17,310	18,015	-	-
	Production (MT)	25,716	26,167	26,500	27,029	38,732	-	-
	Yield (ton/ha)	1.50	1.52	1.53	1.56	2.15	1.66	2.36
Wheat	Area (ha)	416	405	393	395	406	-	-
	Production (MT)	739	718	704	710	742	-	-
	Yield (ton/ha)	1.78	1.77	1.79	1.80	1.83	1.79	2.95
Other Cereals & Millets	Area (ha)	2,442	2,362	2,231	2,290	2,805	-	-
	Production (MT)	2,051	1,889	1,695	1,755	2,430	-	-
	Yield (ton/ha)	0.84	0.80	0.76	0.77	0.87	0.81	-
Total Pulses	Area (ha)	3,539	3,542	3,580	3,648	7,936	-	-
	Production (MT)	3,233	3,229	3,278	3,699	10,645	-	-
	Yield (ton/ha)	0.91	0.91	0.92	1.01	1.34	1.08	0.66
Total Food Grains	Area (ha)	131,559	131,680	131,765	132,518	138,913	-	-
	Production (MT)	235,601	236,132	239,198	255,924	318,202	-	-
	Yield (ton/ha)	1.79	1.79	1.82	1.93	2.29	1.93	1.92

Source: Directorate of Agriculture, Gov. of Meghalaya
**: Source: Average Data of 2008-09 to 2012-13, Pocket Book on Agricultural Statistics 2013, Ministry of Agriculture, Gov. of India*

3.4.2 Horticulture

In Meghalaya, both sub-tropical and temperate horticultural crops and orange are grown in abundance in the middle and lower altitude region. It has been observed that the agro-climatic conditions of the state are favourable for the cultivation of various types of horticultural crops.

Source: JICA Survey Team
Vegetables sold at a Market in

Vegetables are mostly cultivated almost throughout the area in the central part of the Meghalaya Plateau. Important horticultural crops of Meghalaya are potato, various kinds of vegetables like cabbage, radish, cauliflower, beans, brinjal, tomato, chilli, fruit like citrus, pineapples, lemons, banana, arecanuts and orchids. Citrus is the most important fruit of commodity for export to other states and the neighbouring country. Khasi Mandarin is grown extensively in the southern part of Meghalaya.

Cultivation of tuber crops like potato, sweet potato, tapioca, ginger etc. are mostly found in the central plateau part of Meghalaya. Potato is important crops for both food as well as cash crop. In 2012-13, about 18,139 ha of lands were under potato cultivation and 172,955 MT of potatoes were annually produced in Meghalaya.

Sweet potato is a warm temperate crop which is cultivated all the districts of Meghalaya but this crop is next to potato in importance. It occupies nearly 4,438 ha of land and about 15,063 MT of sweet potato yielded annually in 2012-13. Ginger and Turmeric are two other cash crops of Meghalaya. Generally ginger is widely grown in the Jaintia hills and Khasi hills. Turmeric is mainly grown in Jaintia and some parts of Khasi hills. The products of ginger are ginger oil, oleoresin, dry ginger and cattle feed. The quality of turmeric is very high and Meghalaya turmeric has a great demand in other states of the region. The ginger is cultivated in an area about 4,650 hectares and the annual yield is about 19,000 MT in 2012-13.

Source: JICA Survey Team

Khasi Mandarin sold at a Market in Shillong

Source: JICA Survey Team

Potatoes transacted at Market in Shillong

Table 3.4.2 Area, Production and Yield of Major Vegetables in Meghalaya

Crop	Item	2008-09	2009-10	2010-11	2011-12	2012-13	Average Yield of Last 5 Years	Average Yield of All India (2012-13)*
Tomato	Area (ha)	1,813	1,826	1,908	1,957	2,155	-	-
	Production (MT)	28,001	27,522	28,783	29,530	50,894	-	-
	Yield (MT/ha)	15.45	15.07	15.09	15.09	23.62	16.86	20.72
Cauliflower	Area (ha)	1,188	1,000	1,050	1,090	1,937	-	-
	Production (MT)	21,124	35,271	37,756	39,198	75,949	-	-
	Yield (MT/ha)	17.78	35.27	35.96	35.96	39.21	32.84	19.61
Cabbage	Area (ha)	1,586	1,644	1,707	1,746	1,808	-	-
	Production (MT)	35,072	36,022	36,894	37,492	39,353	-	-
	Yield (MT/ha)	22.11	21.91	21.61	21.47	21.77	21.78	22.92
Radish	Area (ha)	822	540	590	625	1,464	-	-
	Production (MT)	11,228	6,839	7,598	8,037	27,840	-	-
	Yield (MT/ha)	13.66	12.67	12.88	12.86	19.02	14.22	14.16
Pumpkin	Area (ha)	1,020	1,013	1,062	1,288	1,301	-	-
	Production (MT)	13,441	12,191	12,831	15,871	16,303	-	-
	Yield (MT/ha)	13.18	11.99	12.08	12.32	12.53	12.42	-
Carrot	Area (ha)	574	619	659	698	1,143	-	-
	Production (MT)	7,990	8,620	9,091	9,598	21,119	-	-
	Yield (MT/ha)	13.92	13.93	13.80	13.75	18.48	14.77	17.81
Brinjal	Area (ha)	836	858	905	945	962	-	-
	Production (MT)	11,214	11,641	12,282	12,821	13,057	-	-
	Yield (MT/ha)	17.00	13.57	13.57	13.57	13.57	14.26	18.62
Beans	Area (ha)	722	773	809	852	878	-	-
	Production (MT)	4,742	5,100	5,358	5,654	5,866	-	-
	Yield (MT/ha)	6.57	6.60	6.62	6.64	6.68	6.62	10.27
Peas	Area (ha)	699	740	776	822	851	-	-
	Production (MT)	4,487	4,780	4,997	5,307	5,508	-	-
	Yield (MT/ha)	6.42	6.46	6.44	6.46	6.47	6.45	9.52
Ridge Gourd	Area (ha)	526	557	592	637	657	-	-
	Production (MT)	6,219	6,593	7,027	7,562	7,818	-	-
	Yield (MT/ha)	11.82	11.84	11.87	11.87	11.90	11.86	-
Bottle Gourd	Area (ha)	479	513	597	628	652	-	-
	Production (MT)	5,635	5,846	7,076	7,470	7,775	-	-
	Yield (MT/ha)	11.76	11.40	11.85	11.90	11.93	11.77	18.35
Turnip	Area (ha)	520	537	555	595	611	-	-
	Production (MT)	7,348	7,204	6,797	7,254	7,459	-	-
	Yield (MT/ha)	14.13	13.42	12.25	12.19	12.21	12.84	-

Crop	Item	2008-09	2009-10	2010-11	2011-12	2012-13	Average Yield of Last 5 Years	Average Yield of All India (2012-13)*
Bitter Gourd	Area (ha)	444	474	503	528	549	-	-
	Production (MT)	4,196	4,484	4,756	4,921	5,127	-	-
	Yield (MT/ha)	9.45	9.46	9.46	9.32	9.34	9.40	11.30
Cucumber	Area (ha)	383	381	441	481	508	-	-
	Production (MT)	3,211	3,007	3,428	3,738	3,980	-	-
	Yield (MT/ha)	8.38	7.89	7.77	7.77	7.84	7.93	15.67
Total Vegetables	Area (ha)	32,766	32,830	33,756	34,202	19,436	-	-
	Production (MT)	355,373	368,817	383,083	391,483	323,315	-	-
	Yield (MT/ha)	10.85	11.23	11.35	11.45	16.64	12.30	17.62

Source: Directorate of Agriculture, Gov. of Meghalaya
**: Indian Horticulture Statistics 2013, National Horticulture Board, Gov. of India*

Area, production and yield of major horticulture crops in Meghalaya are summarised in the following table.

Table 3.4.3 Area, Production and Yield of Major Horticulture Crops in Meghalaya

Crop	Item	2008-09	2009-10	2010-11	2011-12	2012-13	Average Yield of Last 5 Years	Average Yield of All India (2012-13)*
Citrus	Area (ha)	9,368	9,784	9,885	9,997	10,146	-	-
	Production (MT)	37,702	39,070	38,817	39,315	44,896	-	-
	Yield (MT/ha)	4.03	3.99	3.93	3.93	4.43	4.06	9.68
Pineapple	Area (ha)	10,523	10,542	10,607	10,766	11,039	-	-
	Production (MT)	102,506	103,432	104,130	106,168	110,840	-	-
	Yield (MT/ha)	9.74	9.81	9.82	9.86	10.04	9.85	14.93
Banana	Area (ha)	6,522	6,802	6,795	6,919	6,992	-	-
	Production (MT)	74,314	78,822	79,954	82,125	84,613	-	-
	Yield (MT/ha)	11.39	11.59	11.77	11.87	12.10	11.74	34.16
Papaya	Area (ha)	613	613	628	643	708	-	-
	Production (MT)	4,564	4,541	4,729	4,951	5,500	-	-
	Yield (MT/ha)	7.45	7.41	7.53	7.70	7.77	7.57	40.72
Potato	Area (ha)	17,690	17,712	17,685	17,717	18,139	-	-
	Production (MT)	161,138	162,445	164,647	165,670	172,955	-	-
	Yield (MT/ha)	9.11	9.17	9.31	9.35	9.54	9.30	22.76
Sweet potato	Area (ha)	4,895	4,398	4,133	4,164	4,438	-	-
	Production (MT)	15,909	14,053	13,241	13,701	15,063	-	-
	Yield (MT/ha)	3.25	3.20	3.20	3.29	3.39	3.27	10.13
Tapioca	Area (ha)	4,187	4,180	4,180	4,203	4,983	-	-
	Production (MT)	21,773	21,152	21,792	22,046	29,749	-	-
	Yield (MT/ha)	5.20	5.06	5.21	5.25	5.97	5.34	-
Ginger	Area (ha)	9,283	9,321	9,438	9,461	9,587	-	-
	Production (MT)	50,286	54,009	56,622	58,132	60,149	-	-
	Yield (MT/ha)	5.42	5.79	6.00	6.14	6.27	5.93	5.0
Turmeric	Area (ha)	1,959	1,955	1,928	2,000	2,208	-	-
	Production (MT)	10,046	9,895	10,058	10,512	12,831	-	-
	Yield (MT/ha)	5.13	5.06	5.22	5.26	5.81	5.29	5.0
Chili	Area (ha)	1,875	1,832	1,848	1,893	2,033	-	-
	Production (MT)	1,423	1,394	1,415	1,474	1,659	-	-
	Yield (MT/ha)	1.42	1.39	1.42	1.47	1.66	1.47	1.6
Black Pepper	Area (ha)	884	890	889	911	950	-	-
	Production (MT)	462	461	465	493	665	-	-
	Yield (MT/ha)	0.52	0.52	0.52	0.54	0.70	0.56	0.4
Tea	Area (ha)	1,650	1,684	1,794	1,802	2,040	-	-
	Production (MT)	3,626	3,785	3,945	3,992	5,107	-	-
	Yield (MT/ha)	2.20	2.25	2.20	2.22	2.50	2.27	-
Areca Nut	Area (ha)	12,632	13,621	14,611	15,448	16,062	-	-
	Production (MT)	17,400	19,396	20,501	21,751	23,331	-	-
	Yield (MT/ha)	1.38	1.42	1.40	1.41	1.45	1.41	1.4
Cashew Nut	Area (ha)	7,599	8,358	8,650	8,697	9,047	-	-
	Production (MT)	13,027	14,352	15,414	15,720	16,764	-	-
	Yield (MT/ha)	1.71	1.72	1.78	1.81	1.85	1.77	0.8
Rubber	Area (ha)	4,784	-	-	-	4,845	-	-
	Production (MT)	40	-	-	-	793	-	-
	Yield (MT/ha)	0.01	-	-	-	0.16	0.03	-

Source: Directorate of Agriculture, Gov. of Meghalaya
**: Indian Horticulture Statistics 2013, National Horticulture Board, Gov. of India*

3.4.3 Animal Husbandry

The farmers of Meghalaya maintain a large number of livestock because they depend largely on draft animals for farm activities. In Meghalaya, cattle, pigs, goats, buffalos and sheep are mostly reared. According to Livestock Census 2012, there were 894,153 cattle heads, 14,460 buffaloes, 20,089 sheep, 471,148 goats and 541,502 pigs in Meghalaya in 2012. Poultry is extensively practised in all parts of Meghalaya. According to Livestock Census 2012, there were 3,400,032 poultry birds in Meghalaya.

Table 3.4.4 Number of Major Livestock in Meghalaya

Year / Livestock	2003 (17th Livestock Census)	2007 (18th Livestock Census)	2012 (19th Livestock Census)	Increasing Ratio from 2003 to 2012
Cattle	767,015	887,243	894,153	117%
Buffalo	18,003	22,627	14,460	80%
Sheep	18,203	21,041	20,089	110%
Goat	327,332	365,483	471,148	144%
Pig	418,900	524,357	541,502	129%
Poultry	2,821,200	3,026,497	3,400,032	121%

Source: Livestock Census, Department of Animal Husbandry, Dairying & Fisheries, Gov. of India

These animals are not properly cared for and very often livestock are of poor quality in Meghalaya. Cow and buffalo are generally used as draft animal and the cows provide milk for farmers, but the yield per head is quite low. The majority of the population of Meghalaya are Christians and hence the consumption of beef in Meghalaya is significant. It is to be mentioned that cattle are raised for draft animals, beef, milk, hides and dairy products etc. Traditionally these animals are the most important domesticated animal in Meghalaya.

Goats and pigs are reared partly for sale and partly for sacrifice in socio-religious occasions which are eventually used for human consumption. Recently sheep have introduced to the state and many farmers rear them. Such sheep and goat farm is mainly located in Jaintia hills.

In Meghalaya beef is an important item of food and beef cattle is mostly supplied from outside the state of Meghalaya. A large number of beef cattle come from the plains of Assam. Pork meat is another item of food which also comes from the plains of Assam.

Source: JICA Survey Team
A Piglet reared in Backyard in East Khasi Hills

The important dairy products in Meghalaya are milk, cream, butter and cheese. The dairy farming and egg production of Meghalaya is yet to achieve the average per capita availability of all India although it has been observed that the increase in the demand of milk and egg is growing with the increase of population is the state. Average milk and egg yield per animal & poultry in Meghalaya are summarised in the following table.

Table 3.4.5 Average Milk and Egg Yield per Animal & Poultry in Meghalaya

Item / Year	Milk (kg/animal/day)			Egg (number/layer/year)
	Cow		Buffalo	
	Crossbred	Indigenous		
2009-10	8.96	0.75	1.86	111
2010-11	8.96	0.76	1.85	112
2011-12	8.96	0.76	1.84	112

Item / Year	Milk (kg/animal/day)			Egg (number/layer/year
	Cow		Buffalo	
	Crossbred	Indigenous		
2012-13	8.98	0.77	1.84	113
2013-14	8.96	0.76	1.83	112
Average of All India	7.02	2.22	4.80	207

Source: Report on Integrated Sample Survey for Estimation of Production Milk, Egg and Meat Year 2013-14, Directorate of Animal Husbandry & Veterinary, Gov. of Meghalaya

Per capita daily availability of milk and egg in Meghalaya are summarised in the following table.

Table 3.4.6 Per Capita Daily Availability of Milk and Egg in Meghalaya

Item	Area	2008-09	2009-10	2010-11	2011-12	2012-13
Milk (gram/day)	Meghalaya	83	83	83	74	83
	All India	266	273	281	290	299
Egg (number/day)	Meghalaya	39	39	39	34	39
	All India	48	51	53	55	58

Source: Basic Animal Husbandry & Fisheries Statistics, Ministry of agriculture Department of animal husbandry, Dairying and fisheries, Gov. of India

3.4.4 Fishery

Meghalaya is inland state and it has no too many water bodies and swamps which are natural habitats of fishes. However, the climate of Meghalaya is wet and there are numerous rivers, streams, lakes and reservoir in the state. The water bodies of Meghalaya are located at different altitudes and heights and in two different climatic regions of the state, namely cold and warm. Both cold and warm water fisheries can be suitably established in the streams, reservoir and wetlands of the highlands of Meghalaya. Fishes like carp and catfishes are mainly reared and profitably cultured in the different streams and water bodies located at medium and lower heights in the state. In Meghalaya, the available natural resources for fisheries either belong to the District councils or local authorities. These councils and local authorities including characteristic land tenure system cause some uncommon constraints for the steady development of fisheries in the state.

Source: JICA Survey Team
Catfish sold at Local Market in Dawki

3.5 Rural Infrastructure

3.5.1 Irrigation

Irrigated areas in Meghalaya for the five years from 2008-09 to 2012-13 are presented in Table 3.5.1 and Figure 3.5.1. Irrigated areas consist of government-funded and private ones. Private irrigation systems are not usually permanent but more of temporary. For example, a private weir often made by piles of stones in a stream is easily torn down by flood flow. Net and gross irrigated areas by private irrigation systems have been larger than that of government-funded system. However, the difference has decreased both in net area (from 72:28 in 2008-09 to 58:42 in 2012-13) and in gross (from 68:32 in 2008-09 to 55:45 in 2012-13), due to the decrease in private areas and increase in government-funded areas. Total irrigated area and irrigation intensity have increased slightly.

Table 3.5.1 Recent Irrigated Area in Meghalaya

Category	Area (ha)					Average	
	2008-09*	2009-10	2010-11	2011-12	2012-13	(ha)	Share(%)
Net Irrigated Area							
Govt. funded	17,179	18,420	21,919	26,630	27,597	22,349	35
Private	44,747	43,661	40,767	38,123	37,873	41,034	65
Total	61,926	62,081	62,686	64,754	65,470	63,383	100
Gross Irrigated Area							
Govt. funded	23,266	24,928	29,059	35,241	36,532	29,805	39
Private	49,278	48,877	45,209	44,812	44,732	46,582	61
Total	72,544	73,805	74,268	80,053	81,264	76,387	100
Irrigation Intensity							
Govt. funded	1.35	1.35	1.33	1.32	1.32	1.34	
Private	1.10	1.12	1.11	1.18	1.18	1.14	
Total	1.17	1.19	1.18	1.24	1.24	1.20	

*Note: * approved*

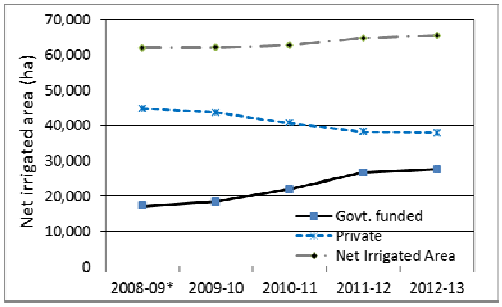


Figure 3.5.1 Change of Irrigation Area in Meghalaya

出典：JICA Survey Team using data of "Irrigation Statistics for the Year 2008-09 to 2012-13, (Districtwise Break-up), DES-GoM"

Information from the farm household survey

According to the results of the farm household survey (Attachment-1.5.1), none of the informant families are members of a water users association (WUA). The reason for not becoming a member of any WUA is that "WUA in the area has not been organised" for all the 50 farmers in West Garo. The reason for another 50 farmers in East Khasi are the same one as in above and "no/little information about WUA".

The following points are also obtained from the survey.

As major constraints in agriculture production, 42% of West Garo farmers pointed out the "lack of irrigation facility" and 6% of them indicated "lack of irrigation water".

In response to a question whether improvement of irrigation system is necessary or not, 52% of West Garo farmers and all of the East Khasi farmers answered "necessary". The types of improvement selected by the West Garo farmers are shown in Table 3.5.2. About one-third of the West Garo farmers considered that the improvement/repair of diversion weir/pump and canal widening/extension are needed. Around two-fifth of them think improvement/repair of irrigation canal structure is necessary.

None of the farmers have drip irrigation system, pump or farming machine, nor use micro irrigation kit. For irrigation during the dry season, 30% and 70% of the West Garo farmers answered "yes, sufficient" and "yes, certain extent", respectively, while all the East Khasi farmers answered "insufficient". In West Garo, sources of irrigation for the interviewees are river/stream, spring, and groundwater by dug well.

Table 3.5.2 Irrigation Improvement Needs in West Garo District in Meghalaya

Items	Need (persons): (a)			Need (%): (a)/(b)*			
	firstly	secondly	thirdly	firstly	secondly	thirdly	total
1 Improvement/repair of diversion weir	17	0	0	65	0	0	65
2 Widening/extension of canal	0	16	1	0	62	4	65
3 Desilting of canal	0	0	4	0	0	15	15
4 Improvement/repair of irrigation canal structure	0	1	10	0	4	38	42
5 Drainage canal improvement/construction	0	0	1	0	0	4	4
6 On-farm development	5	0	0	19	0	0	19
7 Others	3	0	0	12	0	0	12

*Note: * : (b) = 26 persons, who answered that irrigation improvement is needed.*
Source: Farm Household Survey, sublet of the JICA Survey Team (Attachment-1.5.1)

3.5.2 Rural Road

Road is the backbone of Meghalaya. Being landlocked, with no other means of communication, the overall development of the state depends on road connectivity, and hence, one of utmost importance should be given for speedy development of this vital infrastructure. The road lengths and density by area and population are presented in Table 3.5.3.

Table 3.5.3 Road Length and Density by Area and Population: Meghalaya and India

state/ country	unit	1990-91	2004-05	March 2010	March 2011 (estimate)	Remarks
Meghalaya	km (paved*)			5,625	6,041	* blacktopped
	km (graveled)			3,527	3,212	
	total (km)			9,152	9,253	
	km/100km2	25.4	35.12	40.81	41.25	
	/lakh people	320	340			
India	km/100km2	76.8	76.84			
	/lakh people	256	246			

Source: For 1990-91 & 2004-05: "Vision Document for the State of Meghalaya 2030, National Institute of Public Finance and Policy, (2013)" , for 2010 & 2011: website http://meghalaya.gov.in:8080/megcms/sites/default/files/documents/Annual_plan.pdf

Foot paths, footbridges, and culverts, etc., are made by the Community and Rural Development Department through several state programmes including:

- Special Rural Works Programme (SRWP)
- Construction of Rural Roads Programme (CRRP)
- Chief Minister's Rural Development Fund (CMSRDF)

3.5.3 Rural Water Supply

The prime objectives of water supply programmes by the Public Health Engineering Department (PHED) of Meghalaya are:

- To ensure coverage of all rural habitations especially to reach the unreached with access to safe drinking water;
- To ensure sustainability of the systems and sources; and
- To tackle the problem of water quality in affected habitations and to preserve the quality of water by institutionalising water quality monitoring and surveillance through a Catchment Area Approach.

Table 3.5.4 Meghalaya District-wise Water Supply and North East Rank in 2009

District	Households with tap water connection (%)	Rank
East Khasi Hills	62.6	4
Ri-Bhoi	35.8	11
Jaintia Hills	16.5	43
West Khasi Hills	28.7	17
Wesr Garo Hills	17.4	40
South Garo Hills	28.9	16
East Garo Hills	21.3	30
North-East	15.0	

Source: "District Infrastructure Index for the North Eastern Region", Ministry of DONER, September 2009 http://megplanning.gov.in/vision2030.html

District-wise tap water connection rate can be seen in Table 3.5.4.

The following norms are being adopted for providing safe drinking water to rural population in the habitations:

- 40 L of safe drinking water per capita per day for human consumption;
- One hand pump or stand post for every 250 persons; and

- Water source should exist within the habitation/within 1.6 km in the plains and within 100 m elevation in the hilly areas[10].

(Source: http://megphed.gov.in/dept/backgrd.pdf)

Based on the Farm Household Survey (FHS), data are summarised as follows: In West Garo, 100% of the informants receive sufficient drinking water. In East Khasi, 32% of the villagers gain sufficient water but 66% of them get insufficient water. Main sources of drinking water in West Garo are shallow well (94%) and tap water (18%), and sub-sources are spring (96%), river/canal (86%), and tube well (4%). Those in East Khasi are tap water (100%). Average distance from households to the water source is 130 m in West Garo and 750 m in East Khasi.

3.5.4 Rural Electricity

Despite the state's vast hydropower potential and low level of industrial activity, it is still deficient in power supply. While hydro-generation began in the early 20th century, it has stagnated over the past 20 years. Today, in several districts, only half to three-fourths of the villages are connected with power supply as seen in Table 3.5.5.

Table 3.5.5 Meghalaya Districts: Electricity and North East Rank in 2009

District	Villages electrified (%)	Rank
East Khasi Hills	71.9	57
Ri-Bhoi	74.2	52
Jaintia Hills	74.7	51
West Khasi Hills	54.0	68
Wesr Garo Hills	53.9	69
South Garo Hills	44.2	72
East Garo Hills	53.4	70
North-East	68.4	

Source: "District Infrastructure Index for the North Eastern Region", Ministry of DONER, September 2009
http://megplanning.gov.in/vision2030.html

Based on the Farm Household Survey, the main source of light is found to be connected to the electrical grid. Of West Garo, 88% of informants answered the source of light is by using electricity and 100% of the informants from East Khasi also answered the same.

During the field trip as well as in Kohima, the JICA Survey Team experienced frequent blackouts. Some of the village people said that electric power supply is only limited to certain hours in a day.

Meghalaya Non-Conventional and Rural Energy Development Agency (MNREDA) aims to formulate and implement demonstration, experimental, promotional, and extension projects and programmes related to new and renewable energy. As an example, solar street lights with solar panel generation device can be seen in probably every village that the team visited. These devices are expected to be installed in such remote areas that are too distant to connect in the electrical grid system.

Table 3.5.6 Demand and Supply of Power in Meghalaya and North East Region in March 2005

State/Region	Requirement (MU)	Availability (MU)	Surplus/Deficit (+/-)	
			(MU)	(%)
Meghalaya	117	98	-19	-16.2
NER	585	538	-47	-8.0
India	53192	49259	-3933	-7.4

Source: indiastat.com
http://megplanning.gov.in/vision2030.html

Energy consumption by end consumers in Meghalaya has been increasing over the years. While the state was self-sufficient in power until around 2003-04, it has experienced a deficit amounting to 16.2% (Table 3.5.6) since then, which is far higher than the national average of 7.4%. During the 11th Five-Year Plan, the generation capacity in the state was 185 MW against the peak demand of almost 800 MW.

[10] Source: http://megphed.gov.in/dept/backgrd.pdf

3.6 Market, Distribution, and Processing of Agricultural Produces

3.6.1 Market

There are hundreds of rural markets apart from the three main urban markets (Idewuh in Khasi Hills, Jowai in Jaintia Hills, and Tura in Garo Hills) and two regulated markets (Mawiong in Khasi Hills, Garobadha in Garo Hills) in Meghalaya. However, no data exists to estimate the exact number of markets running in the state.

Source: JICA Survey Team
Wholesaler at Shillong Market

There are two kinds of rural market places, i.e., (i) periodic (primary) market places occurring with eight days rotation are majority; these are big and large-scale markets as well as small markets (depending on the location) composed of farmers, traders, middle men, small retail traders, and have a mix of permanent (established), temporary (un-established), and road side shops, and (ii) daily market places, located nearby in the area but are small-sized market places with retailers providing wide variety of products to meet daily necessities. The latter do not exist in all parts of all the districts as there are only ten or more places that have this kind of rural market in the state.

(1) Management System

The management system of markets differs in areas except for two regulated markets managed directly by the Meghalaya Agricultural Marketing Board (MAMB).

(a) Khasi Hills

Most of the rural markets are under the *Syiem* and his *Durbar* who have the right to collect a customary toll called "*Ka Musur*" and "*Ka Bainguh Syiem*" for all types of commercial goods, including Certificate of Origin (CO) on forest for all forest products at any revenue station authorised by the *Syiem* and *Durbar*. It is preferred that the right to collect customary toll and market toll, as far as practicable, be done through public auction as may be decided by the *Syiem* and *Durbar*.

(b) Garo Hills

The rural markets along with toll gates in Garo Region are managed by the Garo Hills Autonomous District Council (GHADC). The markets are leased annually or for a five-year term (depending on the term of the ruling party) by inviting bids. GHADC receives money from the lessee of which 10% is retained by GHADC, and the rest goes to the concerned *Nokma* and his *Durbar*.

(c) Jaintia Hills

The market system in Jaintia Hills is governed by the United Khasi-Jaintia Hills Autonomous District Council (JHADC) Act, 1959. However, there are nine markets directly under JHADC, five private markets under JHADC control, and eight religious/ *Elaka* markets run by respective *Daloi's* of that *Elaka*. The revenue collected from the markets under JHADC control comes in full to JHADC. For private markets which are under JHADC control, JHADC receives 50% of the gross income of all private markets. For the markets under 100% control of *Daloi* of *Elaka* (s), 100% revenue is retained by *Daloi* of the *Elaka* and his *Durbar*.

Source: JICA Survey Team
Rural Market Sheds (Jaintia Hills)

(2) General Conditions

Source: JICA Survey Team
Pyruisa Market

Markets in the rural area is dominated by established shops (permanent, with proper room and roof) and unestablished shops (found along roadsides without proper room and roof). Vendors are also seen in large numbers along the roadsides keeping and selling their products in huge baskets. Markets do not have the required facilities for a regular and economic transport. Besides, the market stalls are not properly laid out and are mostly of temporary structures (broken and in shambles) made of thatches and bamboo. Basic amenities like storage facilities, drainage and pavement, parking facilities, and supply of drinking water are generally not available in these markets.

The rural markets in Meghalaya generally perform three functions, viz, (i) selling of local produce within the area, (ii) assembly of local products for selling to other areas, and (iii) retailing of wholesale lots from other areas in the local area. The selling of local produce to traders and consumers is the predominant activity in these markets. Here farmers represent the biggest group either as sellers or as buyers. At times, farmers retail their produce and become traders also. Besides, goods that are not produced locally, are brought by smaller and occasional traders to retail to the local population. These markets, through their interconnections, are the farmer's main connection point with both inter- and intra-regional marketing system. The condition of such connection is restricted and localised to certain specific areas due to geophysical conditions as well as condition of infrastructure facilities. Thus, markets except the regulated markets mentioned later mix the functions of wholesales and retailing.

Other findings are as follows:

- In the case of distant trading, wholesalers have the network with wholesalers in both the production area and other markets; they communicate and decide the forwarding or receiving volume by mobile phones. Also they do not negotiate prices at the time but settle it at a market price at the time of arrival to the destination market. Payment is done once a week, usually on Saturday.
- Surplus vegetables in the summer season go to different markets spread across the north eastern region. About 60% goes through Silchar may be at higher side.
- Almost all vegetables are directly imported in the dry season from Guwahati and production areas (Original production areas are Assam State such as Barpeta and various states in main land of India).
- In Shillong markets, fishes are imported taking about a week to transport by truck from Andhra Pradesh, with about 2-4 trucks arrival/day. Retailers are cartelised and their sale price is almost fixed. Fishes imported from Bangladesh are also sold in the markets.
- About one-third of the villages is not connected by road, therefore, farmers carry their products on their backs along the roadside. (NABARD State Office)

(3) Regulated Market

The state has two regulated markets. One is in Zone I comprising East/West Khasi Hills and Ri-Bhoi District and the other in Zone II comprising East, West, and South Garo Hills. The objectives of the

regulation of buying and selling of agricultural products are: to eradicate malpractices prevailing in the trade in urban, semi-urban, and rural markets and also to establish an efficient marketing system, where growers may obtain a reasonable and competitive price and the traders receive a fair deal in trading.

Source: JICA Survey Team
Mawiong Regulated Market

The purpose is also to establish a modern market yard, where scientific godowns for storage, platforms for auction of agricultural commodities, display yards, traders shops, banks and post offices are provided for, but has not been facilitated fully yet. Of these two regulated markets, only Zone I market is functioning properly. The overview of Mawiong Market is listed in Table 3.6.1.

Table 3.6.1 Mawiong Regulated Market in Meghalaya

Item	Details
Management Organisation	Regulated Market Committee organised under MAMB
Opening date / hours	Everyday except Sunday. 7:00 a.m. – 9:00 p.m.
Facilities	a) Godowns (200 MT capacity each): 52, b) Cold storage* (900 MT): 1, c) Weigh Bridge (20 MT capacity): 1, d) Sorting and packing sheds (500 m^2 each): 2, e) Drying platform (1000 m^2 each): 2, f) Rural godowns (fruits and vegetables) (2000 MT capacity) : 2, g) Auction platform (460 m^2): 1, h) Grading platform (460 m^2) :1 *The cold storage of the three stories which is leased to a private enterprise is functionally obsolete and planned to be renovated by an enterprise.
Traders	51 traders are registered and have leased all godowns
Traded Produces	1) potato, 2) broomstick, 3) tezpatta (Laurie), 4) resin wood Annual trade volume (Feb. 2013–Mar. 2013): 1) 7,201 MT, 2) 31,655 MT, 3) 7,810 MT, and 4) 72 MT。
Charges	The fee charged is: 1% of the value of the produce transacted in the market Other charges: Weighing: Rs.10 / bag, Warehouse: Rs.300 / month, Entrance: Rs.20 – 50 / 6 – 10 tons truck, Parking: Rs.5 – 10 / LMV – HMV hour, Cold storage: Rs.150,000 / year (30% of the total revenue is paid to MAMB)

Source: Meghalaya Agricultural Marketing Board (MAMB)

(4) Other Findings Provided by MAMB

- There are two peak periods for potatoes i.e., June-December for summer potatoes (considered off season in other places); and September-December for winter potatoes. It is observed that good quality potatoes get traded in rural areas and city markets. Only lower quality potatoes come to the regulated market. About 30% of marketable surplus potatoes get transacted in the regulated market. *Kofri Megha,* a variety of potato, is preferred for making chips.

Source: JICA Survey Team
Grading of Potatoes
(Mawiong Regulated Market)

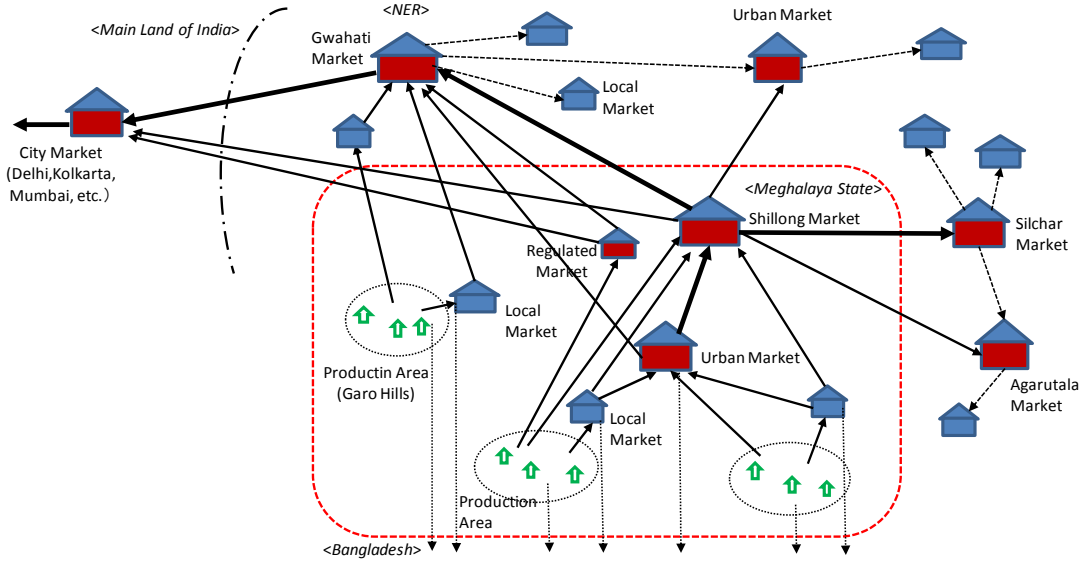
- The State APMC Act has not been revised to conform with the Model Act because the revised act was submitted to the Cabinet five years ago but was not approved yet. Therefore, it is difficult to receive subsidies for renovation and development of the regulated market as well as other existing markets. In this regard, PEPSICO was keen on contract farming with farmers, for production of organic potato chips. However, this has not worked out due to the absence of the amendment of the APMC Act that has provisions for taking up contract farming.

- As the main market (*Bada Bazar*) in Shillong is too crowded with not enough spaces, the facility needs to be renovated but there is no more area for expansion and it is difficult to move to a new place to get an agreement from the *Syiem* and his *Durbar* who manages the market.
- The Directorate of Horticulture has promoted to the strawberry growers association and pineapple growers association in Ri Bhoi District to engage in collective marketing. The local vegetable growers association was encouraged to collectively market their vegetables. However, as they do not have linkage with the outside market, they found it difficult to undertake marketing. It is also difficult for farmers to collectively become involved in marketing. However, they are using a truck provided by the Horticulture Department to transport their vegetables to the market.
- In the past, there has been attempt to create rotating markets amongst villages to sell vegetables, to avoid glut in the market. However, in the absence of trust amongst farmers and villages, such initiatives could not continue. Experience shows that it is difficult to take up collective action like marketing, where individual economic interest is at stake.

3.6.2 Distribution of Agricultural Produces

(1) Distribution Route

Almost all agricultural edible products in the state, mainly animal meat products, eggs, and fish except some fruits, are deficit in total volume to meet the local demand. But there is a vegetable production cluster around Shillong, as one of the major supply areas of vegetables to Guwahati Market, which have various surplus products in the harvest period, and these are distributed beyond the state. These surplus products are handled by various actors mentioned before and distributed to the states in the main land of India as well as in the city markets of the north eastern region. These routes are illustrated in Figure 3.6.1. The products coming from other states are considered to follow the same routes.



Source: JICA Survey Team

Figure 3.6.1 Distribution Routes of Surplus Agricultural Produces in Meghalaya

Characteristics of the distribution system are as follows:

- The state locates for better accessibility to Guwahati Market and main land of India similar with the western area of Assam State and has more distribution routes compared with other states in the

north eastern region.

- The area mainly Ri Bhoi District has better access to Guwahati Market then the products go to Guwahati Market rather than Shillong Market.
- There is no reliable statistical data of export to Bangladesh but it seems, by the information given by traders and farmers in the markets, that many agricultural products such as betel nuts/leaves, potato, tomato, and fruits are exported to Bangladesh. The exports are an important outlet for the farmers who live in the area close to the border to Bangladesh in the southern part of the state.

Source: JICA Survey Team
Crowded Traders
(Bada Bazar)

(2) International Trade with Bangladesh

There are 11 land custom stations (LCSs) along the border with Bangladesh in the state where eight LCSs are functioning. The trade volume is shown in Table 3.6.2. The volume of agricultural products is small but more volume especially of agricultural products is estimated to be exported to Bangladesh as explained before.

Source: JICA Survey Team
LCS, Dawki

Table 3.6.2 Export and Import by LCSs in Meghalaya (2013-14)

Land Custom Station	Export (Rs. Lakh)	Import (Rs. Lakh)	Major Export Commodities	Major Import Commodities
Borsora	40,665	0	Coal, limestone	Nil
Bholaganji	4,462	0	Limestone, stone	Nil
Dawki	13,033	4,335	Coal, limestone, stone, seasonal fruits（tomato: 45, betel leaves: 5, lorie：24）	Clay brick, textile sheet, Food
Shellabazar	21,831	0	Limestone, stone	Nil
Baghmara	984	0	Coal	Nil
Dalu	2,489	346	Coal, stone	Cement, brick, synthetic net, saree
Ghasuapara	19,805	0	Coal only	Nil
Mahendraganj	500	534	Coal, stone, ginger（ginger: 472, betel nuts: 85）	Cement, cotton waste, synthetic net, saree, food
Total	103,769	5,215		

Source: "Land Custom Station at a Glance, 2014", Commissionerate of Custom NER

(3) Findings of Farm Household Survey

Major findings of the Farm Household Survey carried out in four blocks in West Garo Hills and two blocks in Khasi Hills are as follows:

(a) Post-harvest field

Paddy, as the main product, is subjected to various processing like threshing and drying even by traditional way without machine, while other products are not provided special treatment, and few cases showed that producers wash, clean, and grade by size their products by hands.

1) Storage conditions of products

Table 3.6.3 shows the types of containers and storage places for the products in two areas. The farmers in West Garo store their products in storage sheds or on the ground at their house while they use bags for the products. In East Khasi, they seemed to store their products at different places, but mainly in the shed for paddy, on the ground at their house for potato and radish, and on the floor at their house for tomato and cabbage. Containers of the products for storage also differ as bag for paddy, bamboo basket for tomato and radish, and in bulk for potato and cabbage.

Table 3.6.3 Storage Conditions of Produces by Farmers in Meghalaya

		West Garo		East Khasi				
	Product	Paddy	Cashewnut	Paddy	Potato	Tomato	Radish	Cabbage
	No. of respondent	28	24	26	25	25	21	20
Storage way	Bulk	0	0	0	25	0	0	20
	Bag	28	24	26	0	0	0	0
	Wooden Box	0	0	0	0	0	0	0
	Bamboo Basket	0	0	0	0	25	21	0
	Plastic corner	0	0	0	0	0	0	0
	Metal Bin	0	0	0	0	0	0	0
	Others	0	0	0	0	0	0	0
Storage place	Storage Shed	15	8	25	0	0	0	0
	On ground in house	13	16	1	25	2	21	0
	On floor in house	0	0	0	0	23	0	20
	Others	0	0	0	0	0	0	0

Source: Farmer Household Survey, JICA Survey Team

2) Storage period

The storage periods of abovementioned products are presented in Table 3.6.4. Paddy and cashew nut are stored longer than vegetables as vegetables are sold within a week while paddy is stored in one to four months on the average.

Table 3.6.4 Storage Periods of Produces in Meghalaya

	Products	No. of Respondent	Storage Period (day)		
			Min.	Max.	Average
West Garo	Paddy	28	7	150	38
	Cashewnut	7	30	90	69
	Ginger	4	15	20	16
East Khasi	Paddy	26	5	150	123
	Poteto	25	7	7	7
	Tomato	25	1	2	2
	Radish	21	1	1	1
	Cabbage	14	2	2	2

Source: Farmer Household Survey, JICA Survey Team

3) Constraints

Constraints that the farmers in the surveyed area of West Garo are facing are distributed amongst the options and they placed more importance on the lack of processing machines for cashew nuts.

Table 3.6.5 Constraints of Post-harvest Processing in Meghalaya

	Paddy		Cashewnut	
No. of Respondent	28	(%)	7	(%)
Lack of labour	11	39.3	1	14.3
Lack of skills and knowledge on post-harvest treatment.	13	46.4	2	28.6
Lack of storage facilities	13	46.4	3	42.9
Lack of processing machines.	12	42.9	5	71.4
Others	0	0	0	0.0

Source: Farmer Household Survey, JICA Survey Team

(b) Marketing field

1) Sales place, time, and buyer

For the survey area in East Khasi located in the vegetable cluster near Shillong, the farmers responded about their commercial products, mainly vegetables. Their sale places are divided into village markets and outside state that may be the Guwahati Market, and sell their products directly to collectors/ brokers/agents/wholesalers in both markets. Their products can be considered commodities for far distant distribution. On the other hand, in the survey area in West Garo, it seems that they sell perishable products just after harvesting and other products are stored like paddy in time for cash needs. Their sale places are at the village market and their farm gate; and they sell their products mainly to consumers for the former and to collectors/brokers for the latter.

Table 3.6.6 Sales Place, Time, and Buyer of Produces in Meghalaya

East Khasi

Sales Place	1st	2nd	Sales Time		Buyer	
Farm gate	0	0	Immediately after harvest	50	Consumer	0
Village market	48	0	when cash is needed	0	Retailer	0
Roadside market	0	0	When price is high	0	Collector/Broker/Agent/Wholesaler	50
Urban market	1	0	Others	0	Processing factory	0
Outside state	0	49			Others	0
Others	0	0				

West Garo

Sales Place		2nd	Sales Time		Buyer	
Farm gate	11	0	Immediately after harvest	30	Consumer	25
Village market	26	0	When cash is needed	7	Retailer	0
Roadside market	0	0	When price is high	0	Collector/Broker/Agent/Wholesaler	12
Urban market	0	0	Others	0	Processing factory	0
Outside state	0	0			Others	0
Others	0	0				

Source: Farmer Household Survey, JICA Survey Team

2) Mode of transportation and packaging

Table 3.6.7 shows the transportation condition of products in the surveyed area in West Garo. It seemed that they transport their products by foot to village markets and sell them, also sell directly to collectors/brokers coming to their villages, and sometimes forward their cash crops like cashew nut by truck.

Table 3.6.7 Mode of Transportation and Packaging in Meghalaya

Transportation Way		Package	
On foot	27	No arrangement	5
Collected by collector/middleman	10	Bags	57
Cart	0	Bomboo basket	25
Truck	50	Wooden box	0
LMV	0	Others	0
Three wheeler	0		
Motorcycle	0		
Bicycle	0		
Others	0		

Source: Farmer Household Survey, JICA Survey Team

3) Market information

Almost all market information including prices that producers can get in the surveyed area in West Garo are provided by the shops in the markets and traders coming to their villages. The agricultural marketing information system by SMS (mobile phone) is not yet popular in Meghalaya.

Table 3.6.8 Sources of Market Information in Meghalaya

Item	West Garo
Neighbours/Relatives	5
Radio	0
Shops in village	0
Mobile Phone	0
Newspaper	0
Trader/ Retailers in market	50
TV	0
Trader coming to village	50
Government officials/ Extension officer	0
Others	1

Source: Farmer Household Survey, JICA Survey Team

4) Constraints

The respondents in the survey area in West Garo indicated four major constraints in the marketing of their products, namely; low price, fluctuation of price, lack of market information, and lack of knowledge on marketing.

Table 3.6.9 Constraints of Marketing in Meghalaya

Constraints of Marketing	1st	2nd	3rd
Low price	36	0	1
Fluctuation of price	31	50	0
Lack of market information	25	29	30
Limited buyer	0	4	3
Difficulty of market access	0	0	0
Lack of transportation facilities	1	0	2
Lack of knowledge on marketing way	0	3	50
Lickof labour force	0	0	0
Others	0	0	0

Source: Farmer Household Survey, JICA Survey Team

3.6.3 Agro-processing

(1) Outline

The process of growth is typically associated with a structural change in the economy, which involves a shift from the agricultural and allied services sector towards industry. In Meghalaya, with over 80% of the population dependent on land, a transfer of labour from agriculture to manufacturing and tertiary activities would represent an important step towards raising productivity. However, the state appears to be undergoing the beginnings of a structural transformation.

Industry accounts for one-fourth of the state's net domestic product (NDP) through the contribution of the mining sector. Private entrepreneurs, who have coal and limestone deposits in their land holdings, often extract the minerals and send them to Assam and Bangladesh for sale. Thus, important industries are the manufacture of cement, lime, mini steel plants, granite cutting and polishing, and so on. Almost all of these are medium-scale industries. Small-scale industries include wooden furniture making, cane and bamboo works, flour and rice mills, weaving, and baking. In fact, there are only a few large- and medium-sized industries, and the sector mainly comprises small-scale enterprises.

Table 3.6.10 Number of Registered Factories, Small-scale Industries and Employment in Meghalaya (2008-09)

Registered Factory		Small-scale Industry	
No.	Employment	No.	Employment
120	7,625	6,842	37,656

Source: "Statistical Handbook, Meghalaya, 2010-11", Directorate of Economics & Statistics, Government of Meghalaya

Table 3.6.11 Number of Small-scale Industries and Employment by Type in Meghalaya (2008-09)

Type	No.	(%)	Employed	(%)
Bakery	416	6.1	2,345	6.2
Food products / noodles	22	0.3	169	0.4
Cane & bamboo works	495	7.2	1,820	4.8
Weaving / handloom	368	5.4	2,123	5.6
Handicrafts	63	0.9	235	0.6
Others	5,478	80.1	30,964	82.2
Total	6,842		37,656	

Source: "Statistical Handbook, Meghalaya, 2010-11", Directorate of Economics & Statistics, Government of Meghalaya

Despite various handicaps such as inadequate capital investment and shortage of technical skills, the number of small-scale units has increased. However, the number of agro-processing units shares less than 20% and food processing units share only 0.3%. Under such condition, the Department of Industries and Trade promotes and develops industries for employment generation for unemployed youths, imparts training for skill development and motivates the youth to set up self-employment ventures to increase the state domestic product (SDP).

(2) Integrated Basin Development and Livelihood Promotion Programme (IBDLP)

The Integrated Basin Development and Livelihood Programme (IBDLP) was launched in April 2012 as a flagship programme co-terminus with the State's 12th Plan. The program aims to put Meghalaya on a higher growth trajectory during this plan period and improve the quality of life and well-being of all its citizens.

As the program has an ambitious, challenging and ideal concept, it presumes every individual of the state to produce anything for the market as an entrepreneur. The program plans to concentrate all resources to support such individuals and foster real entrepreneurs who can manage their business by themselves.

The Meghalaya Institute of Entrepreneurship (MIE) was set up as the nodal institution to facilitate the setting up of entrepreneurs under the IBDLP. Some points that the responsible person in the MIE explained are as follows:

- There should be a focus on training basic skills of managing enterprises in case of enterprises linked to agriculture. In general, training provided by agriculture-related departments is technical in nature, not so much focusing on the business. MIE emphasizes on looking at the agriculture value chain, and tries to fill up the gaps like those related to post-harvest and packaging. As there is limited business orientation amongst people involved in agriculture, it is quite challenging to provide training in agriculture sector-related enterprises.
- On demand, MIE offers training services to line departments that include training of beneficiaries and officials. Most of the training for the officials is on development orientation of the importance of marketing.

- MIE considers that there are four priority groups of participants, i.e., Priority 1: Ready for business; Priority 2: Need exposure and training; Priority 3: Need detailed support; Priority 4; Persons not knowing what to do. About 80% of its potential participants belong to Priority 4, while 1-2% are Priority 1. MIE is more focused on imparting training to the Priority 4 group of participants, as its focus is bottom up approach. It expects that in five years, Priority 1 would become 5% and in ten years, it may be 10%.

(3) Other Findings:

- There are three industrial centres in the state, i.e., in Burnihat, in Shilling, and in West Khasi Hills. It has been difficult to access land to establish industrial estates. In general, villages oppose setting up of industrial estates, as it would lead to interference from outside and affect communal harmony. There are 22 units in the industrial centre of Shillong, of which two are related to food processing. One unit deals with flour processing while the other unit produces sweets.

Source: JICA Survey Team
Flour Mill in Industrial Estate

- Most of the units in East Khasi Hills face labour problems. The cost of local labour is very high. There is restriction for hiring labour from outside. This is one of the reasons for locating more industries in Ri Bhoi District. As this district is close to Assam, they are able to hire cheap labour from Assam.
- Experiences of support activities by the Office of Commerce and Industrial Centre in East Khasi Hills District indicated that it has been always difficult for entrepreneurs to access financial assistance from banks. Government may need to establish separate alternatives for provision of financial support.
- In 1998, KARA processing unit started as household kitchen in Shillong. The unit produces pickles, squash, and jam with all types of local fruits. There has been increasing trend in the demand for processed fruits and vegetables, which is likely to increase further. The current turnover is about Rs.7 Lakh. The unit requires more space and capital to put up new machineries, but there is no idea to access loan from a bank. The owner expressed that it is cumbersome to access loan from the bank.
- There are two government factories established in Shillong and Dinaruby (Garo Hills) by the Department of Horticulture in 1996. These are fruits and vegetables training cum demonstration centres. The units can process fruits and vegetables to jam, jelly, and squash. In these training centres, about 12 training programmes are imparted to farmers in a year. Due to aging of facilities, these factories are not used well at present.

3.7 Farmers' Organisations and Livelihood

3.7.1 Farmers' Organisations

(1) Overview

Cooperatives of various types, self-help groups (SHG), farmers' clubs, farmers producers organisations, growers association, fisheries groups, and water users' association (WUA) for irrigation have been formed in Meghalaya. SHGs are now being promoted by Meghalaya State Rural

Livelihood Society (MSRLS under NRLM) and other SHG support organisations. The status of the farmers' groups is given in Table 3.7.1 below.

Table 3.7.1 Status of Farmers' Organisations in Meghalaya

Type of Organisation	No.
Cooperatives	1,409
SHG	7,230*
Farmers' Club	50
Joint Liability Groups (JLGs)	331
Water Users Association (WUA)	33

*Note: *State of Micro Finance 2013-14, NABARD.*
Source: JICA Survey Team based on the data obtained from various sources during the field survey.

Farmers Clubs in Puranggong Village and Vorgong Village of Marngar Village Council, Ri Bhoi District, Meghalaya

The farmers clubs in the area have been recently constituted (2014) by the Rural Resource and Training Centre (RRTC) (a local NGO, See Section 3.9.4) and NABARD. In Puranggong Village, the farmers club has 20 members out of total 36 households living in the village. In Vorgong Village, out of the total 42 households, 22 are in the farmers club. The families, who are actively involved in farming, have become members. RRTC and NABARD have given priority to improve and promote three crops, i.e., ginger, turmeric, and paddy, through the farmers clubs. The Survey Team interviewed them on the general condition of the farming, agriculture marketing, and their activities.

In this area, 229 farmers from 17 villages have been trained for demonstration of the ICAR paddy seed variety i.e., Ranjit. Each farmer had experimented cultivation of Ranjit seed in 15 m^2 and the results were quite good. RRTC expects that in the next paddy season, many of the farmers shall use Ranjit seed from ICAR. The production of paddy can be enhanced by 2-3 times if the local seeds are replaced with the improved one. Ginger is commonly cultivated by the farmers, especially in hilly lands and they get good price, but the price fluctuation is very high.

Selling the produces is done on an individual basis. Most of the farmers grow vegetables and they sell the produce at Nongpoh Market and sometimes, the buyers come to the village for procurement of vegetables. If a farmer carries the produce to Nongpoh Market, then s/he gets approximately Rs.5 more per kg than the price offered by buyers in the village. Capsicum and broccoli are important vegetables fetching good prices. These vegetables are graded based on their quality. First grade capsicum and broccoli can be sold for Rs. 70-80 per kg. The farmers get good price from onion/spring onion – sometimes the price goes up to Rs. 100 per kg.

As the farmers club is a recent initiative, the members do not have clear vision for the future. There is no immediate work plan for the farmers club to improve the cropping pattern, crop production, processing and marketing. The only work so far that has been done is the demonstration of paddy seeds.

Source: Group Discussion, JICA Survey Team.

(2) Cooperatives[11]

The number of cooperatives in Meghalaya has grown in the past ten years. Around 1,410 cooperatives are registered and engaged in various activities including agriculture, dairy, fisheries, horticulture, and marketing. Out of the total, 360 multipurpose cooperatives and 172 primary agriculture credit societies are functional. Twenty-five cooperatives are engaged in marketing of agricultural and horticultural produces. The details on cooperatives are given in Attachment-3.7.1. Maximum numbers of the cooperatives have been formed in East Khasi Hills District accounting for 293 cooperatives or 20.8% of the total number of cooperatives in the state. Ri Bhoi District has the

[11] The data referred to in this section is based on the following unless stated separately: Cooperation Department. http://megcooperation.gov.in/coop/list%20of%20Coop%20as%20on%2031-03-2014.pdf

second highest number or 214 cooperatives or 15.2% of the total. There are 89 women cooperatives, of which 16 cooperatives are not functioning.

Table 3.7.2 Status of Cooperative Societies in Meghalaya as of 31st March 2014

District	No Functioning Coop.	No of Non Functional Coop.	% of Non Functional Coop.	Total No of Coop.	District Share to Total No of Coop.
East Khasi Hills	252	41	2.9%	293	20.8%
West Khasi Hills	94	46	3.3%	140	9.9%
Jaintia Hills	118	64	4.5%	182	12.9%
Ri Bhoi	160	54	3.8%	214	15.2%
East Garo Hills	61	16	1.1%	77	5.5%
West Garo Hills	129	47	3.3%	176	12.5%
South Garo Hills	27	28	2.0%	55	3.9%
South West Khasi Hills	98	38	2.7%	136	9.6%
Amlarem Sub-Division	65	12	0.9%	77	5.5%
Sohra Sub-Division	59	1	0.1%	60	4.3%
Total	1,063	347	24.6%	1,410	100.0%

Source: Cooperation Department, Meghalaya State Government.
http://megcooperation.gov.in/coop/list%20of%20Coop%20as%20on%2031-03-2014.pdf *accessed in March 2015.*

On the other hand, as of March 2014, 347 cooperatives or 24.6% of the total number of registered cooperatives were reported to be non-functioning[12]. Many of these institutions were dependent on external support to run their activities. For instance, cooperatives have been receiving support from the Department of Cooperation and also from other departments to run their activities. Many of these enterprises run by the cooperatives were heavily subsidised and do not follow any business model. Most of the infrastructure have been created with the support of the government/project and then handed over to the cooperatives to run it. The number of cooperatives who seem to be making profit is only a few. The documentation of many of the cooperatives/farmers groups on their business activities is inadequate, hence there are difficulties in calculating the profit or viability of cultivation and value addition.

There are some associations of farmers, who seem to have gained prominence. The Strawberry Growers Association in Ri Bhoi District is one of such cooperative. It has contributed significantly in the production and popularisation of strawberry cultivation. The case studies of cooperatives visited by the JICA Survey Team are given in Attachment-3.7.2.

(3) SHGs

SHGs in Meghalaya are formed under the auspices of *Swarnajayanti Gram Swarojgar Yojna* (SGSY) and other projects/schemes like north eastern region community resource managment project (NERCORMP). NABARD is also promoting SHGs through 13 SHG promoting institutions and organised 1,779 SHGs so far. However, due to the lack of the integrated monitoring system of the status of the SHGs, the Survey Team was unable to understand the overall condition of the SHGs in the state. Meghalaya State Rural Livelihood Society is in the process of reorganising SHGs formed under SGSY and organising new ones and also establishing MIS to monitor the status.

Some of the SHGs formed under the integrated watershed management project (IWMP) and NERCORMP are engaged in income generation activities of vegetable cultivation, processing food,

[12] Source: Cooperation Department. http://megcooperation.gov.in/coop/list%20of%20Coop%20as%20on%2031-03-2014.pdf

making vermin compost, handicraft making, processing non timber forest products (NTFPs), etc. During the interaction with SHGs at an exhibition organised by IWMP, it was observed that many SHGs are operating on an individual basis and have not yet reached the stage to collectively market the produces.

As of 31st March 2014, 3,075 SHGs in Meghalaya have outstanding loans amounting to Rs.126.82 million[13]. In the case of SHG bank linkages, the transaction cost for accessing financial and other support services is high because of the terrain and limited presence of service providers. The outreach of banks and other financial institutions is poor in the remote areas. Many of the borrowers become defaulters not because they do not want to make the repayment but due to the cost and time required to reach the bank. They have to travel quite far and spend time and money to come to the bank for repayment. For making a repayment of Rs.1,000 or Rs.500, one may have to spend one day and also Rs.200-300 to visit the bank[14.]

3.7.2 Livelihood of the Farm Households

(1) Overview

Farmers' livelihood comprised various activities including settled as well as shifting cultivation in combination with livestock rearing and earnings from daily wage work. Some of the educated persons earn from government services and other business activities although the number of such villagers is less. Recently, the cycle of shifting cultivation has been drastically reduced to 3-4 years in the case of Meghalaya, which does not allow the areas to regain soil fertility and tree growth. Thus, the farmers are facing increasing difficulties in managing shifting cultivation.

According to the household survey conducted by the JICA Survey Team, 96 households in the sampled households were categorised as below poverty line (BPL). Only four households in West Garo Hills were above poverty line (APL). The average household size is 6.2 persons. All the households surveyed were Christians and scheduled tribes (STs). Only the households in the East Khasi District experienced food shortage. Forty-three sampled households, out of the 50 households in East Khasi Hills District responded that they experienced food shortage in 2014, however, the level of severity could not be understood from the data.

Table 3.7.3 Economic Status of Surveyed Households in Meghalaya

District	APL		BPL		AAY15		Total No. of HH
	No. of HH*	%	No. of HH	%	No. of HH	%	
East Khasi Hills	0	0.0%	50	100.0%	0	0.0%	50
West Garo Hills	4	8.0%	46	92.0%	0	0.0%	50
Total	4	8.0%	96	96.0%	0	0.0%	100

*Note: *HH: Households*
Source: Farm Household Survey, JICA Survey Team

(2) Household Income and Expenditure

The average income of the sampled households in Meghalaya is Rs.162,992.6 while the average expenditure is Rs.151,495.1. The total average income and expenditure of those in West Garo Hills

[13] Source: State of Micro Finance Report 2013-14, NABARD.
[14] Source: Field Interview, JICA Survey Team
[15] AAY stands for Antyodaya Anna Yojana. This is a central government scheme to provide rice and wheat at a concessional rate. The poorer households amongst the BPL households are eligible.

are nearly half of those in East Khasi Hills. The average income of the sampled households in West Garo Hills stood at Rs.115,155.3 and the expenditure is Rs.97,474.2 during the 12 months in 2014.

Table 3.7.4 Total Average Income and Expenditure of Farm Households in Meghalaya in 2014

(Unit: Rs.)

Distance	Income			Expenditure		
	East Khasi Hills	West Garo Hills	Total Average	East Khasi Hills	West Garo Hills	Total Average
<15 km	223,720.0	163,359.6	193,539.8	222,476.0	129,351.0	175,913.5
>30 km	197,940.0	66,950.9	132,445.4	188,556.0	65,597.3	127,076.6
Total Average	210,830.0	115,155.3	162,992.6	205,516.0	97,474.2	151,495.1

Source: Farm Household Survey, JICA Survey Team

In both districts, common sources of income were crop production, livestock/ dairy, collection of forest produces, and wages earned from casual labour work. In East Khasi Hills, all the households were engaged in crop production while for those in West Garo Hills, it was 86.0%. About 94.0% in East Khasi and 86.0% in West Garo Hills earned their livelihood from forest produces. Almost all the households in both districts were engaged in casual wage labour. In East Khasi Hills, 98.0% of the households were engaged in agriculture labour. No households in both districts were engaged in sericulture and cottage industries. The details of households engaged in various livelihood activities are given in Attachment-3.7.3.

The average income earned from various sources is shown in Attachment-3.7.4. Crop production and wages contributed significantly to the average household income in East Khasi Hills. In West Garo Hills, the very high income (Rs.73,280.2) was derived mostly from betel nut during 2014. Livestock also provided an average income of Rs.30,070.0 in West Garo Hills.

The average expenditure of farm households in Meghalaya is given in Attachment-3.7.5. In both districts, the expenditure on food was high with an average expenditure of Rs.48,532. All the households in the East Khasi Hills District incurred expenses on agriculture inputs whereas it was not confirmed in West Garo Hills. No expense on agriculture inputs in West Garo Hills could be estimated because of predominant *Jhum* cultivation. The average amount spent on agriculture inputs in East Khasi Hills was Rs.69,600, accounting for 51.2% of the total average expenditure. Savings was done by 49 households out of 50 households in West Garo Hills, whereas only one household saved in East Khasi Hills. The average amount of savings in West Garo Hills was Rs.17,062.6.

(3) Farmers' Groups and Access to Financial Services

No members from the sampled households had membership to any type of farmers' groups, including cooperatives and SHGs. The reason for not joining a group in East Khasi Hills District was that there was no group nearby. Six households in West Garo Hills indicated that they did not see any benefit of becoming a member. By this, similarly to Nagaland and Tripura, the farmers in Meghalaya are yet to be organised for collective production and marketing.

Between 2012-2014, 28 households out of 100 sampled households borrowed money from different sources for agriculture purposes (Attachment-3.7.6). Some of the households in East Khasi Hills District borrowed money from relatives for an average amount of Rs.30,000. In West Garo Hills District, money lenders/traders provided loans for an average amount of Rs.15,000.

(4) Land

In East Khasi Hills, all the households practised shifting cultivation while only 40.0% of the households practised settled cultivation. In West Garo Hills, all the households practised settled cultivation while only three households out of 50 sampled households practised shifting cultivation.

Table 3.7.5 Number of Farm Households Used Land for Settled Cultivation and Shifting Cultivation in Meghalaya in 2014

(Unit: Households)

Land Use Type	East Khasi Hills (N=50)				West Garo Hills (N=50)				Overall Total
	<15 km	>30 km	Total	% of Total to N	<15 km	>30 km	Total	% of Total to N	
Settled cultivation	-	20	20	40%	25	25	50	100%	70
Shifting cultivation	25	25	50	100%	3	-	3	6%	53

Source: Farm Household Survey, JICA Survey Team

The land used for settled cultivation in East Khasi Hills was mostly under periodic *patta*, a temporary land document issued by the village council. In West Garo Hills, land used for settled cultivation was acquired through land settlement document for permanent land holdings. In East Khasi Hills, the area under shifting cultivation was largely under periodic *patta*. No community land ownership was reported by the respondents of the household survey.

Table 3.7.6 Land Tenure of Area under Settled Cultivation and Shifting Cultivation in Meghalaya

(Unit: Responses)

Land Holding Type	Settle Cultivation			Shifting Cultivation		
	East Khasi	West Garo	Total	East Khasi	West Garo	Total
Periodic *Patta*	20	-	20	49	-	49
Land Settlement Document (Permanent)	-	50	50	1	3	4
Total	20	50	70	50	3	53

Source: Farm Household Survey, JICA Survey Team

The average land use area in East Khasi Hills was 1.2 acre for settled cultivation and 9.1 acre for West Garo Hills. The area under shifting cultivation was 4.0 acre in East Khasi and 2.0 acre in West Garo Hills.

Table 3.7.7 Average Area under Different Land Uses in Meghalaya in 2014

(Unit: acre/ 1 acre=0.4 ha)

Land Use Type	East Khasi Hills			West Garo Hills			Overall
	<15km	>30km	Total	<15km	>30km	Total	
Settled cultivation land	-	1.2	1.2	8.1	10.0	9.1	6.8
Shifting cultivation	5.7	2.4	4.0	2.0	-	2.0	3.9
Residential area	0.9	0.6	0.7	1.3	1.6	1.4	1.1

Source: Farm Household Survey, JICA Survey Team

(5) Household Assets

(a) Electric and Communication Devices, and Agriculture Machinery

Sprayers were owned by almost all the households in East Khasi Hills. The number of sprayers owned by a household was 1-2 per household. On the other hand, no household owned a sprayer in West Garo Hills. Television, radio, and mobile phones were owned by nearly 60% of the households in both districts.

(b) Livestock

Livestock provides substantial amount of income to the households. Cow, pig, and poultry are owned most by surveyed households (Attachment-3.7.7). On an average, 2.4 pigs were kept by a household. Cows are also owned by 79 households amongst the sampled households with an average holding of 2.9 heads. Women do have larger responsibilities in managing backyard piggery and poultry[16].

3.8 Interventions by Donor and Private Organisations, and Civil Society Organisations

3.8.1 Livelihood Improvement Project in the Himalayas

The Livelihood Improvement Project in the Himalayas was funded by the International Fund for Agriculture Development (IFAD) between 2004 and 2011. The Meghalaya Rural Development Society was established for implementation of the project. The project areas include East Garo Hills, South Garo Hills, East Khasi Hills, Ri Bhoi, and Jaintia Hills districts.

The objective was to improve the livelihood of the vulnerable groups just above or below poverty line through promotion of improved livelihood opportunities and strengthening of local institutions. The livelihood interventions were done by promoting small and micro enterprises and agriculture development. Demonstrations of various livelihood options were done so that the beneficiaries can select the most suitable activities with reference to the available resource, skill sets, and their interest. The project also facilitated the SHGs to establish bank linkages. The Livelihood Improvement Finance Company of Meghalaya (LIFCOM) was established as a Section 25 company[17] by IFAD and the Government of Meghalaya to identify, plan, and undertake suitable income generation activities and also to facilitate credit linkages. Nine NGOs were placed to work in nine blocks in the project districts. The project activities included establishment of demonstration plots on System of Rice Intensification (SRI), cultivation of colour capsicum, kitchen garden, intercropping of maize with turmeric, vermi-compost, green house for off season vegetable cultivation, banana cultivation, organic pineapple cultivation, pig rearing, cross breeding cows, tree plantation, sustainable harvesting of non timber forest product (NTFP), and scientific management of sacred groves, water harvest storage cum fishery pond, and organic composting.

3.8.2 National Rural Livelihood Mission by Meghalaya Rural Livelihood Society

The Meghalaya Rural Livelihood Society (MRLS) has been established as a state level nodal agency of the National Rural Livelihood Mission (NRLM) with a vision to eradicate poverty through empowerment of the poor by facilitating the concerted efforts between the state and non-state sectors. Its approach, following the overall principles of NRLM, emphasizes on the active involvement of the poor in the process of livelihood improvement and its interventions will evolve around the self-help groups (SHGs). It also envisages the involvement of various stakeholders including village institutions and others for the enhance efficiency of interventions. The NRLM-funded interventions will be implemented in the 39 community and rural development blocks (blocks) between 2012-13 and 2017-18.

The Annual Action Plan 2013-14 of the MRLS indicated that the society was still in the early stage

[16] Male and female participation in crop production is almost at the par. However, women plan a greater role in maize and vegetable cultivation in Meghalaya. (Livelihood and Access to Market Project Meghalaya – Final Project Design Report. (2014).International Fund for Agriculture Development.)

[17] Section 8 of New Company Act 2013 is currently applicable.

of establishing the organisation and administrative systems. Field visits were conducted for assessing the current status and to select the initial four blocks where the interventions will be implemented. Rongram and Dallu blocks of West Garo Hills District and Mairang and Mawkyrwat blocks of West Khasi Hills districts, where SGSY was not implemented, were selected as "intensive blocks" where the intensive capacity development of the SHGs and community organisations will take place. The activities in the blocks where SGSY was implemented have been scheduled to commence at the later stage of intervention.

3.8.3 North Eastern Region Community Resource Management Project for Upland Areas Phases I (1999 – 2008) and II (2012-2014)

The North Eastern Region Community Resource Management Project for Upland Areas (NERCORMP) was commenced in 1999 and completed its first phase in 2008 followed by the second phase between 2012 and 2014. The project has been implemented in six districts in Assam, Manipur, and Meghalaya. In Meghalaya, West Garo Hills and West Khasi Hills districts were covered. The project interventions were designed by integrating the local traditions and culture and aimed at achieving food security and eradication of poverty. The project organised the objective-based community level project implementation units and capacitated them to plan and implement the activities that they planned. In this way, the project planning and implementation process were made more inclusive and helped develop the awareness of the community members towards natural resource management and livelihood improvement. NERCORMP also invested in building rural infrastructures which were critically missing in the project areas.

In Meghalaya, construction of rural access road, formation of SHGs, introducing savings and credit, promotion of planting tree crops, improvement of drinking water supply and sanitation facilities, improvement of wet terrace, and skills development in record keeping were done.

Table 3.8.1 Achievement of NERCORMP in Meghalaya

Districts	Phase I				Phase II			
	No. of Villages	No. of HH	No. of NaRM-G*	No. of SHG	No. of Villages	No. of HH	No. of NaRM-G*	No. of SHG
West Khasi Hills	162	6,900	162	454	76	3,619	76	155
West Garo Hills	192	7,070	257	852	75	3,627	95	154
Total	354	13,970	419	1,306	151	7,246	171	309

*Note: *NaRM-G: Natural Resource Management Groups*
Source: One World Foundation India. (2011). Sustainable Development in the North East India – A Case of NERCORMP (December, 2011).

In the case of NERCORMP, the Natural Resource Management Groups (NaRM-G) are constituted for planning and implementation of the natural resource management-related activities and SHGs for livelihood activities. Although the communities in Meghalaya are largely matrilineal, communal matters were the domain of the men. NERCORMP, thus, to involve women in the process of planning and implementation, formed NaRM-G with equal participation of both men and women in every household. Furthermore, the head of the village council (*durbar/ nokma*) was made as the chairperson of NaRM-G in order to create synergy amongst the existing village level institutions. The third phase of NERCORMP has been launched with emphasis on linking the rural communities to the market.

3.8.4 Civil Society Organisation – Rural Resource and Training Centre

Meghalaya being a Christian dominant state, Catholic Church organisations have been actively involved in the implementation of the social development sector. The Rural Resource and Training Centre (RRTC) also functions as a Rural Self Employment Training Institute (RSETI) which is an initiative of the Ministry of Rural Development, Government of India and supported by the State Bank of India for Ri Bhoi District. The facility includes the demonstration garden for integrated farming (fish pond, horticulture crops, piggery, poultry, vermin compost, etc.). The area is nearly 200 acres, which has different demonstration facilities. These demonstrations/models have been set up in collaboration with ICAR, and various departments of the Government of Meghalaya.

The training programmes organised by RRTC include both classroom training as well as field demonstration. Usually, the duration of the training varies from one week to three weeks depending on the subject and participants. RRTC has facilities to accommodate 220 trainees. RRTC has been assigned by the Apiculture Mission, Government of Meghalaya to provide training to 2,700 bee keepers. However, the major issue is that after the training, RRTC does not have resources to help the farmers with necessary infrastructure and handholding support in their respective villages.

RRTC also has a food processing unit where the pickles of various fruits and vegetables and honey are processed. Other products include ginger (raw and powder form), turmeric (raw and powder form), pineapple, orange, broom stick, finished broom, incense sticks, pickles, squash, jams and jelly. The centre is also promoting modernisation of bee keeping techniques from the traditional one, which is much more productive.

RRTC has promoted 23 organic farmers' associations in 23 villages of Ri Bhoi District for promotion of organic farming. Three cooperative societies with 481 farmers have been promoted by the RRTC in its project area[18]. All of these cooperative societies are involved in the production and marketing of organic vegetables and fruits.

3.9 Issues and Possible Counter Measures

In order to achieve the agricultural development in Meghalaya, all the allied sectors contributing to the food production are to be developed by strategic interventions based on the existing production systems in each sector. The result of SWOT analysis and recommendation of countermeasures are as follows.

3.9.1 Agriculture and Horticulture Production

SWOT analysis of agriculture production and horticulture is as follows.

[18] These include: 1) Synropelang Cooperative Society with office in Umsning, 2) Teilang Cooperative Society in Umsaw Nongkharai. and 3) Kynjoh Shaphrang (Phra Shnong) Cooperative Society in Nongpoh.

Table 3.9.1 SWOT Analysis of Agriculture Production and Horticulture in Meghalaya

	Helpful	Harmful
Internal Origin	**Strength** ・ Sufficient land for area expansion ・ Abundant water resources during monsoon season ・ Favourable agro climatic condition ・ Various crops from sub-tropical to temperate ・ Availability of germplasm of good quality for crop and livestock for breeding ・ Availability of indigenous fruits ・ Availability of indigenous technological knowhow ・ Availability of family labour ・ Higher literacy rate ・ Fair social stratification compared to main land of India ・ Organic farming	**Weakness** ・ Undulating topography ・ Requirement of soil conservation measures for land expansion ・ Small quantities of produces for marketing ・ Lack of irrigation water for dry season ・ Lack of irrigation facility ・ Lack of organised markets ・ Poor transport and storage ・ Lack of agro based industries ・ Non availability of quality planting materials and farm inputs ・ Unsustainable farming practice due to shortening of Jhum cycle ・ Rigid mind-set of farmers to introduce new farming practice ・ Dependence on migrant labour
External Origin	**Opportunity** ・ Promotion of organic production for export to other states and international market ・ Eco tourism ・ Permission for cultivation in forest area under Forest Right Act	**Threat** ・ Pests and diseases outbreak ・ Natural calamity like, hail storm, land slide, wildfire ・ Dependence on import from other states ・ Migration of man power from rural to urban

Source: JICA Survey Team

Based on the interviews, field survey and analysis, the following focus areas are recommended for the development of agriculture and horticulture production in Meghalaya.

Agriculture Production

1. Increase in cropping intensity by introduction of short duration high yielding varieties by replacing the existing long duration local varieties followed by cultivation of other crops like oilseed, pulses, wheat.
2. Proper nutrient management practices along with crop protection measures to be under taken to increase production and productivity of crops.
3. Maximum utilization of available water sources for irrigation purpose and creation of extensive rain water harvest structures to reduce the runoff loss and soil erosion.
4. Farm mechanisation, wherever possible, in order to meet the agricultural labour demand and to reduce the time required for agricultural operations.

Horticulture

1. Natural advantages such as topography, climatic conditions are to be best utilized by cultivating wide range of horticultural crops like fruits, flowers, spices, medicinal and aromatic plants. Exotic crops like strawberry having very high demand in local, domestic and international markets can accelerate the enhancement of farmers' income.
2. Promotion and commercialisation of horticulture by means of value addition through Common Interest Groups (CIGs) or SHGs.
3. The protection of existing forest areas through awareness programmes and planting of fast growing species of fruit trees in Jhum areas. To release the pressure on existing forests, cultivation should be encouraged in waste land and other marginal lands.
4. Development of high value and specialised tissue culture laboratories to enhance food production capacity and benefit farmers by supplying the required quality seedlings for horticultural crops.

3.9.2 Animal Husbandry and Dairy Farming

SWOT analysis of animal husbandry and dairy production is as follows.

Table 3.9.2 SWOT Analysis of Animal Husbandry and Dairy Production in Meghalaya

	Helpful	Harmful
Internal Origin	**Strength** ・ High demand in local markets ・ Availability of family labour ・ Using as emergency cash income as stock ・ Large area for grazing	**Weakness** ・ Secondary source of income ・ Lack of improved breed ・ Lack of piglet supplier ・ Problem in animal health care ・ Poor nutritious feed ・ Poor accessibility for extension work
External Origin	**Opportunity** ・ None	**Threat** ・ Avian influenza for poultry industry ・ Swine fever for pig rearing ・ Dependency on the outside source for feed with high cost ・ Support by central government for piggery sector is not enough

Source: JICA Survey Team

Based on the interviews, field survey and analysis, the following focus areas are recommended for the development of animal husbandry and dairy production in Meghalaya

1. Development of piggery and poultry including small ruminants for meat production and dairy cattle for milk by encouraging revived and improved backyard farming.
2. Encouragement to each household in the rural area for rearing three nos. of pig, 50 nos. of poultry birds, and one dairy cow in every 10 household.
3. Implementation of programmes such as, induction of quality dairy cattle, community cattle rearing, rural dairy farming, and artificial insemination.
4. Establishment of Dairy co-operatives/CIGs/SHGs for easy marketing
5. Establishment of small scale milk product processing industries for value addition
6. Improvement of technical dissemination network from Departmental farm to individual farms
7. Consolidating the existing livestock and poultry breeding farms, so as to evolve suitable crossbred in sufficient numbers from departmental farms for breeding and propagation.
8. Establishment of piggery clusters composed of core breeding farm and satellite fattening pig farms
9. Intensification of fodder development. Fodder stock and grass land reserve in all districts such as hay and silage making units to meet the requirement of fodder in lean period are to be set up.
10. Consolidating entire animal health care programme.

3.9.3 Fishery

SWOT analysis of fishery is as follows.

Table 3.9.3 SWOT Analysis of Fishery in Meghalaya

	Helpful	Harmful
Internal Origin	**Strength** ・ Low lands below water catchment area are available ・ Sufficient rainfall in monsoon season	**Weakness** ・ Acidic soil ・ Lack of awareness among farmers ・ Non availability of quality fish seed ・ Scarcity of water in dry season
External Origin	**Opportunity** ・ Good demand in neighbouring state like Manipur	**Threat** ・ Diseases ・ Dependent on Migrant Labour

Source: JICA Survey Team

Based on the interviews, field survey and analysis, the following focus areas are recommended for the development of fishery in Meghalaya.

1. In order to increase fish production in the State low lying area to be brought under aquaculture
2. Paddy cum fish culture to be encouraged in low lying paddy fields
3. Emphasis to be given for demand driven timely supply of quality fish fingerlings
4. Specialized transport vehicles for transportation of fish to the distant markets
5. Production of quality nutrition rich fish feeds to cater to the needs of fish farmers

3.9.4 Farmers Organisation and Livelihood

Based on the interviews, field survey and analysis, the following focus areas are recommended for the development of farmers organisation and livelihood in Meghalaya.

Table 3.9.4 Issues and Possible Countermeasures in Farmers Organisation and Livelihood in Meghalaya

Category	Issues	Possible Countermeasures
Farmers' Organisation	➢ Cooperatives are promoted while nearly 30% of the total is not functioning. ➢ Cooperatives are dependent on the subsidies. Many are lacking a clear sense of the objectives other than receiving subsidies, leadership, and management skills. ➢ A multiple number of institutions have been involved in the formation of SHGs and difficult to understand the overall status of the groups. ➢ Farmers are not yet to be organised into groups that could enable them to produce and market their products in an efficient way. ➢ SHGs are not yet organised to enable them to produce substantial volume of produces to attract the buyers and market. ➢ Support for business planning, management and marketing is not sufficient to capacitate the cooperatives and SHGs to succeed in their enterprise.	➢ The ongoing interventions need to incorporate the aspect of capacity development in entrepreneurship, business planning and management, and product development. ➢ Market research should be done by specialised agencies. The results should be reflected in the decision making process of the cooperatives and SHG members when selecting an enterprise. ➢ The capacity to produce needs to be enhanced in order to create a need for efficient marketing. The facilitation in organising the farmers into groups as well as to align them with the market needs has to be ensured. ➢ The SHGs and cooperatives are to be federated at a higher level in order to attract the market and buyers. For this purpose, field-level facilitation by trained personnel will be critical.
Access to Financial Services	➢ Borrowing from financial institutions is not common. Money lender is the main source of loan but the interest rate is very high. ➢ SHGs-based lending is very limited. ➢ Savings is not equally popularised in the state. It seemed rather a location-specific practice.	➢ Community-based financial services are required. ➢ It is critical to develop the capacity of SHGs to manage the fund and enterprises. ➢ NERCORMP model of micro-financing may be popularised. ➢ As savings will help stabilise the household economy, it is advisable to enhance the formation of SHGs to promote the understanding and importance of savings and can provide required services to the members.

Source: JICA Survey Team

CHAPTER 4 AGRICULTURE SECTOR IN NAGALAND

4.1 State Agriculture Development Plan

4.1.1 Vision and Strategy

(1) General

The State Government of Nagaland has a long term vision of "Prosperity through Agriculture", which was adopted in the Nagaland Vision 2025 (subtitled as Food For All) published in 2012. To uplift the income level of the people in Nagaland to the national average (per capita gross state domestic product (GSDP) = Rs.87,456 estimated) by 2020, Nagaland should achieve 8.50% growth rate of GSDP and 7.28% growth rate of per capita GSDP on the average from 2007 to 2020 as shown below.

Table 4.1.1 Nagaland Average Annual Growth Rates Required to Reach India's Per Capita GDP Level in 2019-20

Five-Year Plan Period	Years	India		Nagaland	
		Growth Rate of GSDP (%)	Growth Rate of Per Capita GSDP (%)	Growth Rate of GSDP (%)	Growth Rate of Per Capita GSDP (%)
11th	2007-08 to 2011-12	9.0	7.51	8.50	7.22
12th	2012-13 to 2016-17	9.0	7.67	8.50	7.28
13th	2017-18 to 2019-20	9.0	7.80	8.50	7.41
Average Annual Growth Rate (%) during 2007 to 2020		9.0	7.61	8.50	7.28

Note: GSDP is at fixed cost at 2006-07 prices
Source: National Institute of Public Finance and Policy (NIPFP) estimates in NEC Vision 2020

(2) Agriculture and Allied Sector

Land and water are the two most vital natural resources for the development of sustainable agriculture and economy. It is absolutely necessary to improve the productivity of land through scientific management practices without impairing the ecological and environmental status. As predominantly an agrarian state, the economy of Nagaland is dependent on the development of agriculture. In order to bring agriculture to the forefront and prioritise its development, it is important and necessary to utilise all available resources rationally with the application of modern technology to achieve the optimum level of development, in order to meet the goal of food security.

Vision 2025 also emphasises the utilisation of the water resources of the state towards sustainable agriculture by means of rain water harvesting and creating irrigation potential. With the combination of all these measures, the state of Nagaland can invariably be brought to the status of a state surplus in food production by the year 2025.

Taking the above into account, Vision Nagaland 2025 aims at addressing the entire gamut of issues to make Nagaland a prosperous state surplus in food production by 2025 by adopting the following measures.

Table 4.1.2 Development Strategies for Agriculture and Allied Sector in Nagaland

SN.	Development Strategy
(1)	Capacity building of farmers as well as extension personnel.
(2)	Creation of commodity-specific production zones for easy marketing of perishable horticultural commodities by establishing an agricultural market hub with internet facilities.
(3)	Encouraging maximum possible settled cultivation (as terrace cultivation) of suitable agri-horti crops, such as rainfed cereals, fodders, vegetables, and fruits in hilly terrains and in areas traditionally under *Jhum* (shifting cultivation).
(4)	Construction of all-weather roads to connect production centres to markets.
(5)	Use of quality seeds, fertiliser and other agro-chemicals and make them available at the doorstep of the farmers.
(6)	Adopting steps to increase piggery, goatery, cattle rearing, poultry, duckery, etc., for maximising meat production through breed improvement.
(7)	Increasing the availability of chicks of layers and broiler birds in the state by establishing hatchery units.
(8)	Increasing commercial cattle rearing for the development of dairy sector.
(9)	Utilising available water bodies and low lying areas for fish production.
(10)	Assured availability of fish seed with onset of fish production season.
(11)	Establishing agro service centres in each block by imparting training to the educated unemployed youth for providing easy access of farm mechanisation, and other services to the farming communities.
(12)	Encouraging the development of agri-preneur as organic producer of high value fruits and vegetables to attract the educated youth for self-employment through agriculture.
(13)	Entrepreneur development for the establishment of fruits and vegetables processing industries with a purpose of value addition.
(14)	Ensuring easy availability of farm credit.
(15)	Construction of rural warehouses and cold storages.

Source: Nagaland Vision 2025

The State Government of Nagaland is continuously putting the priority on improvement of *Jhum* (shifting) cultivation in the agriculture and allied sector. The two methods of cultivation practised by the Naga tribes are *Jhum* cultivation and terrace cultivation. The area under *Jhum* cultivation was about 93,000 ha while terrace cultivation was about 83,500 ha in 2010-11. *Jhuming* has its obvious disadvantages as large tracts of land are required for cultivation. The shifting cultivation is a traditional agricultural practice with high incidences of soil erosion and loss of fertility, due to the reduction of periodicity in the *Jhum* cycle. In the past, *Jhum* was not so detrimental because the long periodicity of the cycle allowed the soil to regain its lost fertility. But now with the increased population pressure, the *Jhum* cycle has been reduced to 9-10 years, as a result, soil is becoming unproductive. Therefore, proper planning and management of *Jhum* cultivation is urgently required, while a gradual shift towards settled cultivation is the need of the hour to feed the ever growing population. It is not possible to eradicate *Jhum* cultivation because of its links to socio-customary agrarian practices by the people in the state. However, a more eco-friendly method is that of preparing terraced fields for cultivation where practically possible.

Looking at other alternatives for shifting cultivation, it is important to take into consideration the nature, or in particular the topography, of *Jhum* fields. *Jhum* is generally situated on hilly slopes and therefore, vulnerable to soil erosion rendering the land unstable. It is very essential to preserve moisture and plant nutrients in soil at any cost in order to have stable agriculture. By preserving the moisture and nutrients, crop growth and stable income can be ensured. The following are the important areas requiring immediate attention before adopting any alternatives to shifting cultivation.

Table 4.1.3 Countermeasures for Shifting Cultivation in Nagaland

Features of Jhum Cultivation	Countermeasures
• Clearing the site • Burning of cut vegetation • Sowing of mixed crops	• Topo-sequential land use • Wet terracing for permanent farm land • Permanent soil conservation

Features of Jhum Cultivation	Countermeasures
• Poor yield • Rotation of fields • Extensive soil erosion • No fertiliser and agrochemicals • Create ecological imbalance, etc.	• Water conservation • Establishment of perennial tree crops • Crop rotations • Mulching and organic matter recycling, etc.

Source: Nagaland Vision 2025

4.1.2 Development Budget and Expenditure under the State 12th Five-Year Plan

The state plan under the 12th Five-Year Plan (2012-2017) is broadly divided into 10 items as shown in Table 4.1.4 below. The plan budget with respect to agriculture and rural development (items 1 to 3) will share only 34.4% of the total budget. However, it will practically occupy about 50% as other items except for items 9 and 10 which also include more or less agriculture and rural development components. Thus, agriculture and rural development are important sectors in Nagaland.

Table 4.1.4 Nagaland State Plan Budget and Expenditure under the 12th Five-Year Plan

SN	Sector	12th Plan Proposed Outlay	Annual Plan 2012-13		Annual Plan 2013-14		Annual Plan 2014-15 Tentative Budget
			Approved Outlay	Expenditure	Approved Outlay	Anticipated Expenditure	
1	Agriculture & Allied Services including Irrigation	2,937.21	405.23	421.66	357.05	357.05	530.54
2	Rural Development	507.07	80.60	84.58	33.80	33.80	52.26
3	Special Area Development	834.14	138.70	214.06	202.93	202.93	220.88
4	Energy	701.88	104.10	89.94	68.93	68.93	123.65
5	Industry & Minerals	341.70	55.97	59.00	44.19	44.19	104.12
6	Transport & Communication	1,144.85	171.58	179.83	162.23	162.23	184.12
7	Science, Technology & IT	83.39	13.66	38.67	49.39	49.39	64.80
8	General Economic Services	1,930.12	289.43	116.39	168.73	168.73	633.25
9	Social Services	3,386.61	558.12	525.36	446.61	446.61	581.57
10	General Services	558.83	100.00	101.16	64.34	64.34	64.34
	Total (State Plan)	**12,425.80**	**2,000.20**	**1,830.65**	**2,000.00**	**2,000.00**	**3,303.01**

Notes: Unit: Rs. crore
Source: Plan Supplement 2014-15 Nagaland

4.2 Social Institution and Local Governance

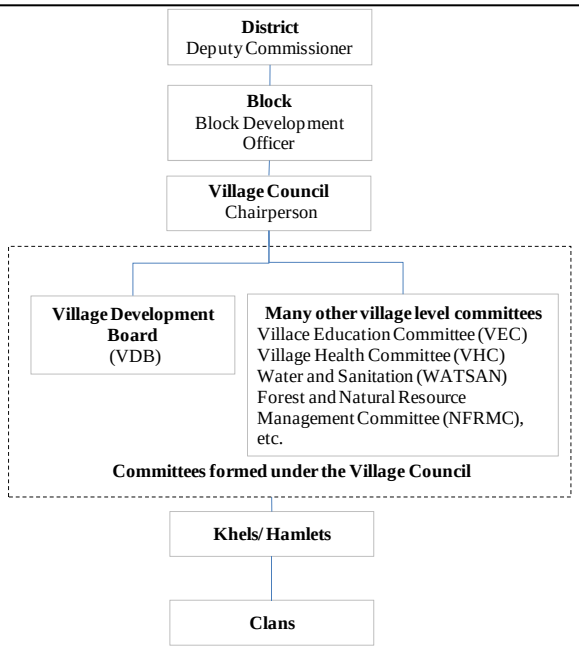
4.2.1 Social Institution

About 86.5% of the total population or 1,710,973 persons in Nagaland belong to Scheduled Tribes (ST)[1]. There are 16 tribal communities in Nagaland including Ao, Konyak, Angami, Sema, and Chakhesang. The Konyak, Ao, and Sema communities comprise 41.2% of the total population[2]. Each tribal community has its own distinct culture, tradition, language, attire, and village administration. Around 90.0% of the total population belongs to Christianity[3]. Communities of Nagas are known for their rich social capital which can provide the basis for collective action. The land holding system is largely communal and clan owned. The village council is responsible for the management of communal land. However, individual ownership and tenants are also emerging in Nagaland. Women customarily do not own or inherit land.

[1] Census 2011, Government of India, Refer to Table 2.6.12 in Attachment-2.6.1.
[2] Nagaland Data Highlights; The Scheduled Tribes. Census 2001, Government of India.
[3] Census 2001, Government of India. Refer to Table 2.6.10 in Attachment-2.6.1.

4.2.2 Local Governance

Traditionally, every village has its own form of administration and governance. After the formation of the state, the government has recognised such traditional system and tried to bring in uniformity in the local governance system. The districts were created with general geographical boundaries of the tribal communities in order to continue the traditional practice and linguistic affiliations.



Source: JICA Survey Team

Figure 4.2.1 Governance Structure in Nagaland

The present day local governance system is largely based on the traditional one. The state enjoys special status under Article 371 (A) of the Indian Constitution and implements its customary laws and rules. A village council is established in the village and functions as a key institution for local governance. Although variations in structure of the village council may be observed from community to community, the council, in general, comprised the representatives from all hamlets (small settlement areas in a village). The village council is led by the Chairman and assisted by the *gaonburras* (village elders) and members. The members are elected democratically and serve for a period of five years. The village council has the authority in the administration of justice within the village. The traditional village councils were given legal status in 1968 and subsequently, the Nagaland Village and Area Council Act, 1978 was passed to empower them to engage in village development activities. There are 1,278 villages[4] in 11 districts in Nagaland. Each one of them has a village council. By tradition, women do not participate in the village council.

Communitisation in Nagaland – Empowering Communities to Implement their Own Interventions

Communitisation of public institutions and services was introduced in 2002 under the Nagaland Communitisation of Public Institution and Services Act of 2002 and the government in phases handed over ownership and management of education, health care, water supply, electricity, tourism, and bio-diversity conservation to the communities. It is a partnership between the government and the community to own and manage public resources and assets, control over service delivery mechanisms with the aim of improving the delivery of public utility systems. Nagaland was awarded the United Nations Public Service Awards in 2008 for the communitisation programme in recognition of its innovative use of rich social capital.

Source: JICA Survey Team compiled based on various materials.

The village education committee, village health committee, and village water and sanitation committee were created under the village council to manage schools, health centres, drinking water and sanitation. The village development board (VDB) is established to plan and implement various rural development activities such as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and other interventions implemented through the Rural Development Department.

[4] State Perspective and Strategic Plan (SPSP) of Nagaland, Integrated Watershed Management Programme (IWMP). State Level Nodal Agency for IWMP, Department of Land Resources, Government of Nagaland.

A unique attempt was made by the government where it provides a matching grant to the VDBs and enables them to establish and operate a revolving fund so that they can implement their developmental plans. Although not many VDBs succeeded in doing so, there is a scope for bottom up planning and participatory development.

Source: MoDONER

Figure 4.2.2 District Map of Nagaland

4.3 Agricultural Resources

4.3.1 Land

About half of Nagaland's land area is covered with forest as shown in Table 4.3.1 and Figure 4.3.1. Net area sown has increased to over 1/5 of the state land.

Table 4.3.1 Land Use Pattern in Nagaland (%)

	Classification	2008-09	2009-10	2010-11	2011-12	2012-13	Average
i	Forest	52.0	52.0	52.0	52.0	52.0	52.0
ii	Non available for cultivation (a+b)	5.9	5.4	5.4	5.7	5.7	5.6
	(a) Land under non-agriculture uses	(5.7)	(5.2)	(5.2)	(5.6)	(5.6)	(5.5)
	(b) Barren and uncultivable land	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)
iii	Other uncultivated land excluding fallow land (c+d+e)	10.9	8.4	9.4	9.6	9.9	9.6
	(c) Permanent pasture and other grazing land	(-)	(-)	(-)	(-)	(-)	(-)
	(d) Misc. tree crops & groves not included in net ara sown	(7.3)	(5.8)	(6.2)	(5.5)	(5.7)	(6.1)
	(e) Culturable waste land	(3.6)	(2.6)	(3.2)	(4.1)	(4.2)	(3.5)
iv	Fallow land (f+g)	9.8	9.7	9.4	8.9	9.0	9.4
	(f) Fallow land other than current fallow	(5.4)	(6.1)	(6.0)	(5.9)	(6.0)	(5.9)
	(g) Current fallow	(4.4)	(3.6)	(3.3)	(3.0)	(3.0)	(3.5)
v	Net area sown	19.0	21.7	21.8	22.9	22.9	21.7

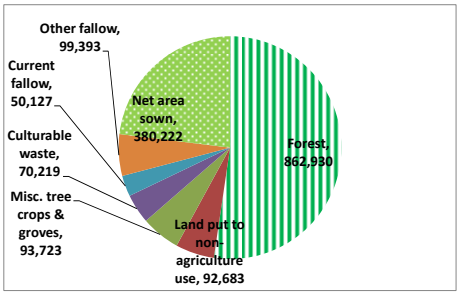
Source: JICA Survey Team based on original data from the Directorate of Agriculture in Directorate of Agriculture in "Statistical Handbook of Nagaland 2013, DES, GoN"
Basic data of 2008-09 are from the "Report on Census of Minor Irrigation Schemes in Nagaland 2006-2007, DOIFC Nagaland"

Status of Nagaland forest is presented in Table 4.3.2, in which ownership of the forest belongs mostly to the village or private community (88%) see Figure 4.3.2.

Table 4.3.2 Status of Forests in Nagaland as of 31 January 2014

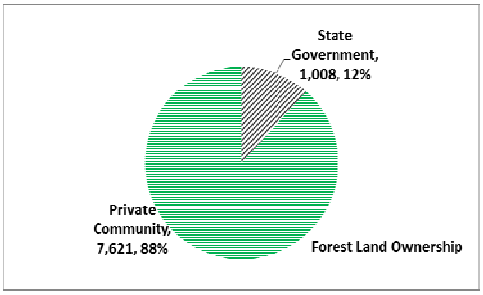
Legal Status	Forest Area (km^2)	% of Total Forest Area	% of Total Geographical Area
a) Government owned Forests			
1. Reserved Forests	62.26	0.72	0.38
2. Purchased Forests	192.47	2.23	1.16
3. Protected Forests	34.69	1.40	0.21
4. Wildlife Sanctuary	202.02	2.34	1.22
Sub-total	**491.44**	**5.70**	**2.96**
b) Government controlled (Private owned) Forests			
5. Protected Forests	**516.79**	**5.99**	**3.12**
c) Village owned Forests			
6. Virgin Forests	4,778.27	55.4	28.8
7. Degraded Forests	2,842.80	32.9	17.2
Sub-total	**7,621.07**	**88.3**	**46.0**
Total (a + b + c)	**8,629.30**	**100.0**	**52.0**
Ownership			
A) State Government (a + b)	1,008.23	11.7	6.0
B) Private Community	7,621.07	88.3	46.0
Total	**8,629.3**	**100.0**	**52.0**

*Note: * as in original data*
Source: Basic Facts Nagaland, Directorate of Information and Public Relations



Source: same as Table 4.3.1

Figure 4.3.1 Land Use in Nagaland in 2012-13



Source: Basic Facts Nagaland, Directorate of Information and Public Relations

Figure 4.3.2 Forest Land Ownership in Nagaland

The forest cover of Nagaland in 2011 is presented, where 1.1% of the forest was reduced from 2006-07. The forest cover occupies 80% of the state land. Around 1/3 of the forest cover is considered to be used for other purposes, particularly in case of "open forest".

Table 4.3.3 Forest Coverage by District in Nagaland

District	Geographical area (km2)	Forest in 2011 Assessment (km2)					Change from 2006-07 *
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total	(%)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)=(6)/(2)	(8)
Dimapur	758	0	75	317	392	51.72	-9
Kohima	3,283	288	1,146	1,489	2,923	89.03	58
Mokokchung	1,615	3	521	825	1,349	83.53	-46
Mon	1,786	33	482	724	1,239	69.37	-55
Phek	2,026	279	675	813	1,767	87.22	56
Tuensang	4,228	603	1,112	1,517	3,232	76.44	-108
Wokha	1,628	1	504	873	1,378	84.64	-6
Zunheboto	1,255	86	416	536	1,038	82.71	-6
Total: Nagaland	16,579	1,293	4,931	7,094	13,318	80.33	-143 **

*Note: * Dec. 2006 - Jan. 2017, ** as in original data*
Source: Basic Facts Nagaland, Directorate of Information and Public Relations

Table 4.3.4 presents the altitude zone-wise forest coverage, where 77% of the forest cover or 62% of the state land is over 500 m in altitude, and 47% of forest cover or 38% of the state land is located over 1000 m elevation. These suggest the importance of development in the hilly area.

Table 4.3.4 Forest Coverage by Altitude Zone in Nagaland (km^2)

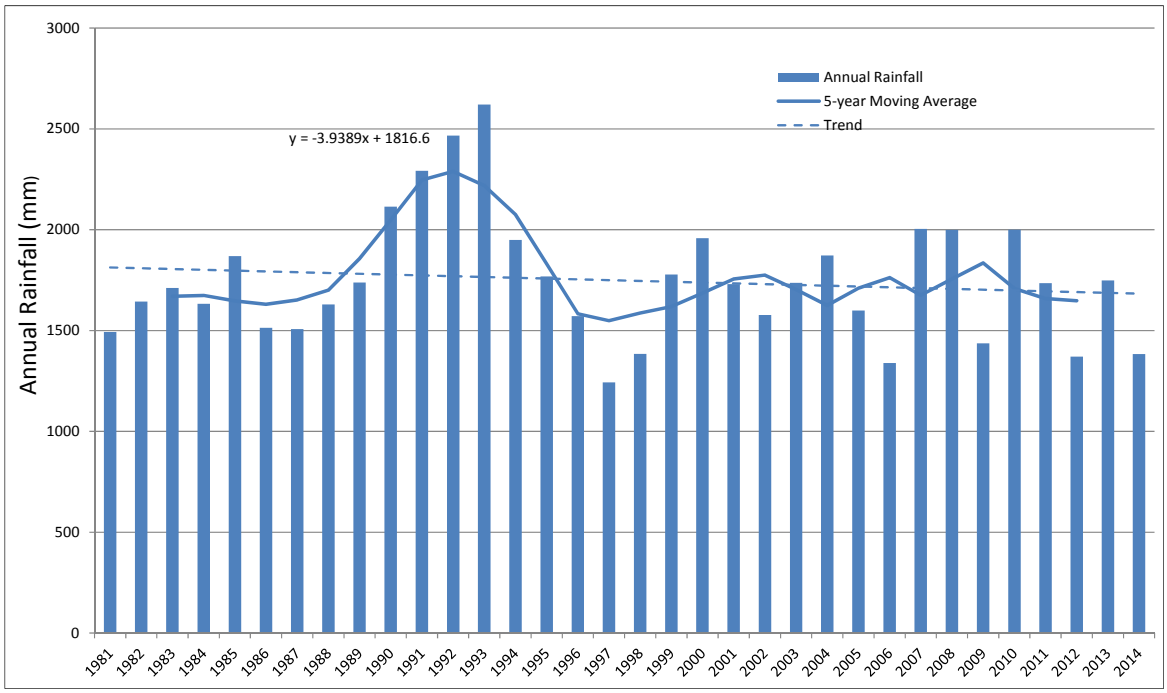
Altitude Zone	Very dense forest	Mod. dense forest	Open forest	Total		To stata land (%)
				(km2)	(%)	
0 - 500 m	0	1,098	1,946	3,044	22.9	18.4
500 - 1000 m	16	1,410	2,533	3,959	29.7	23.9
1000 - 2000 m	595	2,169	2,505	5,269	39.6	31.8
2000 - 3000 m	669	246	108	1,023	7.7	6.2
above 3000 m	13	8	2	23	0.2	0.1
Total (km2)	1,293	4,931	7,094	13,318	100.0	80.3
(%)	*9.7*	*37.0*	*53.3*	*100.0*		

Note: Based on SRTM, Digital Elevation Model

Source: Basic Facts Nagaland, Directorate of Information and Public Relations

4.3.2 Water

Fluctuation of annual rainfall in Kohima for 34 years from 1981 to 2014 is shown in Figure 4.3.3 (Data source: Soil and Water Conservation Department). Even though the data period is not long enough, there may be a trend of decrease in the annual rainfall series. With long-term data and those at other stations, the trend can be analysed more precisely. Average annual rainfall in Kohima for the period is 1,748 mm, which suggests occurrence of drought in the dry season.



Source: JICA Survey Team based on the original data of Soil and Water Conservation Department, Nagaland

Figure 4.3.3 Fluctuation of Annual Rainfall in Kohima in Nagaland

At the time of irrigation planning, rainfall data are used as basic data. In case that water source is the river or stream, flow data are essentially important to estimate the available water from supply side. According to the Soil and Water Conservation Department (SWCD), Nagaland has 16 meteorological stations with manual rain gauge. In addition, it has 22 automatic rain gauges but observation activities started only a few years ago. The Irrigation and Flood Control Department

(IFCD) in Nagaland keeps five meteorological stations, of which one is in Dimapur with a more than 10-year observation period, and 27 river gauge stations, of which 3 or 4 stations has observed more than the 10-year period, and the remaining stations has commenced their observation a few years ago.

Rainfall height varies widely by time and by location in Nagaland. For example, the altitude and annual rainfall in 2008 in several selected places in the state are within the range between 260 m (Dimapur) and 1874 m (Zunheboto), and between 677 mm (Dimapur) and 2337 mm (Wokha) (SWCD)[5].

4.4 Agriculture Production

Agriculture and allied sectors play an important role in the socio-economic development of Nagaland. This sector is a major contributor to the State economy as well as providing livelihood to more than 60% of the working population. However, the mountainous topography and uneven terrain breaking into small lowlands and valley areas is an obstacle to expand farm land with commercial production.[6]

Source: JICA Survey Team
Rice Terraces in in Phek

The state is also classified into four agro climatic zones, namely high hills, low hills, foot hills, and plain areas. These zones have distinct characteristics with regard to soils, crops, rainfall, and biodiversity. Traditional shifting cultivation, namely Jhum is practiced in over 80% of the cultivable area. Rice is the main crop grown in all zones. About 80% of the gross cropped area is also under rice cultivation. Rice is mostly single cropped but sometimes other various crops like maize, millets, and vegetables are cultivated with rice.

Jhum Cultivation in Nagaland

Source: JICA Survey Team
Jhum Cultivation in Phek

Traditionally, all the tribes in Nagaland practice slash-and-burn cultivation locally known as "Jhum". The Angami, Chakhesang and Zeliang tribes have additionally developed a sophisticated system of Wet Terraced Rice Cultivation (WTRC), which they practice along with Jhum cultivation.

It is said that over 40% of the land in Nagaland is subjected to Jhum and more forests are being cut down every year. This practice is widespread not only Nagaland but also in the neighbouring states, as well as Myanmar.

The procedure is slashing burning, tilling and sowing before monsoon season start. After one or two years of cultivation, fields go into fallow. Farmers move to the next plot and forest land to protect the soil and regain its fertility for some years. Then the next slashing is done. The period from slash to slash makes a "Jhum cycle".

The soil, especially in the hill slopes, is subject to massive top soil erosion from March to May when the first monsoon rains occur. It is said that Jhum is sustainable when the Jhum cycle is lasts 15-20 years. But with increasing food demand due to increase in population, Jhum cycle has reduced leading to decreases in crop yields.

Although the practice has many adverse effects, the following aspects cannot be ignored:

- Jhum assures a measure of food security for most of the people
- In ecologically-sensitive and hilly terrains like Nagaland, application of modern technologies has limitations. Jhum, on the other hand, is the base of development and application of low-input technologies like "low-external agriculture input technology".
- The sustenance of agro-diversity of Nagaland may be attributed to the Jhum practice.

Agriculture development concept of NEPED are summarised as follows:

[5] Soil and Water Conservation Department, The Government of Nagaland.
[6] Nagaland State Action Plan on Climate Change, Gov. of Nagaland

- Trees should be incorporated in Jhum. Originally, Jhum is a mixed crop system and adding one more "tree crop" will no harm.
- Sowing of non-traditional winter crops like wheat, barley, pea and other crops after the harvest of traditional crops like rice, maize, millet, etc. in Jhum fields.
- Selected shade-loving crops can be planted among the trees. These crops can yield income during the fallow periods, which is also the gestation period of the trees.
- By adopting proper crop rotation and combination of trees and other crops, Jhum cultivation can be turned into the main tool for economic development in Nagaland.

Source: JICA Survey Team
Jhum Cultivation in Wokha

Source: Building upon Traditional Agriculture in Nagaland, NEPED

In general, the soils are acidic in nature with pH ranging from 4.20 to 5.70. The soils are rich in organic carbon which may be as high as 3% but very poor in base saturation. Due to acidic nature of soils the available phosphate and potash content of the soils are usually poor or low. The heavy monsoonal rains, and traditional agriculture practice of *jhum* leading to severe soil erosion, followed by increased acidity of soils, affecting an estimated 1,333 thousand ha of land in the State.

4.4.1 Food Grain

The three types of traditional farming systems in practice in the State are mainly shifting cultivation, namely *jhum*, Terrace Rice Cultivation (TRC) and Wet Rice Cultivation (WRC). The farmers have significantly moved on to adopt each system such as integrated approaches, organic, dry land farming and double cropping system. Some advanced farmers have gone forward to grow cash crops such as tea, maize, chilli, ginger, cardamom, oilseeds, pulses and tuber crops.

Source: JICA Survey Team
Rice Terraces in Kohima District

Rice is the stable food occupying about 70% of the total cultivated area and constitutes about 75% of the total food grain production in the State with 429,340 MT. During 2012-13, the State anticipates an increasing in the food grain production to 453.77 MT. However, the State is still deficit in rice production to the extent of 30% and strategies to fill the gap have been formulated with a "Vision 2025, Prosperity through Agriculture" prepared by the State government.[7] Physical target and achievement during 2007-13 are shown in the following table.

Source: JICA Survey Team
Paddy Field in Dimapur District

Table 4.4.1 Physical Target and Achievement of Food Grain Production from 2007-08 to 2012-13 in Nagaland

Year	Area (in '000 ha)		Production (in '000 MT)	
	Target	Achievement	Target	Achievement
2007-08	309.25	278.50	374.33	367.25
2008-09	313.89	284.99	384.57	390.64
2009-10	288.51	285.77	423.82	271.64
2010-11	292.71	292.71	452.95	431.95
2011-12	301.87	299.67	448.52	433.70
2012-13	303.25	303.25	453.77	453.77
2013-14	310.15	310.15	625.34	625.20

Source: Directorate of Agriculture, Gov. of Nagaland

[7] Economic Survey 2012-2013, Directorate of Economics & Statistics, Gov. of Nagaland

During 2010-11, the yield rate of Jhum has increased to 1,800 kg/ha from 1,213 kg/ha in 2009-10 but it has shown a slight decrease in 2011-12. In 2012-13, the yield rate of jhum paddy recovered to 1,905 kg/ha. The yield rate of TRC/WRC paddy experienced faster rise in 2010-11 and remain stagnant in 2011-12. The yield rate of TRC/WRC paddy was 2,446 kg/ha in 2010-11 as against 1,673 kg/ha in 2009-10 and remains at the same rate in 2011-12. Due to good seasonal rainfall by monsoon, the yield rate has however recorded 46.20% increase in 2011-12. Then it increased to 2,537 kg/ha in 2012-13.

Table 4.4.2 Yield Rate of Principle Agriculture Crops in Nagaland (in kg/ha)

Name of Crops	2009-10	2010-11	2011-12	2012-13
Jhum Paddy	1,213	1,800	1,799	1,905
TRC/WRC Paddy	1,673	2,446	2,446	2,537
Maize	1,074	1,958	1,960	1,960
Total Pulses	1,206	1,058	1,063	1,117
Total Oil Seeds	825	1,025	1,027	1,031

Source: Directorate of Agriculture, Gov. of Nagaland

The table below highlights the production characteristics of some major food grains and industrial crops grown in the State.

Table 4.4.3 Production Trend of Major Food Grains and Industrial Crops in Nagaland (in MT)

Crops	2009-10	2010-11	2011-12	2012-13	2013-14
Cereals	322,440	531,860	533,270	558,510	583,680
Pulses	29,680	36,460	37,170	40,450	41,600
Oilseeds	86,020	67,530	68,120	68,900	69,300
Sugarcane	152,880	184,920	186,670	187,570	No Data
Potato	59,580	78,400	58,780	69,000	No Data
Tea	53,250	33,150	33,330	33,470	No Data

Source: Directorate of Agriculture, Gov. of Nagaland

Alder Based Cultivation in Kohima District

Alder Based Cultivation in Khonoma, Kohima
Source: JICA Survey Team

Alder Based Cultivation is a characteristic farming system in Nagaland and it is also called as a modified *Jhum* system. In order to restore the soil fertility, the farmers of Khonoma village of Kohima district grow Alder trees in great numbers along with rice and other agricultural crops. The idea behind this is that root nodules of Alder improve soil fertility by fixing atmospheric nitrogen. It also provides sheds to plantation crops like coffee at lower altitude and cardamom at higher altitude which further increases crop yield and reduces soil erosion. This practice has been in use since about 100 years by the whole community. Normally, *jhum* farmers cultivate the field for 2 years within a 9 years span, but the alder-based system allows two harvests in every 4 to 5 years. In this cultivation system the Alder seedlings are planted on the sloppy land intended for cultivation and the alder grows fast till attain six to ten years old. At this stage initially the trees are pollarded, the leaves and twigs are burnt and ash is mixed with soil to prepare it for raising crops. Subsequently also pollarding is done once in every four to six years.

Jhum cultivation resulted in loss of forest cover, erosion of top soil, desertification etc. Increasing population pressure on food grains has resulted in land degradation. However *Jhum* cultivation still remains a predominant indigenous practice of farming in Nagaland. Alder based farming increases the yield of *Jhum* crops and it should be encouraged. This could be achieved through proper identification and validation in the areas it is practiced. [8]

[8] Longshibeni N Kithan, Indigenous system of Paddy cultivation in Terrace and Jhum fields among the Nagas of Nagaland, International Journal of Scientific and Research Publications

4.4.2 Horticulture

Nagaland is quite conducive for cultivation of various fruits, vegetables, plantation crops, flowers, and spices. Horticultural crops are cultivated by almost all rural households in Nagaland; however, it has typically been considered as a backyard activity since farmers' main focus was on agriculture in general. Farmers preferred field crops over orchards because gestation period of horticultural crop cycles are longer than the agriculture.

Source: JICA Survey Team
Pineapple Growers in Dimapur District

Elevation range and climate are two factors on which horticultural crop production system is based. Based on altitude, the horticultural crop production zones could be classified into two agro climatic zones. Within these zones farmers follow standard cropping pattern.

Table 4.4.4 Agro-climatic Zones and Horticulture Crops in Nagaland

Zone	Elevation Range	Important Horticulture Crop
Foothills and Lower hills	Lower than 800 m Temperature: 8-38 °C	・ Fruits: Pineapple, Mango Papaya, Guava, Citrus, Banana, Litchi, Jack fruit, Coconut, Cashew nut ・ Vegetables: Cabbage, Cauliflower, Pea, Bean, Brinjal, Tomato, Potato, root crops, Cucumber etc. ・ Spices: Naga Mircha, Turmeric, Black pepper, Ginger ・ Flowers: Anjuriuim, Gerbera, Orchid
Mid- and High Hills	800-1,500 m Temperature: 3-24°C	・ Fruits: Plum, Pear, Kiwi, Mango, Banana, Passion fruit, Apple, Cherry, Walnut, Chestnut, Pear, Plum, Kiwi, Peach ・ Vegetables: Broccoli, Chow-chow and Cabbage, ・ Cauliflower, Pea, Bean, Brinjal, Tomato, Potato, root crops, Cucumber ・ Spices: Large cardamom, Ginger, Naga Mircha, Naga garlic ・ Flowers: Rose, Lilium, Alstroaemeris, dry flowers, Carnicium

Source: Nagaland State Action Plan on Climate Change, Gov. of Nagaland

In recent years, horticulture has emerged as an important growing sub-sector of agriculture. It provides ample opportunities for substantial employment and remarkable progress in Nagaland. Horticultural crops in Nagaland cover a variety of temperate/tropical fruits like apple, pear, peach, orange, lemon, papaya, pineapple, banana, guava, mango, passion fruit, jackfruit, wild apple, gooseberry, litchi and pomegranate, spices like large cardamom, Naga chilli, ginger and turmeric. Besides, medicinal and aromatic plants, floriculture, mushroom, plantation crops and various vegetables are cultivated in the State.

Cabbage Production in Dimapur District
Source: JICA Survey Team

Production and area of major horticultural crops in Nagaland are shown in the following tables. The crops which yield is above the national average are yield of almost all crops is below the average of all India except for orange, ginger, chilli, sweet potato and cardamom.

Table 4.4.5 Production and Area of Major Fruits and Plantation Crops in Nagaland in 2011-12

Crops	Production (MT)	Area (ha)	Yield (MT/ha)	Yield of All India (MT/ha)*	
				2011-12	2012-13
Pineapple	81,600	8,295	9.84	14.7	14.9
Banana	53,900	6,690	8.06	35.7	34.2
Orange	46,000	4,645	9.90	9.5	9.3
Passion Fruit	15,240	7,570	2.01	-	5.6
Lemon	8,240	1,050	7.85	9.7	9.9

Crops	Production (MT)	Area (ha)	Yield (MT/ha)	Yield of All India (MT/ha)*	
				2011-12	2012-13
Papaya	6,330	900	7.03	38.0	40.7
Gooseberry	2,580	225	11.47	-	-
Pomelo	2,020	545	3.71	-	-
Guava	1,490	300	4.97	11.4	13.6
Wild Apple	1,170	160	7.31	-	-
Mango	610	290	2.10	6.8	7.2
Plum	565	290	1.95	-	3.1
Peach	515	230	2.24	-	5.9
Litchi	430	400	1.08	6.7	7.0
Coffee	120	1,250	0.10	-	-
Cashewnut	225	670	0.34	0.7	0.8
Arecanut	105	195	0.54	1.5	1.4
Coconut	7,380	1,275	5.79	7.0	7.0

Source: Department of Horticulture, Gov. of Nagaland

**: Indian Horticulture Database 2013, National Horticulture Board, Ministry of Agriculture, Gov. of India*

Table 4.4.6 Production and Area of Major Vegetables and Spices in Nagaland in 2011-12

Crops	Production (MT)	Area (ha)	Yield (MT/ha)	Yield in All India (MT/ha)*	
				2011-12	2012-13
Tapioca	45,000	5,600	8.04	38.6	35.0
Colocassia	39,600	3,100	12.77	-	-
Ginger	34,000	3,300	10.30	4.9	5.0
Potato	29,200	3,530	8.27	21.8	22.8
Chilli	27,500	4,800	5.73	1.6	1.6
Chowchow (Chayote)	20,500	2,470	8.30	-	-
Sweet Potato	13,780	1,230	11.20	9.7	10.1
Cabbage	12,700	1,380	9.20	21.6	22.9
Beans	7,350	1,600	4.59	-	10.3
Peas	7,000	1,250	5.60	9.2	9.5
Tomato	4,750	970	4.90	20.6	20.7
Xanthophyllum	3,460	700	4.94	-	-
Radish	2,220	410	5.41	-	14.2
Brinjal (Eggplant)	2,150	305	7.05	18.3	18.6
Naga Chilli	1,760	435	4.05	-	-
Cauliflower	1,460	520	2.81	18.8	19.6
Bhindi (Okra)	1,200	335	3.58	12.1	12.0
Cardamom	1,125	2,510	0.45	0.2	0.2
Turmeric	470	100	4.70	5.3	4.9
Garlic	200	100	2.00	5.1	5.1
Black Pepper	16	195	0.08	-	-

Source: Department of Horticulture, Gov. of Nagaland

** Source: Indian Horticulture Database 2013, National Horticulture Board, Ministry of Agriculture, Gov. of India*

4.4.3 Animal Husbandry

Livestock is considered as supplemental income by most rural farmers in Nagaland. Along with agriculture, backyard piggery and poultry rearing is integral to the livelihoods of farmers. Piggery in Nagaland is traditional and very common practice, provides additional income to households, and helps rural households diversify their risks. In Nagaland, average number of pigs per household ranges between 1-3. Pig rearing is easy since they are fed on by-products of paddy, maize, taro, vegetables and

Source: JICA Survey Team

Mithun in Khonoma Village in Kohima

other gathered forages and is an excellent source of subsidiary income for poor farmers because of high local demand for pork, consumption in Nagaland being the highest among all the North Eastern India. While crossbred pigs have significantly better productivity value, many rural households prefer to keep indigenous scavenging pigs because they produce better tasting pork.

Rearing cows and mithun for meat is also a common traditional practice; however, they are free grazing and not stall-fed. Dairy farming is not generally practiced by farmers except in some small pockets of Kohima and Dimapur districts, as Nagas are not primarily milk consuming people.

The rearing rate of all species per household is, however, declining mainly because of increased management costs, lack of feed resources, increased risks due to disease. The livestock population trends of Nagaland is shown in the following table.

Table 4.4.7 Number of Major Livestocks in Nagaland

Year / Livestock	1997 (16th Livestock Census)	2003 (17th Livestock Census)	2007 (18th Livestock Census)	2012 (19th Livestock Census)
Cattle	383,308	451,017	469,818	302,565
Buffalo	36,131	33,757	33,920	31,451
Mithun	33,345	40,452	33,355	30,980
Sheep	2,339	4,187	3,649	3,600
Goat	160,761	174,929	178,072	93,122
Dog	90,986	141,373	161,617	110,155
Rabbit	20,207	38,408	41,922	46,587
Pig	571,176	644,214	697,790	491,087
Horse & Pony	1,133	893	799	390
Duck	80,467	116,576	119,730	125,961
Poultry	2,363,058	2672,554	3,282,196	2,055,056

Source: Livestock Census, Department of Animal Husbandry, Dairying & Fisheries, Gov. of India

Swine fever is a major cause of concern in piggery in Nagaland and the state lacks facilities for confirmatory diagnosis and providing timely vaccines. The department has not so far developed systematic disease reporting system like many other states in the country leading to inaccurate assessment of disease status of the state. Among pig rearing households, farmers lack knowledge on care of sows during pregnancy and lactation, and efficient usage of household crop by-products, as well as general health care management (medication and vaccination). Although the state has a high percentage of crossbred population among large ruminants, the feeding systems are still traditional, and poor management of cattle sheds increases the risks of parasitic diseases and mastitis especially in crossbreds. Also, fodder availability is a concern, since most farmers do not allocate fields for sufficient fodder cultivation as the priority is for crop production. Heavy loss of soil nutrients due to heavy rainfall in turn affects fodder quality, which in turn impacts the health of ruminant.

Source: JICA Survey Team
Backyard Peggery in Kohima

4.4.4 Fishery

In Nagaland, aquaculture in pond is commonly practiced in foothills, whereas in hill areas, especially Kohima and Phek districts, farmers practice paddy cum fish culture. In all there are 68 fish varieties

in Nagaland and data available with the Department of Fisheries. It shows that fish production has been steadily growing, and currently stands at 7,465 MT in 2013-14. Fish production is reported throughout the year and maximum production is recorded during March and least in June. The common species of fish grown in Nagaland are Catla, Rohu, Mrigal and Silver carp, Grass carp, cat fishes and Common carp. Ponds and tanks comprising 81.23% of total fish production. Paddy cum fish culture contributes 13.86%. The fish production status in Nagaland are summarised in the following table.

Source: JICA Survey Team
Fish sold at a Market in Kohima

Table 4.4.8 Status of Fish Production and Sources in Nagaland

Year / Source	2012-13			2013-14		
	Volume		Area (ha)	Volume		Area (ha)
	(MT)	(%)		(MT)	(%)	
Pond and Tanks	5,760	80.79	2,880	6,064	81.23	3,032
Paddy-cum-Fish Culture	1,005	14.10	2,926	1,035	13.86	2,993
Reservoir	357	5.01	2,258	357	4.79	2,258
Rivers/Streams	3	0.04	-	3	0.04	-
Lakes/Weirs/Swamps	5	0.07	960	6	0.07	960
Total	7,130	100.00	9,024	7,465	100.00	9,243

Source: Department of Fisheries, Gov. of Nagaland

The average productivity of fish in the state is about 0.81 MT per ha in 2012-13. Fish productivity is higher in Kohima, Dimapur, Mokokchung, and Wokha whereas all other district productivity is below the average. However, lack of longer time series data is a constraint to draw any conclusions with regard to productivity. Management of ponds is a serious concern in Nagaland. Most of the ponds in Nagaland are rainfed and all of them would dry during summer months impacting the productivity of fish. Also poor maintenance of water bodies results in growth of weeds and heavy siltation affecting the fish production. Lack of technical knowhow in fish farming among farmers is also an area of concern.

4.4.5 Extension Service and Research[9]

The Agriculture department has extensive network of field level officers. There are nine KVKs established at Dimapur, Kohima, Mokokchung, Mon, Phek, Tuensang, Wokha, Longleng, and Zunheboto with the purpose of increasing productivity by conducting field demonstrations and improve awareness among farmers to transform from subsistence agriculture. One Integrated Extension Training Centre is located at Medziphema with a purpose of training of field staff and farmers. ICAR located at Jarnapani in Dimapur district works on conservation, propagation, and improving species in the North East Region. State Agriculture Research Station (SARS) located in Yisemyong in Mokokchung district. The major activities of the Station are maintenance and preservation of crop germplasm, agro forestry, soil chemistry, development of watershed models and

Source: JICA Survey Team
ICAR Jarnapani

[9] Nagaland State Action Plan on Climate Change, the Government of Nagaland

crop research. One Soil Conservation Training and Research Centre is located at Sechu in Kohima district to impart training on soil conservation measures to field staff before they are deputed to their field stations.

Source: JICA Survey Team
State Agriculture Research Station

Nagaland Empowerment of People through Economic Development (NEPED) is a State government programme, which has contributed substantially, since its establishment in 1993, through its intensive extension activities at augmenting the Jhum cycle through agro-forestry activities and creating micro-credit mechanisms at the village level. NEPED is the nodal agency for carrying out the KfW funded climate change adaptation project in the state.

4.5 Rural Infrastructure

4.5.1 Irrigation

As shown in Table 4.3.1, net area sown covers about 23% of the state land. Recent cropping intensity and irrigation intensity are not high at 128% and 108%, respectively, as seen in Table 4.5.1. Also, rates of irrigation area to cropped area are low at 22% in net irrigated area and 19% in gross irrigated area.

Table 4.5.1 Cropped Area and Irrigated Area in Nagaland

Classification			2008-09	2009-10	2010-11	2011-12	2012-13	Average
Sown area	Net area sown	(ha)	315,570	360,316	362,231	379,469	380,222	359,562
	Area sown more than once	(ha)	86,221	121,000	96,190	94,870	108,300	101,316
	Total cropped area	(ha)	401,791	481,316	458,421	474,339	488,522	460,878
	Cropping intensity	(%)	127	134	127	125	128	128
Irrigation	Net irrigated area	(ha)	77,320	72,670	-	79,369	88,410	79,442
	Gross irrigated area	(ha)	82,150	77,670	-	92,040	92,450	86,078
	Irrigation intensity	(%)	106	107	-	116	105	108
Net irrigated area/Net area sown		(%)	24.5	20.2	-	20.9	23.3	22.1
Gross irrigated area/Total cropped area		(%)	20.4	16.1	-	19.4	18.9	18.7

Source: JICA Survey Team based on the Data of Directorate of Agriculture in "Statistical Handbook of Nagaland 2013, DES, GoN"
Basic data of 2008-09 are from the "Report on Census of Minor Irrigation Schemes in Nagaland 2006-2007, DOIFC Nagaland"

According to the Census of Minor Irrigation Schemes (MISs) in Nagaland 2006-07 of Irrigation and Flood Control Department (IFCD), most of the area is irrigated by canals (99.7%) and wells such as tube wells and other wells are very little (0.2%), as can be seen in Table 4.5.2. Also, most of MIS water source is surface water scheme (99.5%) and data of groundwater scheme (0.5%) are available only for Dimapur District.

Table 4.5.2 Agricultural Land Use in Minor Irrigation Scheme in Nagaland

District	Culturable area (ha)	Net area sown (ha)	Area irrigated by (ha)						Summary of M.I. Scheme (nos)		
			Canals	Tanks	Tube wells	Other well	Other sources	Total	Ground water	Surface water	Total
1 Dimapur	23,916	17,096	15,036	0	3	141	24	15,204	103	926	1,029
2 Kohima	11,083	6,986	7,253	0	0	0	0	7,253	0	1,916	1,916
3 Mokokchung	9,190	5,466	5,242	0	0	0	0	5,242	0	1,252	1,252
4 Mon	3,240	2,814	2,380	0	0	0	0	2,380	0	1,147	1,147
5 Phek	12,480	9,251	8,996	0	0	0	15	9,011	0	3,815	3,815
6 Tuensang	7,925	5,979	5,978	0	0	0	0	5,978	0	4,851	4,851
7 Wokha	3,760	2,244	2,244	0	0	0	0	2,244	0	1,715	1,715
8 Zunheboto	9,684	6,326	6,311	0	0	0	0	6,311	0	3,131	3,131
9 Kipheri	2,316	1,459	1,459	0	0	0	0	1,459	0	870	870
10 Longleng	1,875	1,396	876	0	0	0	0	876	0	271	271
11 Peren	6,613	4,838	4,838	0	0	0	0	4,838	0	898	898
Total	92,083	63,855	60,614	0	3	141	39	60,796	103	20,792	20,895

Source: "Report on the Census of Minor Irrigation Schemes in Nagaland 2006-2007, DOIFC Nagaland"

Most of the water source devise is temporary diversion (97.4%) and permanent diversion is only 1.4%. Water is distributed mostly through open water canal unlined (96.5%). Irrigation potential created (IPC) was 103,626 ha and actual area irrigated (AAI) during 2006-07 was 60,315 ha or 59% of IPC. The schemes are mainly owned by individual farmers (64.4%) and group of farmers (34.6%).

Presence of Water Users' Association (WUA) is very poor, only 14 out of the 1146 target villages or 1.2%. This rate is far from the results of the farm household survey conducted in the survey as mentioned below. The reason of the gap should be made clear in further studies of expected cooperation.

Results of the farm household survey in the survey (Attachment-1.5.1) mentioned that 50% of the informant families are members of WUA, consisting 28% of Tuensang informants and 72% of Kohima interviewees. Of the 29% farmers who are not members of WUA (38% of Tuensang and 20% of Kohima), all of them answered that "WUA in the area has not been organised" as the reason why they are not members.

Information from the Farm Household Survey

In addition to abovementioned data on WUA, several points were obtained from the survey, as follows:

Settled irrigated cultivation was marked by 20% of Tuensang farmers and 78% of Kohima farmers for mainly paddy cultivation. This suggests that irrigation is not yet so common in the remote areas. As to the major constraints in agriculture production, 10% of Tuensang farmers and 38% of Kohima farmers pointed out the lack of irrigation facility, while 8% of the former and 62 % of the latter indicated lack of irrigation water. Such constraints seemed to be more serious for Kohima farmers with regard to irrigation system. In response to a question whether improvement of irrigation system is necessary or not, 40% of Tuensang farmers and 92% of Kohima farmers answered affirmatively. Types of irrigation improvement needs are shown in Table 4.5.3. Many farmers considered that canal widening/extension, improvement/repair of irrigation canal structure, on-farm development, and drainage canal improvement/construction are necessary.

Table 4.5.3 Types of Irrigation Improvement Needs in Irrigation

Items	Need (persons): (a)			Need (%): (a)/(b)*			
	mostly	secondly	thirdly	mostly	secondly	thirdly	total
1 Improvement/repair of diversion weir	8	0	0	12	0	0	12
2 Widening/extension of canal	35	4	0	53	6	0	59
3 Desilting of canal	5	4	1	8	6	2	15
4 Improvement/repair of irrigation canal structure	8	27	2	12	41	3	56
5 Drainage canal improvement/construction	5	9	7	8	14	11	32
6 On-farm development	0	3	19	0	5	29	33
7 Others	1	0	1	2	0	2	3

*Note * : (b) = 66 persons, who answered that irrigation improvement is needed.*
Source: Farm Household Survey, sublet of the JICA Survey Team (Attachment-1.5.1)

4.5.2 Rural Road

The Public Works Department (Road and Bridge) (PWD(R&B)) has jurisdiction over the national highway (NH), state highway, major district road (M.D.R.), other district road (O.D.R.), village/rural road, and feeder road. The Forest Department, Rural Development Department, Agri-Link Road and DUDA Department also take part in road preparation together with the Border Road Organisation (BRO). The total road length in 2008-09 was 15,078 km.

4.5.3 Rural Water Supply

The Public Health Engineering Department (PHED), Nagaland takes care of water supply in the state. Table 4.5.4 presents the information on drinking water supply.

Table 4.5.4 Number of Village/Habitation Covered by Drinking Water Supply and Population Covered in Nagaland

Item	2009-10	2010-11	2011-12	2012-13
No. of Village/ Habitation covered NC/PC	97	128	136	104
Population served	127,484	168,889	164,429	105,219

Source: Chief Engineer PHED, Kohima ("Statistical Handbook of Nagaland 2013, DES, GoN")

4.5.4 Rural Electricity

Installed capacity in 2010-11 in Nagaland was 27.85 KW, of which 99% is hydropower. Electricity generated in 2010-11 was 518 MKWH, consisting of (14%) hydropower and (86%) purchased energy and it was 554 MKWH in 2012-13, including (17%) hydropower and (83%) purchased energy. In 2012-13, the number of electricity consumers was 202,533 and the unit consumed was 352.48 MU. The numbers of villages electrified and un-electrified are 1258 (98.7%) and 17 (1.3%), respectively[10]. (Source: Statistical Handbook of Nagaland 2013, DES, GoN)

4.6 Market, Distribution, and Processing of Agricultural Product

4.6.1 Market

In Nagaland State, there are nine agricultural produce marketing committees (APMCs) organised under the State Agricultural Produce Marketing Board in the seven districts, namely; Kohima, Phek, Wokha, Mokokchung, Tuensang, Mon, and Dimapur. Apart from the above nine markets managed by APMCs, there are about

Source: JICA Survey Team
Roadside shed

[10] Source: Statistical Handbook of Nagaland 2013, DES, the Government of Nagaland.

192 markets including traditional open markets and roadside markets. Two markets in Kohima and Dimapur are operated every day but the rest are markets operating periodically, mainly once a week.

(1) Management System

Other than the nine markets managed by APMCs, markets are managed by local organisations such as the district committee and village committee based on location and ownership of facilities.

(2) General Conditions

Similarly as Meghalaya, the rural markets in Nagaland generally perform three functions, i.e., (i) selling of local produce, (ii) assembly of local products, and (iii) retailing of wholesale lots from other areas. However, assembly and wholesale volume is very little except in the urban area, in addition to small sales volume of local products. In general, villagers especially in areas not accessible to main roads are self-sufficient entities and do not depend much on procurement of products from the markets, and prefer selling their products within their village or from sales counters built along major roads near their villages. Actually, more roadside sheds used for retail shop and/or shipping place of local products can be seen compared with the condition of Meghalaya and Tripura. Additionally, it seems that such local markets are not linked to each other and organised properly as the entire marketing system in the state, due to poor road network, small sales unit of producers, less participation of traders, and weak management by the State Agricultural Produce Marketing Board.

Same as the other two states surveyed, the market facilities are poor. There are no storage facilities and basic amenities are not fulfilled in the rural markets.

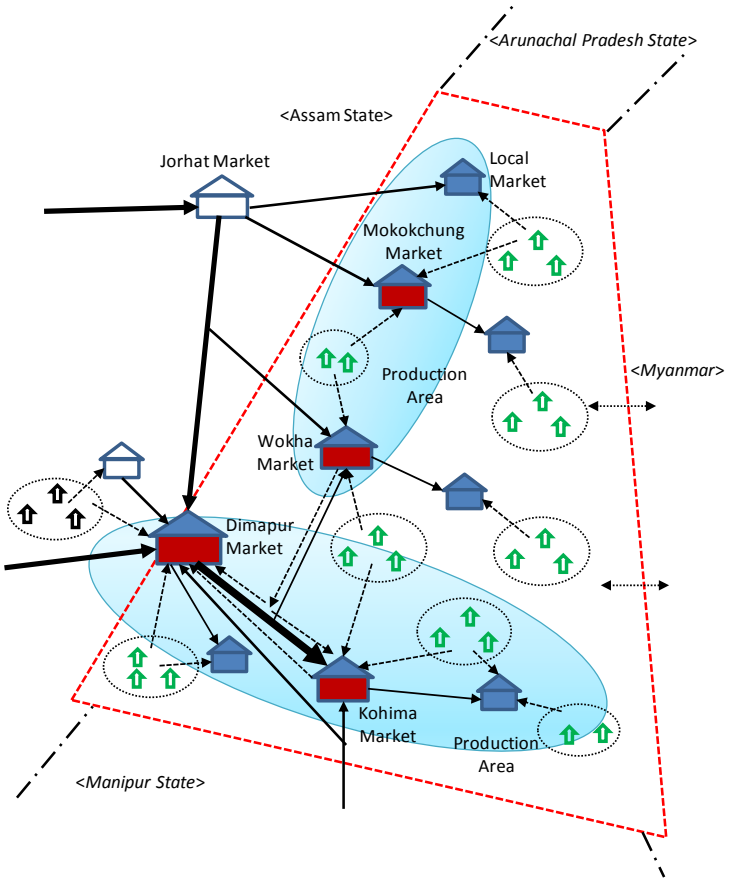
Other findings are as follows:

- The agricultural production in the state cannot fulfil the local demand in general. Throughout the year, almost all agricultural products come from other states excluding those small number of products like orange, pineapple, bloom, and ginger. Vegetables come mainly from neighbouring production areas in Assam, Balpeta area, Shillong area, and Mao side of Manipur State. Animal meat, egg, and fish come from the mainland of India same as Meghalaya and Tripura states. Occasionally, even pineapple comes from Assam State.
- The State APMC Act has already been revised to conform with the Model Act but new issues like establishment of direct sales market and contract farming have not yet been promoted.
- Storage facilities, including cold storage, have not been introduced in the field of agricultural produce distribution in the state.
- It seems that the State Agricultural Produce Marketing Board cannot get the necessary funds to improve market facilities.

4.6.2 Distribution of Agricultural Produce

(1) Distribution Route

The agricultural production in the state cannot fulfil the local demand in general. Almost all agricultural commodities come from other states throughout the year. These routes are illustrated in Figure 4.6.1.



Source: JICA Survey Team

Figure 4.6.1 Distribution Routes of Agricultural Produces in Nagaland

Characteristics of the distribution system are as follows:

- It is considered that the Nagaland market is attached and belonged to the Assam market. The distribution of agricultural products in the state is divided into two routes (blue circles in Figure 4.6.1); Route (1) starts from Dimapur, the central market of the state, goes to Phek via Kohima and the other route (2) is between Wokha, Mokokchung and Mon along Road No. 61. Route (1) connects to Jorhat market by Road No. 39 and other area by Road No. 36 in Assam State from Dimapur and route (2) connects to Jorhat market by bypasses from the areas along Road No. 61.
- Therefore, in the north area of the state, the agricultural products come directly from Jorhat market and few local products go to the said place. Thus, Jorhat market is located and characterised as the central wholesale market of Nagaland State.
- At Kohima market, few wholesalers come by trucks from Dimapur in the early morning and sell products to retailers, and some local retailers go and buy the products at Dimapur market.
- As explained before, producers in the state traditionally behave to be self-sufficient and their sales unit is small in volume. It is

Source: JICA Survey Team
Kohima Market

Source: JICA Survey Team
Retailer in Wokha Market

not an economical and attractive condition for traders, and therefore only few traders come to the rural markets.

- Commercial farming of cash crops like pineapple and orange has just started in the area along the main roads (in blue circles of Figure 4.6.1). In the area along the road between Dimapur and Kohima, pineapple producers organised their associates and achieved to invite wholesalers in their place for aggregation of products.
- Transportation cost is high due to poor road conditions and taxes levied by informal groups; and people in urban areas like Dimapur, Kohima, and Mokokchung find it easier to get the products from Assam rather than from rural areas of Nagaland.
- There are village traders, mainly women, who transport their local products to recent urbanised markets but sometimes they do not generate profit due to high transportation cost.
- There are situations where production is more and cannot reach the market and local products cannot meet the market demand; these situations may mean less market-oriented mindset amongst producers.

(2) International Trade with Myanmar

It is said that villagers on both sides of the border to Myanmar have continued to move together as well as their commodities beyond the border in the same community area, and some parts of the border line have not been finalised yet. This condition of border trade is unclear. There were very limited information on finding out if these agricultural commodities are coming from Myanmar in the market survey conducted in Nagaland. Garlic and some processed products in plastic bags were seen but they came from Manipur via Moreh. Therefore, border trade with Myanmar in the state has not been developed yet and the land custom station (LCS) does not exist. Recently, the state government set up the project for International Border Trade Centre in the four districts as shown in Table 4.6.1.

Source: JICA Survey Team
Village women sell their products (Mokokchung Market)

Table 4.6.1 International Border Trade Centres in Nagaland

District	Phek	Tuensang	Kiphire	Mon	Total
International Border Trade Centre (No.)	2	1	1	1	5

Source: "Statistical Handbook of Nagaland 2013", Directorate of Economics & Statistics, Government of Nagaland

(3) Findings of the Farm Household Survey

Major findings of the Farm Household Survey carried out in two blocks in Tuensang and three blocks in Kohima are as follows:

(a) Post-harvest Processing Field

Paddy, as the main product, is treated with various processing like threshing and drying even by traditional way without machine, other products are not provided special treatment and few cases showed that producers wash, clean, and grade by size their products by hands for potatoes, beans, and some vegetables.

1) Storage condition of products

In the survey area in Tuensang, major containers for storage of products are bamboo baskets and bags; and wooden boxes are sometimes used. Only bags are used for potatoes. More products are

stored in storage sheds, while chili and potato are preferred to be stored on the floor of the house. In contrast, producers in the surveyed area in Kohima seemed to use various containers other than plastics and metal ones. An exception is that paddy is mainly stored in sheds by wooden boxes; and garlic, potato, pumpkin, and squash are stored more inside the houses.

Table4.6.2 Storage Condition of Produce by Farmers in Nagaland

		Tuensang						
	Product	Beans	Chilli	Ginger	Grain	Maize	Paddy	Potato
	No. of respondent	22	19	12	15	42	27	12
Storage way	Bulk	8	4	5	2	10	5	0
	Bag	7	0	3	2	8	5	*12*
	Wooden Box	3	3	3	2	0	2	0
	Bamboo Basket	*16*	*11*	2	*11*	*30*	*26*	0
	Plastic corner	0	0	0	0	0	0	0
	Metal Bin	2	0	0	0	0	0	0
	Others	0	0	0	0	3	0	0
Storage place	Storage Shed	*11*	0	6	*15*	*37*	*23*	0
	On ground in house	1	5	5	0	0	1	1
	On floor in house	6	*10*	1	0	4	2	*11*
	Others	2	0	0	0	1	1	0

		Kohima								
	Product	Beans	Cabbage	Chilli	Garlic	Maize	Paddy	Potato	Pumpkin	Squash
	No. of respondent	18	11	14	15	11	45	20	15	11
Storage way	Bulk	1	0	1	5	1	0	1	3	2
	Bag	1	3	1	0	3	1	3	2	0
	Wooden Box	1	0	4	1	1	*33*	9	2	0
	Bamboo Basket	*12*	5	5	6	5	12	5	6	7
	Plastic corner	0	0	2	0	0	0	0	1	1
	Metal Bin	0	0	0	0	0	0	0	0	0
	Others	0	0	0	0	0	0	0	0	0
Storage place	Storage Shed	8	4	4	3	5	*25*	0	3	3
	On ground in house	3	2	0	6	3	11	9	7	5
	On floor in house	1	6	4	5	3	9	9	4	2
	Others	2	0	2	1	0	0	2	0	0

Source: Farmer Household Survey, JICA Study Team

2) Storage Period

The storage period of above products is rather long from 5-10 months except for some cases as chili and potato in Tuensang and beans in Kohima.

Table 4.6.3 Storage Period of Produce in Nagaland

	Products	No. of Respondent	Storage Period (day)		
			Min.	Max.	Average
Tuensang	Beans	22	90	365	183
	Chilli	18	7	180	40
	Ginger	12	30	365	158
	Grain	15	167	365	259
	Maize	41	100	365	186
	Paddy	25	150	365	271
	Potato	12	8	150	57
Kohima	Beans	17	3	240	49
	Chilli	12	50	365	298
	Garlic	13	90	365	276
	Maize	11	3	365	223
	Paddy	45	6	730	380
	Potato	17	90	365	192
	Pumpkin	12	100	299	125

Source: Farmer Household Survey, JICA Study Team

3) Constraints

Constraints that the farmers in the surveyed areas are facing are listed in Table 4.6.4. Major constraints in Tuensang are “lack of skills and knowledge on post-harvest treatment” and “lack of processing machines”. They may have interest in fruits processing. In Kohima, “lack of skills and

knowledge on post-harvest treatment" and "lack of storage facilities" are major constraints. They may feel the need for storage spaces through their commercial activities in urban markets. Additionally, it is noted that both areas have the problem of "lack of labour", but this is more in Tuensang.

Table 4.6.4 Constraints of Post-harvest Processing in Nagaland

	Tuensang		Kohima	
No. of Respondent	50	(%)	50	(%)
Lack of labour	11	22.0	7	14.0
Lack of skills and knowledge on post-harvest treatment.	34	68.0	15	30.0
Lack of storage facilities	5	10.0	21	42.0
Lack of processing machines.	24	48.0	8	16.0
Others	0	0.0	0	0.0

Source: Farmer Household Survey, JICA Study Team

(b) Marketing Field

1) Sales Place, Time and Buyer

Table 4.6.5 below shows the sales conditions of the producers in the surveyed area in Tuensang and Kohima, separately. The producers in Tuensang sell their products at the village market and urban market. It may be considered that they may sometimes need to go to the urban market because the demand in the village market is small and used to be full of local products especially in the harvest season. Main buyers are consumers even in the urban market. The producers in the surveyed area in Kohima sell their products, mainly vegetables, after harvest at the village market, urban market like in Kohima, and roadside market which is a very convenient outlet for farmers who live in the area along the main road in between Kohima and Dimapur. More returns of "when cash is needed" for sales time in Tuensang may indicate that more subsistence farming exists in the area relatively.

Table 4.6.5 Sales Place, Time, and Buyer of Produces in Nagaland

Tuensang

Sales Place	1st	2nd	Sales Time	1st	2nd	Buyer	1st	2nd
Farm gate	1	0	Immediately after harvest	48	0	Consumer	91	0
Village market	49	5	when cash is needed	42	1	Retailer	1	1
Roadside market	3	2	When price is high	2	2	Collector/Broker/Agent/Wholesaler	16	2
Urban market	61	12	Others	5	0	Processing factory	2	0
Outside state	1	0				Others	4	0
Others	5	9						

Kohima

Sales Place	1st	2nd	Sales Time	1st	2nd	Buyer	1st	2nd
Farm gate	0	0	Immediately after harvest	106	0	Consumer	70	0
Village market	38	0	when cash is needed	1	3	Retailer	9	1
Roadside market	32	1	When price is high	2	0	Collector/Broker/Agent/Wholesaler	28	8
Urban market	38	0	Others	0	0	Processing factory	2	2
Outside state	0	0				Others	0	0
Others	0	0						

Source: Farmer Household Survey, JICA Study Team

2) Mode of Transportation and Packaging

The producers in the area of Tuensang transport their products to the village market by foot, and also to urban market by LMV (public bus) or truck, carrying them in a basket or bag. They also sell their products by bulk to collectors/middlemen coming to their villages. In Kohima, they also have a similar behaviour for sales of their products, but they do not owe much to collectors/middlemen coming to their places and may go to the urban market by LMV more frequently.

Table 4.6.6 Mode of Transportation and Packaging in Nagaland

Tuensang

Transportation Way	1st	2nd	Package	1st	2nd
On foot	58	0	No arrangement	33	0
Collected by collector/middleman	36	0	Bags	52	1
Cart	0	0	Bomboo basket	25	3
Truck	5	0	Wooden box	4	0
LMV	16	18	Others	3	0
Three wheeler	0	0			
Motorcycle	0	0			
Bicycle	0	0			
Others	2	0			

Kohima

Transportation Way	1st	2nd	Package	1st	2nd
On foot	48	0	No arrangement	1	9
Collected by collector/middleman	5	0	Bags	5	24
Cart	2	0	Bomboo basket	12	8
Truck	12	0	Wooden box	0	3
LMV	25	0	Others	0	2
Three wheeler	5	0			
Motorcycle	9	0			
Bicycle	2	0			
Others	1	0			

Source: Farmer Household Survey, JICA Study Team

3) Market Information

Major resource of market information is “neighbours/relatives” in both surveyed area and diversified various items like mobile phone especially in the area of Kohima. Producers in Tuensang rely little more on “trader/retailers in the market” in getting information. The agricultural marketing information system by SMS (mobile phone) is getting popular in Nagaland.

Table 4.6.7 Sources of Market Information in Nagaland

Item	Tuensang	Kohima	Total
Neighbours/Relatives	33	21	54
Radio	6	8	14
Shops in village	4	13	17
Mobile Phone	8	10	18
Newspaper	0	5	5
Trader/ Retailers in market	17	7	24
TV	1	0	1
Trader coming to village	1	3	4
Government officials/ Extension officer	2	0	2
Others	1	0	1

Source: Farmer Household Survey, JICA Study Team

4) Constraints

The major constraints in the area of Tuensang are “lack of knowledge on marketing”, “lack of transportation facilities” and “difficulty of market access”. “Low price” and “lack of transportation facilities” are major constraints in Kohima. The recognition of constraints is diversified to other options entirely in both areas.

Table 4.6.8 Constraints of Marketing in Nagaland

Tuensang				Kohima			
Constraints of Marketing	1st	2nd	3rd	Constraints of Marketing	1st	2nd	3rd
Low price	6	0	1	Low price	12	12	4
Fluctuation of price	0	5	2	Fluctuation of price	2	2	2
Lack of market information	6	10	0	Lack of market information	1	8	4
Limited buyer	0	1	5	Limited buyer	2	6	1
Difficulty of market access	7	9	7	Difficulty of market access	3	2	14
Lack of transportation facilities	8	8	13	Lack of transportation facilities	14	4	1
Lack of knowledge on marketing way	12	4	6	Lack of knowledge on marketing way	5	0	7
Lack of labour force	0	2	5	Lack of labour force	2	1	2
Others	0	0	0	Others	0	0	0

Source: Farmer Household Survey, JICA Study Team

4.6.3 Agro-processing

(1) Outline

Industrial development in Nagaland is hindered by various factors, but most importantly, the near absence of credit flow from the financial institutions and banks.

Amongst all sectors, the food processing industry is still in its infancy within the state. There are many units in the unorganised sector such as manufacturing of pickles, sauces, jam, jellies, and fruit juices. These industries are mostly in cottage industry sector controlled and run by cooperatives or self-help groups (SHGs) developed under different development programs being implemented in the state.

There are only a few units in the organised sector engaged in manufacturing of pickles, juices, honey and ice cream, meat and milk. The state does not present any blueprint on the industrial front despite being rich in natural resources that can provide the raw material base for the industry. There are only 37 food processing units in the state, half of which are either closed or operating below their installed capacity. In other words, whatever processing or value addition drives are realised, all utilise primitive technology mostly by household-based units catering to the localised markets. The sector is constrained by the lack of entrepreneurship, infrastructure, and market linkage.

Table 4.6.9 Number of Registered MSMEs in Nagaland

Particulars	No.	(%)
Manufacturing of Food Products and Beverages	37	4.9
Manufacturing of Wood and Wood Products except Furniture	0	0
Manufacturing of Furniture	193	25.4
Others	530	69.7
Total	760	100.0

Source: "Statistical Handbook of Nagaland 2013", Directorate of Economics & Statistics, Government of Nagaland

(2) Industrial Infrastructure

The Department of Industries has created two industrial areas, namely, the Industrial Growth Centre (IGC) and Production Specification Special Economic Zone (SEZ) in Ganeshnagar, Dimapur. The SEZ is being upgraded from the Export Promotion Industrial Park, which was constructed before. Additionally, the Department of Industries is creating the Mega Food Park near Dimapur and has finished land preparation at present.

Source: JICA Survey Team
IGC, Dimapur

Industrial Growth Centre (IGC)/Production Specification Special Economic Zone(SEZ)

The Department of Industries has set up a fully developed SEZ of 125 acres but there is hardly any demand to use the facility. With regard to SEZ, four enquiries including one from a Korean company came, but nothing concrete has materialised to date. As business condition is always fluctuating, some companies are waiting for the business scenario to improve. Similarly, IGC has developed 170 acres already, in total 325 acres.

In IGC, there are four plots given to Nagaland Food Centre, two plots for a manufacturer of window panes, one plot used for manufacturing animal feeds, and two plots used by power department. Amongst them, only two units are functional. Previously, the Naga Food Products was functional dealing with products made from pineapple, orange, and bamboo shoots.

Source: JICA Survey Team
Aromatic Oil Extraction Plant
(Naga Fragrance Pvt. Ltd.)

(3) Human Resource Development

The Department of Industries and Commerce is regularly providing training programs in various fields to local artisans, craftsmen, entrepreneurs, and educated youths including capacity building and skills upgrading in and out of the state. But the subjects for the training are in different fields other than agro-processing such as weaving, hand craft, welding, radio repair, automobile repair, iron processing, beauty and hairstyling, tailoring and computer operation according to the Annual Administrative Report, 2013-14.

Information of various food processing enterprises:

- The product range of unit includes defense spray, pickle, powder, flakes, and pulp made of king chilli; mixed pickles from tree tomato; tree tomato ketchup. Most of the products get sold in North East India, Shillong being a key emerging market. The products are sold through appointed distributors. As most of the raw materials are seasonally available, it is difficult to meet regular demand throughout the year. It is difficult to get the know-how to be able to standardise the quality.
- Although prices of raw materials are high, demand for meat processing products is increasing in the north eastern region. The key challenge is to operate at a bigger scale. There is only one more meat processing unit in Shillong. Youths are slowly being aware of the opportunities to set up the enterprises. However, they need more effort to identify potential entrepreneurs, and proper technical know-how. About 80% of marketing efforts can best be done by the entrepreneurs. There may not be any need external support for marketing.
- Most of the entrepreneurs in North East India belong to the first-generation category, which is perceived to be risky for bank finance. The subsidy is not reaching the right people. Subsidy is not likely to support promotion of enterprises. There is a need to set up a standard quality system by focusing on laboratory and research; and it is important to link research to industry. Promotion of business environment, networking, creating win-win situation, and entrepreneurial culture is critical for the promotion of enterprises involving youth. There is also a possibility of mobilising students for skills training. But generally, students are not available for skills training because existing skills programs provide lessons in driving, carpentry, welding, and electrical works.

4.7 Farmers' Organisations and Livelihood

4.7.1 Farmers' Organisations

(1) Overview

As in other states visited by the JICA Survey Team, different types of groups were organised in Nagaland by both men and women who were engaged in farming activities. These groups have been formed mostly as the grassroots beneficiary unit of various government interventions.

Table 4.7.1 Status of Farmers Organisations in Nagaland

(Unit: Number of Organisations)

Type of Organisation	Status as of 31 March 2014
Cooperatives	7,000
SHGs (promoted by commercial banks and cooperative banks)	8,817
Farmer Producer Organisations	1
Farmers Clubs	211
Joint Liability Groups (JLGs)	566
Water Users' Associations (WUAs)	1,161

Source: JICA Survey Team based on the records of Dept. of Cooperation, Agriculture, Irrigation and Flood Control, NABARD, and Nagaland State Cooperative Bank.

Farmers' Clubs and Joint Liability Groups (JLGs) aiming at facilitating credit linkage with banks are not many. Irrigation schemes were developed under the Accelerated Irrigation Benefit Programme by the Irrigation and Flood Control Department. Water users' associations were organised. They hold meetings as required to schedule water distribution and maintenance works.

Farmer producers organisations have been promoted by the Department of Agriculture with an aim to create an enabling environment for small-scale producers to improve their productivity and access to market through collective action[11]. As it is, still at the stage of awareness creation amongst the farmers and different stakeholders, only one group was reported to be organised. In the subsequent sections, the status of cooperatives and SHGs which are high in numbers are reviewed.

(2) Cooperatives

Cooperative movement in the state started in 1946 while it was part of Assam. The Registrar Cooperative Society was separated from the Agriculture Department in 1966. As shown in the Attachment-4.7.1, the cumulative total number of registered cooperative societies was reported to be 7,000 in Nagaland, as of February 2014, out of which, 3,844 or 54.5% accounted for multipurpose cooperative societies. The major emphasis of the Department of Cooperation is to promote agriculture and allied primary cooperative societies. During FY 2012-13 and 2013-14, 388 cooperative societies were registered in the state and more than half of these are agriculture and allied cooperatives. Cooperatives are involved in a wide range of activities, although mostly operating as primary producers but most of them have not been effective in providing value addition and marketing of their produce.

The district-wise number of cooperative societies indicates that 42.9% of the total number of cooperative societies is established in Dimapur and Kohima districts. Around 604 registered cooperative societies in the state have been non-functional and thus, are under consideration for cancellation of their registration by the government[12].

[11] Policy and Process Guidelines for Farmer Producer Organisations. (2013). Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. (http://nhm.nic.in/Archive/FPO-Policy&Process-GuidelinesDAC2013.pdf accessed in March 2015). The guideline promotes that the 50-70 farmer interest groups to be aggregated to a Farmer Producer Company, which can be registered under the Company Act as the Producer Company.

[12] Annual Administrative Report 2013-14. Department of Cooperation, Nagaland.

The Department of Cooperation has limited resources to revive the cooperatives and been unable to provide sufficient technical, financial, and marketing assistances to the cooperatives to build their capacity. The Integrated Cooperative Development Programme (ICDP) with a 50% financial assistance from the National Cooperative Development Corporation has been implemented for the last five years in five districts, i.e., Kohima, Mokokchung, Wokha, Phek, and Tuengsang, with a financial cost of Rs.28.9 billion[13]. However, the funds have been limited and activities were provided to only selected cooperatives for their institutional capacity development, which include training programmes on accounting and bookkeeping, leadership development, etc.

(3) SHGs

The SHG movement in Nagaland gained momentum with the initiation of SGSY in 1999 but the spread of SHGs is less in comparison with other states in mainland India as well as in the North East. Due to the inadequate banking network in the state, the SHG-Bank Linkage Programme could not bring desired results. Most of the SHGs in Nagaland are involved in agriculture and allied activities. Similar to other states, SHGs are organised by the government departments, banks, non-government organisations (NGOs), and government programmes and schemes. This section reviews the current status of the SHGs formed by various institutions/ programmes/schemes and their interventions.

SHGs in Phesama Village, Kohima District – Challenge Ahead –

A meeting was held with SHGs (5 groups) in the presence of the Staff of Block Office and NSRLM. It is the target village of NSRLM. There are 28 SHGs in the village, of which 23 are formed in 2014. All the groups have opened their bank accounts. Ten SHGs have already received revolving funds of Rs.15,000 each from NSRLM. These groups are largely involved in vegetables, fruits, spices, and condiments cultivation.

As of the last season, one group is involved in potato cultivation, the Agriculture Department had given them potato seeds (50 kg of seed per member x 11 members). A one-day orientation on cultivation was given to the members. The SHG members got a good harvest – each member has kept the seed for cultivation in the current season, each member has kept about 30 kg for self-consumption, and the surplus was sold for Rs.20,000 by the SHG. But the group does not have a clear plan on the continuation of potato cultivation in the current season, such as the area to be cultivated individually and by the group collectively, inputs required, etc. The SHG still expects support from the Agriculture Department. The same situation with other groups – there is no clear IGA plan – what is to be done individually or collectively; what is the requirement of inputs including credit; what is the estimated volume of production; what is the strategy of the group to sell their produce, etc. The staff of NSRLM need to assist the SHGs for the preparation of their IGA/business plan.

Source: Group discussion held with SHG members of Phesama Village, Kohima District, Nagaland by the JICA Survey Team.

(a) Nagaland State Rural Livelihood Mission (NSRLM)

NSRLM is the main actor in promoting livelihood improvement through SHGs and started its field operations in 2013 in nine districts other than Tuengsang and Peren. The latter two districts are where the World Bank supported the North Eastern Rural Livelihood Project (NERLP), which implements the activities[14]. To date, NSRLM selected one block from each district and commenced the project activities. Till December 2014, NSRLM has formed 1,666 SHGs covering 14,994 households in 164 villages. Thirty-one village-level organisations (VOs) have been formed as apex body of SHGs at the village level. NSRLM provides start-up cost of Rs.2,000 to each SHG as grant.

[13] Annual Administrative Report 2013-14. Department of Cooperation, Nagaland.
[14] NERLP has formed 2,570 SHGs in Tuengsang and Peren districts.

Around 745 SHGs received a revolving fund of Rs.15,000 each. Many SHG members have started various income-generating activities (IGAs) such as petty shop, weaving, knitting, apparel business, kitchen gardening, and other agriculture activities like piggery, poultry, floriculture, soap and detergent making, and noodles factory. Social activities undertaken by some SHGs include sanitation and cleanliness drive, tree planting, running of play schools, and non-formal education for school dropouts, care and support for the aged, vocational trainings, donations to vulnerable persons, and campaign against alcoholism.

Table 4.7.2 Status of NRLM in Nagaland, as of December 2014

Sl.	Districts	No of Villages	No of SHG Member HH	No. of SHGs	No. of VLOs*	No. of SHGs Opened SB A/c**	No. of SHGs Linked to Bank Credit	No. of SHGs Disbursed RF***
1	Dimapur	49	3,393	377	22	315	0	223
2	Kiphiri	17	1,413	157	0	156	0	64
3	Kohima	12	1,647	183	0	149	0	65
4	Longleng	15	1,755	195	0	195	0	101
5	Mokokchung	6	1,197	133	0	127	1	60
6	Mon	19	2,043	227	0	218	6	35
7	Phek	8	1,692	188	9	152	3	102
8	Wokha	12	792	88	0	84	0	60
9	Zunheboto	26	1,062	118	0	65	0	35
Total		164	14,994	1,666	31	1,461	10	745

*Note: *VLOs: Village Level Organisations; **SB A/c: Savings Bank Account; *** RF: Revolving Fund*
Source: Communication with NSRLM, Kohima

(b) Horticulture Department Programme

Around 1,300 SHGs have been promoted by the Horticulture Department in the state and a sum of Rs.5,000 has been provided to each SHG to start their activities. Training programmes have been organised for the SHG members to initiate fruits and vegetable cultivation, processing of different wild and cultivated fruits for juices, candies, and pickles. Some training programmes have also been provided for processing of spices and condiments. The Horticulture Department has helped many SHGs to procure packaging materials such as food grade bottles, polypacks, and labels from Kolkata and Delhi, and assisted some of the SHGs to participate in different exhibitions and festivals organised within the state. The Hornbill Festival has been very helpful for the SHGs to display and sell their products.

The SHGs promoted by the Horticulture Department are currently producing juices of Indian gooseberry (Kohima and Phek districts), red guava (Kohima District), kiwi (Phek District), wild apple (Kohima and Phek districts), pineapple (Dimapur), mezi (*Spondius mengifera* – Kohima and Phek districts), pickles of king chilli (Kohima), tree tomato (Kohima and Phek), meat, candies from Indian gooseberry, ginger, wild apple, and powder of turmeric (Kiphere, Peren, and Dimapur).

(c) Nagaland State Cooperative Bank Programme

The Nagaland State Cooperative Bank has been actively promoting SHGs and micro-financing in the state. As of the end of March 2014, the bank has formed 6,380 SHGs and linked 2,054 SHGs with bank credit. During 2013-14, the State Cooperative Bank has provided credit worth of Rs.79.11 million to SHGs, and the total outstanding loan with the SHGs at the end of March 2014 was Rs.100.79 million. The State Cooperative Bank had earlier also financed SGSY groups and the total outstanding loan with SGSY groups at the end of March 2014 was Rs.0.38 million.

(d) NABARD

NABARD has been providing assistance to different institutions, mostly NGOs, to promote SHGs as Self-help Promoting Institutions (SHPIs). Under the women SHG scheme of the Government of India, NABARD has provided support to two NGOs (Eletherous Christian Society in Tuengsang – Rs.3 million and Hill Area Development Organisation in Mon – Rs.2 million) for the formation and strengthening of women SHGs and promote credit linkages with banks. The target is to form 300 SHGs in Tuengsang and 200 SHGs in Mon districts.

(e) Department of Women Resource Development

The Department of Women Resource Development has been promoting SHGs to cultivate and process pineapple, wild apple, and gooseberry but the SHGs are facing difficulties to transport their produce to the mainland because of high transportation cost. There is a pineapple processing unit set up in Kohima managed by the department with the help of some SHGs. Another unit has been established by the department to promote cotton and Eri silk. The department has promoted a brand for the products of SHGs – *Myke*, which means "woman" as well as my "home" in Nagamese language. The department is currently planning to start cultivation of mushroom with 250 SHGs in Phek District, as it is confident to sell the produce locally in the state. The department shall set up its facility to produce and supply spawn to the farmers/SHGs and it shall work with the Apex Women Organisation (*Hohos*) in the district to mobilise the SHGs.

4.7.2 Livelihood of the Farm Households

(1) Overview

Farming in Nagaland is mostly subsistence agriculture. They cultivate paddy mostly for home consumption and grow vegetables, cereals, and pulses in the *Jhum* areas. At the same time, they also earn their living from livestock and wages earned from various works. According to the household survey conducted by the JICA Survey Team, the proportion of above poverty line (APL) families was 39.3% in Kohima whereas for Tuengsang, it was 10.2%. While the proportion of below poverty line (BPL) families in Tuengsang was 89.8% and 46.4% in Kohima. Ninety-nine households out of 100 surveyed households were Christians and 98 households belonged to ST community. The average household size was 5.9 persons. Food is sufficient in Kohima District while 20 households out of 50 sampled households in Tuengsang District experienced food scarcity for two to three months a year.

Table 4.7.3 Economic Status of Sampled Farm Households in Nagaland

District	Total						Total of District	
	APL		BPL		AAY[15]			
	No of HH*	% (A/G)	No of HH*	% (C/G)	No of HH*	% (E/G)	No of HH*	No Responses
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Kohima	11	39.3%	13	46.4%	4	14.3%	28	22
Tuengsang	5	10.2%	44	89.8%	0	0.0%	49	1
Total	16	20.8%	57	74.0%	4	5.2%	77	23

*Note: *HH: Household*
Source: Farm Household Survey, JICA Survey Team

[15] AAY stands for Antyodaya Anna Yojana. This is a central government scheme providing rice and wheat at a concession rate. The poorer households amongst the BPL households are eligible.

(2) Household Income and Expenditure

The average income of farm households in Kohima District between January and December 2014 was Rs.131,115.4 while that of the Tuengsang was Rs.76,640.5. About 94.0% of the households in Kohima and 98.0% of the households in Tuengsang earned their income from crop production. Around 96.0% and 74.0% of the households in Tuengsang derived their income from livestock and forest produce, respectively. The number of households earning their income from casual wage labour work was higher in Tuengsang District (39 households or 78.0% of the total sampled households), whereas the same was less in Kohima District. In Kohima District, 56.0% and 52.0% of the households were engaged in business/trading and wage casual labour, respectively. The number of household earnings from different income sources is provided in Attachment-4.7.2.

Table 4.7.4 Total Average Income and Expenditure of Farm Households in Nagaland in 2014

(Unit: Rs.)

Distance from the District Centre	Income			Expenditure		
	Kohima	Tuengsang	Total Average	Kohima	Tuengsang	Total Average
<15 km	111,918.8	87,773.1	99,845.9	130,260.4	121,062.3	125,661.3
>30 km	150,312.0	65,508.0	107,910.0	105,496.0	68,279.2	86,887.6
Total Average	131,115.4	76,640.5	103,878.0	117,878.2	94,670.7	106,274.5

Source: Farm Household Survey, JICA Survey Team

Crop production, livestock/dairy and forest produce contributed substantially to the overall income of the households in both districts. An average income from different sources is given in Attachment-4.7.3.

The average total expenditure in Kohima was Rs.117,878.2 and Rs.94,670.7 in Tuengsang District during 2014. The number of households with savings was smaller compared with Meghalaya and Tripura. Four households in Kohima and five households in Tuengsang saved an average amount of Rs.22,433.3. The itemised average expenditure indicated the high spending of food and education in both districts (Attachment-4.7.4).

(3) Farmers' Groups and Access to Financial Services

The number of households having membership in SHGs in Tuengsang was 40 or 80.0% of the total sampled households, whereas, there were 8 households or 16.0% households in Kohima. The number of households having membership with agriculture/farming related groups/organisations was 9 households out of 50 sampled households in Kohima, and only one household in Tuengsang District. Although crop production and livestock provided the main sources of income for both districts, the number of households participated in cooperatives of relevant sector or any other forms of producer groups was small. This suggests that the farm households have not been organised yet in these sectors and production and marketing are mostly done on an individual basis. The data on group membership are given in Attachment-4.7.5.

Both cooperatives and SHG memberships were mostly held by women in both districts. The major benefit of being a member in cooperative and SHG was perceived to be the facilitation of transportation of products. Purchasing of inputs as a group has also been perceived to be another benefit of joining a group. The most frequently stated reason for not joining the group was that "there is no benefit" followed by "no groups nearby".

Nine households in Kohima and 18 households in Tuengsang took out some loans between 2012 and 2014 for agriculture purpose. The most common source of loan was SHG. Around 61.5% of the households took out a loan from SHGs with an average amount of Rs.15,333.3. The factors that hinder their access to loans include 1) procedures for loan application are complicated (41.0%) and 2) loan condition is severe (37.0%) . About 26.0% of the total sampled households in Nagaland also indicated their lack of knowledge about the available loan schemes naturally prevented their application. The details of the status of loan accessibility are given in Attachment-4.7.6.

Table 4.7.5 Number of Households Took Out Loan for Agriculture Purposes in Nagaland Between 2012 and 2014

(Unit: Households)

Responses	Kohima (N=50)				Tuengsang (N=50)				Overall
	<15 km	>30 km	Total	% of Total to N	<15 km	>30 km	Total	%of Total to N	
Took out loans	4	5	9	18.0%	14	4	18	36.0%	27
Did not take loans	12	15	27	54.0%	5	16	21	42.0%	48
Total	16	20	36	72.0%	19	20	39	78.0%	75

Source: Farm Household Survey, JICA Survey Team

(4) Land

In Kohima, all the households were engaged in settled cultivation, while 20 households out of 50 sampled households were engaged in settled cultivation in Tuengsang. Shifting cultivation was practised by 80.0% of the sampled households in Kohima and 98.0% of the sampled households in Tuengsang.

Table 4.7.6 Number of Households Used Land for Settled Cultivation and Shifting Cultivation in Nagaland in 2014

(Unit: Households)

Land Use Type	Kohima (N=50)				Tuengsang (N=50)				Overall Total
	<15 km	>30 km	Total	% of Total to N	<15 km	>30 km	Total	% of Total to N	
Settled cultivation	25	25	50	100.0%	5	15	20	40.0%	30
Shifting cultivation	22	18	40	80.0%	24	25	49	98.0%	46

Source: Farm Household Survey, JICA Survey Team

In Nagaland, no cadastral survey and land settlement has been done so far. Major portion of the land is owned by different clans. Within the clans, in many cases, land is settled for individual ownership. The respective village council issues land ownership documents once all the members of the clan approach the village council for such settlement (land settlement document). The area under settled cultivation is either owned by the clan or individuals within the clan. The households using the land acquired through the land documents are largely found in Tuengsang. On the other hand, many households in Kohima District obtained their land by way of land documents issued by the village council. Shifting cultivation is practised mostly on community land and clan land acquired through land settlement document. The village council takes the decision on the area to be taken up under *Jhum* irrespective of land ownership (community, clan, and individual).

Table 4.7.7 Land Tenure of Area under Settled and Shifting Cultivation in Nagaland

(Unit: Responses)

Type of Land Holding	Settled Cultivation			Shifting Cultivation		
	Kohima	Tuengsang	Total	Kohima	Tuengsang	Total
Periodic *Patta*	0	0	0	0	2	2
Land settlement document (Permanent)	17	18	35	4	19	23
Community land (not permanent)	5	1	6	15	18	33
VC Pass (permanent)	27	0	27	20	0	20

Source: Farm Household Survey, JICA Survey Team

The overall average area under settled cultivation in Kohima is 2.1 acre or 0.84 ha, whereas that of Tuengsang is 1.6 acre or 0.64 ha. The area under shifting cultivation in Kohima is 1.5 acre or 0.6 ha and 10.8 acre or 4.32 ha in Tuengsang.

Table 4.7.8 Area Under Various Land Use in Nagaland

(Unit: acre/ 1 acre = 0.4ha)

Land Use Type	Kohima			Tuengsang			Overall Total
	<15 km	>30 km	Total	<15 km	>30 km	Total	
Settled cultivation land	2.6	1.6	2.1	2.5	1.3	1.6	2.0
Shifting cultivation	1.5	1.6	1.5	14.1	7.7	10.8	6.7
Residential land	3.6	0.9	2.1	0.8	3.5	2.2	2.1

Source: Farm Household Survey, JICA Survey Team

(5) Household Assets

(a) Livestock

The number of households owning pigs was the highest amongst the households in both districts. Ninety households out of 100 sampled households reared pigs. On an average, 1.8 pigs are reared in a household. Poultry was the second common livestock kept at the household level. The average number of poultry kept at a household is 11.5 head (Attachment-4.7.7).

(6) Gender and Agriculture

Gender division of labour in agriculture in the case of Nagaland is summarised in Table 4.7.9 below. Women are exclusively responsible for sowing, weeding, tending, and other works done before harvesting in terraced paddy fields, potato cultivation, and *Jhum*. It was also learned that women are also responsible for procuring seeds. As observed during the field visits, there is an increasing number of male workers trying to earn a living and younger generations are moving out of their villages. On the other hand, the paddy and *Jhum* crops provide food for the family and the role of women in food production is becoming even more important. When an intervention is designed, women's role and their contribution in agriculture need to be carefully reviewed and the lessons learned are to be reflected accordingly in the planned interventions.

Table 4.7.9 Gender Division of Labour in Different Agriculture Land Use in Nagaland

Land Use	Specific Work (Men)	Specific Work (Women)	Joint Work
Paddy and Potato (Terrace Rice Cultivation)	➢ Irrigation ➢ Land preparation (Small power tiller)	➢ Land preparation (manual) ➢ Composting ➢ Sowing ➢ Earthing up ➢ Weeding	➢ Land preparation ➢ Harvesting ➢ Marketing

Land Use	Specific Work (Men)	Specific Work (Women)	Joint Work
Jhum	➢ Slashing ➢ Cutting trees ➢ Laying barriers for soil conservation	➢ Gathering fire wood ➢ Tilling ➢ Sowing ➢ Tending ➢ Weeding ➢ Seasonal harvesting ➢ Collection of firewood to village	➢ Clearing debris and burn ➢ Harvesting of main crop

Source: Department of Planning and Coordination. (2009). The Role of Women in Natural Resource Management: A Thematic Report. Strengthening of State Plans for Human Development. A GOI-UNDP Project (p39). Extracted and edited by the JICA Survey Team.

4.8 Interventions by Donors and Civil Society Organisations

4.8.1 North East Rural Livelihood Project (NERLP)

This is a World Bank-supported project covering the four states (Nagaland, Tripura, Mizoram and Sikkim) in North East India, which commenced in 2012. A State Coordinator is placed at the state level below the Regional Mission. In each project district, there is a District Project Management Unit responsible for the implementation of the project. There is a District Project Advisory Committee headed by the Deputy Commissioner in charge of taking major decisions concerning project implementation in the district. In Nagaland, the project is implemented in all eight blocks in Tuengsang and three blocks in Peren District. The project intends to improve rural livelihood, especially women, unemployed youth, and the most disadvantaged as the target groups. SHGs, federations of SHGs, community development groups (CDGs), and producer organisations are organised as the village level implementation units. The project comprised four main components of social empowerment, economic empowerment, partnership development, and project management.

Various Financial Supports from NERLP to the Community Level Institutions

- Entry Point Activities – Rs.50,000 to each Community Development Group (CDG)
- Seed Fund – Rs.20,000 to each eligible SHG for corpus
- Livelihood Fund – Rs.80,000 to each eligible SHG to take up various farm and non-farm livelihood activities
- Community Development Plan (CDP) – Each CDG shall prepare the plan, which would be implemented through convergence. The Project shall provide Rs. 1 million to implement each CDP
- Cluster Development – The Project shall promote some livelihood clusters such as livestock clusters, handloom, agro-product, eco-tourism etc. The Project may support up to Rs.10 million per cluster

Source: Interview with NERLP - Nagaland, compiled by the JICA Survey Team.

The current emphasis of the project implementation is placed upon creating CDGs and SHGs; and preparation of community development plan (CDP) to be implemented by these groups. The implementation of CDP is yet to start. There are 2,570 SHGs[16] that have been constituted/co-opted so far covering almost 80% of the households in the two districts.

The key challenge in livelihood promotion is the geographical isolation. Villages are located in remote areas with very poor infrastructure. The cost of production and transportation is very high. The agriculture produce market committees (APMCs)[17] and local markets are unable to provide any

[16] It includes SHGs newly formed and existing SHGs screened.
[17] Agriculture Produce Market Committee aims to develop and regulate a market of agriculture produce. It is established based on the Nagaland Agricultural Producer Marketing (Development and Regulation) Act 2005.

help to facilitate or improve market access for producers/farmers. The project heavily depends on the convergence to implement the community development plans, which is yet to begin. This may come up as a major challenge in the project implementation.

4.8.2 Sustainable Land and Ecosystem Management in Shifting Cultivation Areas of Nagaland for Livelihood and Ecological Security (SLEM)

SLEM is a co-financed project of the Department of Soil and Water Conservation, Government of Nagaland and the United Nations Development Programme (UNDP) (Global Environment Facility). The main objective was to address the issue of land degradation in the *Jhum* areas. The project was initiated in 2009 for a period of five years and extended until 2016. The department is expecting further continuation of the project. The project is implemented in 30 villages in Mokokchung, 20 villages in Mon, and 20 villages in Wokha districts. The project works with *Jhum* cultivators and village councils. Participatory Land Use Committees have been specially formed in the target villages to implement the project activities.

Project Activities of SLEM

- Setting up of District Level Project Management Units
- Constitution of Land Use Committee to plan and implement project activities at the village level
- Preparation of Participatory Land Use Plans
- Implementation of soil and water conservation works, agro-forestry and horticulture plantations etc. (more than 2000 ha area has been planted)
- Improvement of Jhum cultivation and reduction of soil erosion through – integrated farming of agriculture crops, livestock, horticulture, fishery etc.(more than 800 households have been benefited by the integrated farming efforts)
- Enhancement of livelihood opportunities through access to credit, market linkages, convergence with other programmes and schemes

Source: Compiled by JICA Survey Team based on the various project documents and interaction with the Project staff.

SLEM implements the activities on the basis of the plans prepared by the community and to address the community specific issues, which make the project activities diverse. Some sites have been developed to demonstrate integrated farming by combining agriculture, horticulture, vegetables, animal husbandry, and composting. SLEM also made an attempt to establish a seed bank by the community in order to establish community reserve of seeds for crops cultivated in the *Jhum* areas. This also facilitates the exchange of seeds that are not available in the village from other areas which would help the Jhum cultivators to maintain crop diversity and thus, to enhance the resilience to crop failure in *Jhum* farming. Women in the villages created the inventory of seeds along with the information of availability of seeds and seed samples. The record is maintained by the Land Use Committee.

In some villages, the project has supported women SHGs to establish a revolving fund for agricultural activities. A sum of Rs.100,000 is being provided to the SHGs as interest-free loan and once the SHG generates its own revolving fund, the amount given by the project shall be given to other SHGs in the same village.

To date, SLEM has established the models in selected villages. However, due to the constraints in financial and human resources, out scaling of the models and implementing other activities such as land shaping/development, creating water harvesting structures and wet terraces, expansion of vegetable cultivation, establishment of horticulture farms and rubber farms along the river valleys, and improving farm infrastructure including access to electricity would face a challenge. Furthermore, the fragmented land holding system and high cost of land development are the major constraints.

4.8.3 Nagaland Empowerment of People through Economic Development (NEPED)

NEPED is the first donor-funded project in Nagaland. The financial assistance was extended by the Indo-Canadian Environment Facility for the 1st phase implemented between 1995 and 2000, and the 2nd phase between 2001 and 2005. Into the 3rd and 4th phases, NEPED, as an autonomous society, mobilised resources from various sources including the Government of Nagaland and Government of India; and continued to implement the activities relevant to livelihood improvement in the rural areas in Nagaland. NEPED is still widely seen as an institution; and its effective implementation of activities responds to community-specific issues on livelihood in rural Nagaland. The project fund for implementation was channelled directly from the state-level project implementation unit to the village-level committee in order for the community members to be fully empowered to implement the project activities as well as to maintain a high level of transparency and accountability. A brief chronology of the project activities is provided in Attachment-4.8.1.

Currently, NEPED focuses on two areas of interventions i.e., a) energy development – promotion of hydrogers, and b) strengthening of community conserved areas (CCAs). NEPED has identified 254 CCAs and initiated the maintenance of a people's biodiversity register in all the CCAs. NEPED has collaboration with the Sri Ratan Tata Trust to work on CCAs in Nagaland. NEPED is also the nodal partner of the *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) to implement the North East Climate Change Adaptation Programme.

4.8.4 North East Climate Change Adaptation Programme (NECCAP)

The North East Climate Change Adaptation Programme[18] is supported by Germany aiming at strengthening the capacity of people and other stakeholders to cope with the consequences of climate change. Under the programme, a bilateral technical cooperation programme has been implemented in Nagaland by GIZ since 2011. In Nagaland, NEPED is the nodal partner to implement the programme and the focal areas of interventions are: 1) to prepare the government for drafting the State Water Policy; 2) to green the indigenous rice value chain; and 3) to enhance irrigation for enhanced production.

4.8.5 Civil Society Organisations

Ratan Tata Trust (SRTT), Entrepreneurs Associate, North East Initiative Development Agency (NEIDA), and Eleutheros Christian Society (ECS) are actively implementing the interventions to improve rural livelihood in Nagaland. Livestock-based programmes, enterprise development, and apiculture are some of the interventions done by these organisations. An overview of such interventions is given in Attachment-4.8.2.

[18] The programme is being implemented in Assam, Sikkim, Meghalaya and Nagaland. Ministry of Development of North Easter Region (MDoNER) is the executing agency.

Improving Terrace Rice Cultivation – An Attempt Made by NECCAP

Efforts have been made in Tseise Basa Village in Kohima District to enhance rice production through appropriate management of water resources. One diversion weir has been constructed to irrigate the rice fields. Thirty-six rain water harvesting ponds have been constructed to store runoff water. A village water committee has been constituted to manage the assets created and a fund has also been created with the contribution of farmers for operation and maintenance. Because of these initiatives, some of the terrace rice cultivation fields were cultivated after five years. Rice and fish demonstration has also been carried out. Three ponds were renovated for fish farming.

Seed exchange programme was started in 2013 in four villages belonging to four districts and now ten farmers from three villages have started breeding of paddy seeds. Sixty-one varieties of seeds were documented (30 varieties from the *Jhum* field and 31 from TRCs).

Source: Compiled by the JICA Survey Team from the presentation made by GIZ staff to APC and other departments on 11 February 2015 and interaction with NEPED.

4.9 Issues and Possible Counter Measures

In order to achieve the vision 2025 for agricultural development in Nagaland, all the allied sectors contributing to the food production are to be developed by strategic interventions based on the existing production systems in each sector. Current situation of agriculture sector in Nagaland are summarised as follows.

4.9.1 Agriculture and Horticulture Production

SWOT analysis of agriculture production and horticulture is as follows.

Table 4.9.1 SWOT Analysis of Agriculture Production and Horticulture in Nagaland

	Helpful	Harmful
Internal Origin	**Strength** ・ Sufficient land for area expansion ・ Abundant water resources during monsoon season ・ Favourable agro climatic condition ・ Various crops from sub-tropical to temperate ・ Availability of germplasm of good quality for crop and livestock for breeding ・ Availability of indigenous fruits ・ Availability of indigenous technological knowhow ・ Availability of family labour ・ Railway connectivity and airport at Dimapur ・ Higher literacy rate ・ Fair social stratification compared to main land of India ・ Organic farming	**Weakness** ・ Undulating topography ・ Requirement of soil conservation measures for land expansion ・ Small quantities of produces for marketing ・ Lack of irrigation water for dry season ・ Lack of irrigation facility ・ Lack of organised markets ・ Poor transport and storage ・ Lack of agro based industries ・ Non availability of quality planting materials and farm inputs ・ Unsustainable farming practice due to shortening of Jhum cycle ・ Rigid mind-set of farmers to introduce new farming practice ・ Dependence on migrant labour
External Origin	**Opportunity** ・ Promotion of organic production for export to other states and international market ・ Eco tourism ・ Permission for cultivation in forest area under Forest Right Act	**Threat** ・ Pests and diseases outbreak ・ Natural calamity like, hail storm, land slide, wildfire ・ Dependence on import from other states ・ Migration of man power from rural to urban

Source: Prepared by JICA Survey Team based on VISION 2025 Food for All, Government of Nagaland

Based on the interviews, field survey and analysis, the following focus areas are recommended for the development of agriculture and horticulture production in Nagaland.

Agriculture Production

1. Increase in cropping intensity by introduction of short duration high yielding varieties by replacing the existing long duration local varieties followed by cultivation of other crops like oilseed, pulses, wheat.
2. Proper nutrient management practices along with crop protection measures to be under taken to increase production and productivity of crops.

3. Maximum utilization of available water sources for irrigation purpose and creation of extensive rain water harvest structures to reduce the runoff loss and soil erosion.
4. Farm mechanisation, wherever possible, in order to meet the agricultural labour demand and to reduce the time required for agricultural operations.

Horticulture

1. Natural advantages such as topography, climatic conditions are to be best utilized by cultivating wide range of horticultural crops like fruits, flowers, spices, medicinal and aromatic plants. Exotic crops like strawberry having very high demand in local, domestic and international markets can accelerate the enhancement of farmers' income.
2. Promotion and commercialisation of horticulture by means of value addition through Common Interest Groups (CIGs) or SHGs.
3. The protection of existing forest areas through awareness programmes and planting of fast growing species of fruit trees in Jhum areas. To release the pressure on existing forests, cultivation should be encouraged in waste land and other marginal lands.
4. Development of high value and specialised tissue culture laboratories to enhance food production capacity and benefit farmers by supplying the required quality seedlings for horticultural crops.

4.9.2 Animal Husbandry and Dairy Farming

SWOT analysis of animal husbandry and dairy production is as follows.

Table 4.9.2 SWOT Analysis of Animal Husbandry and Dairy Production in Nagaland

	Helpful	Harmful
Internal Origin	**Strength** ・ High demand in local markets ・ Availability of family labour ・ Using as emergency cash income as stock ・ Large area for grazing	**Weakness** ・ Secondary source of income ・ Lack of improved breed ・ Lack of piglet supplier ・ Problem in animal health care ・ Poor nutritious feed ・ Poor accessibility for extension work
External Origin	**Opportunity** ・ None	**Threat** ・ Avian influenza for poultry industry ・ Swine fever for pig rearing ・ Dependency on the outside source for feed with high cost ・ Support by central government for piggery sector is not enough

Source: Prepared by JICA Survey Team based on VISION 2025 Food for All, Government of Nagaland

Based on the interviews, field survey and analysis, the following focus areas are recommended for the development of animal husbandry and dairy production in Nagaland.

1. Development of piggery and poultry including small ruminants for meat production and dairy cattle for milk by encouraging revived and improved backyard farming.
2. Encouragement to each household in the rural area for rearing three nos. of pig, 50 nos. of poultry birds, and one dairy cow in every 10 household.
3. Implementation of programmes such as, induction of quality dairy cattle, community cattle rearing, rural dairy farming, and artificial insemination.
4. Establishment of Dairy co-operatives/CIGs/SHGs for easy marketing
5. Establishment of small scale milk product processing industries for value addition
6. Improvement of technical dissemination network from Departmental farm to individual farms

7. Consolidating the existing livestock and poultry breeding farms, so as to evolve suitable crossbred in sufficient numbers from departmental farms for breeding and propagation.
8. Establishment of piggery clusters composed of core breeding farm and satellite fattening pig farms
9. Intensification of fodder development. Fodder stock and grass land reserve in all districts such as hay and silage making units to meet the requirement of fodder in lean period are to be set up.
10. Consolidating entire animal health care programme.

4.9.3 Fishery

SWOT analysis of fishery is as follows.

Table 4.9.3 SWOT Analysis of Animal Fishery in Nagaland

	Helpful	Harmful
Internal Origin	**Strength** ・Low lands below water catchment area are available ・Sufficient rainfall in monsoon season	**Weakness** ・Acidic soil ・Lack of awareness among farmers ・Non availability of quality fish seed ・Scarcity of water in dry season
External Origin	**Opportunity** ・Good demand in neighbouring state like Manipur	**Threat** ・Diseases ・Dependent on Migrant Labour

Source: Prepared by JICA Survey Team based on VISION 2025 Food for All, Government of Nagaland

Based on the interviews, field survey and analysis, the following focus areas are recommended for the development of fishery in Nagaland.

1. In order to increase fish production in the State low lying area to be brought under aquaculture
2. Paddy cum fish culture to be encouraged in low lying paddy fields
3. Emphasis to be given for demand driven timely supply of quality fish fingerlings
4. Specialized transport vehicles for transportation of fish to the distant markets
5. Production of quality nutrition rich fish feeds to cater to the needs of fish farmers

4.9.4 Farmers Organisation and Livelihood

Based on the interviews, field survey and analysis, the following focus areas are recommended for the development of farmers organisation and livelihood in Nagaland.

Table 4.9.4 Issues and Possible Countermeasures in Farmers Organisation and Livelihood in Nagaland

Category	Issues	Possible Countermeasures
Farmers' Organisation	➢ A large number of cooperatives have been formed without adequate technical, managerial, financial, and backstopping support, and 50% of them are in poor condition. ➢ Cooperatives are dependent on subsidies. Many of them do not have clear purpose, direction, leadership, and management skills. ➢ Farmers are not yet organised into groups for collective production and marketing. ➢ A multiple number of institutions are involved in the formation and promotion of SHGs and there is hardly any coordination amongst them. SHGs still face problems in accessing finance and building linkages with technical resource agencies and market. ➢ SHGs are not yet organised to enable them to produce substantial volume of produces to attract the buyers and market. ➢ Support for business planning, management, and marketing is not sufficient to capacitate the cooperatives and SHGs to succeed in their enterprises.	➢ Cooperatives need to be selected on the basis of clusters and products to be promoted. These clusters and products shall be identified through market research. For each cluster, a detailed capacity building plan and strategy needs to be developed for both cooperatives and SHGs working in the cluster. Ongoing interventions of the government/projects may include capacity development in entrepreneurship, business planning and management, product development in order to make the cooperatives efficient and effective, and the enterprises run by them can be profitable. ➢ Market research should be done by the specialised agencies. The results shall help cooperatives and SHGs to select an enterprise. ➢ The production capacity needs to be enhanced to create the basis for the marketing. Field-level facilitation in mobilisation of farmers and capacity development in group management and marketing is essential. ➢ SHGs need to be federated at the higher and appropriate level to build their institutional capacity in accessing different inputs and to attract the market and buyers. ➢ Cooperatives and SHG federations are suggested to provide services for the members (i.e., procurement of farm inputs and sell at lower prices to its members, banking facilities, buy back arrangement with the members, etc.)
Access to Financial Services	➢ Borrowing from financial institutions is not a common practice as the existing network of banking services is very poor. ➢ SHGs-based lending is not common. ➢ Savings is not common.	➢ Strategy and adequate efforts are needed to build the capacity of SHGs in group and financial management. ➢ SHG federations may be established through which financial services can be extended to the households in the rural non-bank areas. ➢ Understanding towards the importance of savings needs to be promoted amongst the communities.
Women in Agriculture	➢ Women play an important role in *Jhum* cultivation, especially in the procurement of seeds, managing soil fertility, and sale of harvest.	➢ Training programmes for women are required in terms of effective *Jhum* plot management and facilitating procurement of seeds. ➢ Women-friendly farm mechanisation should be considered.

Source: JICA Survey Team

CHAPTER 5 AGRICULTURE SECTOR IN TRIPURA

5.1 State Agriculture Development Plan

5.1.1 Vision and Strategy

(1) General

The State Government of Tripura has adopted the "Approach to People's Plan in Tripura" since 1996, taking into account the state's strengths, weaknesses, and opportunities. The salient features are as follows:

- Inclusive development, especially Scheduled Tribes, Scheduled Castes, Religious Minorities and Other Backward Classes, and Tripura Tribal Areas Autonomous District Council (TTAADC) areas to the same standard and level with the rest of Tripura.
- Provision of clean drinking water and housing, eradication of illiteracy and malnutrition, improving the health standards, electrification and connection by roads in all habitations.
- Additional employment opportunities in non-government sectors.
- Realistic and time bound resource-based planning and mobilisation of additional resources.
- To attain self-sufficiency in the production of food grains and fish, as well as, double the production of animal inputs, fruits, and vegetables and extension of irrigation.
- Involving all classes of people and their democratically elected representatives in the decentralised planning process so as to achieve effective balanced development of the state.
- Appropriate use of available land and water resources.

Catching up with the rest of the country (per capita gross state domestic product (GSDP)＝Rs.87,456 estimated) by 2020, Tripura should achieve 9.02% growth rate of GSDP and 7.80% growth rate of per capita GSDP on the average from 2007 to 2020 as shown below.

Table 5.1.1 Tripura Average Annual Growth Rates Required Reaching India's Per Capita GDP Level in 2019-20

Five Year Plan Period	Years	India		Tripura	
		Growth Rate of GSDP (%)	Growth Rate of Per Capita GSDP (%)	Growth Rate of GSDP (%)	Growth Rate of Per Capita GSDP (%)
11th	2007-08 to 2011-12	9.00	7.51	9.00	6.73
12th	2012-13 to 2016-17	9.00	7.67	9.00	7.78
13th	2017-18 to 2019-20	9.00	7.80	11.50	10.38
Average Annual Growth Rate (%) during 2007 to 2020		9.00	7.61	9.02	7.80

Note: GSDP is at fixed cost at 2006-07 prices
Source: National Institute of Public Finance and Policy (NIPFP) estimates in NEC Vision 2020

Although the state has recorded an impressive average annual growth rate of net state domestic product (NSDP) at 8.42% during 2005 to 2012, it still could not tap the vast potential that the sector holds on account of lack of adequate infrastructure. The key infrastructure interventions identified for harnessing full potential of the agriculture and allied sector in the state are minor irrigation projects, modern rice mills, farm gate infrastructure, post harvest management facilities, cold storage units, godowns, market yards, bio fertiliser units and strengthening and creating veterinary network.

(2) Agriculture and Allied Sector

Low capital formation, inadequate infrastructure, geographical isolation, and communication bottleneck limit the scope of industrial growth of the state. Agriculture remains the main focus for developing the economy of the state. Transfer of technology to farmers' field is a sine qua non to improve productivity which demands for strengthening of extension machinery.

The need for the basic infrastructure is immense on account of the inadequate and underdeveloped infrastructure as well as its geographical location. The state is isolated within the country and hence needs modern and reliable methods of communication and transport facilities to remain connected with the rest of the country, and particularly with trade centres such as Kolkata and Guwahati. The process of economic development of the state is highly dependent on development of infrastructure. The railway link is extremely poor. The state does not have any water transport system. The state has two sources of generation of electricity i.e., hydro and thermal. The state has potential for gas thermal power generation since it is endowed with natural gas.

Building up suitable infrastructure coupled with appropriate technology and management practices will contribute substantially to higher productivity of farm and non-farm sectors with holistic development of the state.

Taking the above into account, the Vision of the 12th Five-Year Plan is set for the agriculture and allied sector in Tripura as follows:

- To achieve 6% annual growth rate in the agriculture and allied sector.
- To achieve self-sufficiency in food grains production.
- To increase area, production, and productivity of horticultural crops.
- Prevent soil erosion and increase soil moisture, improve biomass and soil fertility.
- Preserve rain water and increase ground water recharge.
- To bridge the gap between demand and supply of animal origin food through augmentation of production and productivity of livestock and birds.
- Increase production to make available the 19 kg/capita of locally produced fish.
- To create irrigation potential for 29,000 ha under minor irrigation sector and 4,078 ha of annual irrigation potential through medium irrigation projects.

Realising the vision, the 12th Five-Year Plan recommends the following countermeasures for the agriculture and allied sector development in Tripura.

Table 5.1.2 Development Countermeasures for the Agriculture and Allied Sector in Tripura

Subsector	Countermeasures
(1) Agriculture	• Enhancement of crop productivity through the system rice intensification (SRI), hybrids and high yielding varieties (HYVs) including the Integrated Crop Management (ICM), wherever SRI is not feasible. Intercropping of pulses in fruit and plantation crops, post-harvest facilities should be created. One hundred pulses villages in all the four districts may be developed. Soybean, *Rajma* should be cultivated in FRA areas as mixed crop. Sugarcane cultivation should be encouraged by shortening the duration of through preparation of nursery bed. • Production of certified HYV seed should be continued in the government farms as well as in farmers' fields with proper seed testing, seed processing, and storage facilities. Government farms could be utilised for production of hybrid seeds. • Availability of 50% fertilisers through government channel and remaining 50% by private channel shall be ensured. Non-government organisations (NGOs) and private parties are to

Subsector	Countermeasures
	be encouraged for increasing bio-fertiliser production in the state. Farm health/farm plan passbook to be issued to all farmers in a phased manner. Amelioration of acidic soils through soil ameliorants to be undertaken and side by side Acid tolerant crops are also to be included in the cropping system approach, where amelioration would not be profitable. • Promotion of zero tillage or minimum tillage in FRA areas up to 10-15% slope, *Moringa*, millets, nutri-cereals (coarse cereals), vegetables for nutritional support in FRA areas. • Water use efficiency to be increased through rain water harvesting and exploiting ground water potential for irrigation. • 100% seed treatment, popularisation of farm mechanisation, creation of infrastructure including storage, marketing, and market intelligence to be taken up.
(2) Horticulture	• Bringing more area under fruits, nuts, vegetables, potato, and spices in normal as well as in FRA areas, high density planting with pineapple, guava, litchi, lemon and mango, emphasis on minor fruits and some indigenous vegetables of the region. • Supplying quality planting/propagating materials and all technology inputs e.g., ICM, INM. Enhancing productivity, profitability, and sustainability through rejuvenation of old, unproductive orchards. • Introducing new fruit crops like strawberry and grapes; vegetables like broccoli, gherkin, capsicum and spices like onion and garlic. Promoting commercial cultivation of high value flowers and ornamental foliage. • Encouraging adoption of good agricultural practice (GAP) and organic farming under certification arrangements. • Increasing productivity of fruits and vegetables through micro irrigation facilities in upland areas. Enhancing productivity of labour through farm mechanisation. • Following a strong human resource development (HRD) programme for quick dissemination and adoption of related technologies. Creating common infrastructure at farm gate of production clusters for reducing postharvest losses. Developing market infrastructure and proper linkage with the growers. • Strengthening horticultural statistics and bringing all crops under insurance coverage.
(3) Animal Resources Development	• (Milk) Genetic up-gradation of local cattle, promotion of Indian dairy breeds in ADC areas for productivity enhancement, continuation of genetic improvement with exotic germplasm where the exotic inheritance should not exceed 50% in prospective milk-shed areas, continuation of ongoing heifer rearing scheme, new programme for augmentation of milk production to be introduced. Fodder development to minimise the input cost-emphasis on harvesting and processing of straw through formation of straw blocks, improving reproductive health of female cattle, artificial insemination (AI) infrastructure, prevention and control of animal diseases, castration of local bull, massive awareness programme to popularise AI & CB cow rearing, marketing arrangement of milk and milk by product. • (Meat) Genetic up-gradation of local goat to increase carcass yield, popularisation of exotic piggery, strengthening of government pig breeding farm, studies to be conducted in collaboration with the Indian Council of Agricultural Research (ICAR) on suitability and prospect of *Gunghuroo* breed of North Bengal hilly tracts in Tripura, promotion of piggery and goatery in FRA areas and cultivation of tapioca in forestland, promotion of local variety 'Tripura Brown' for backyard poultry in collaboration with ICAR, entrepreneurship development in pig sector, technical support to private broiler farmers. • (Egg) Strengthening of rural backyard poultry farming, government poultry farm to supply required number of germ plasm to the BLBH, promotion of indigenous duck in backyard system, massive awareness for control of diseases in backyard poultry. Expansion of veterinary service network to ensure one veterinary centre per two gram *panchayets* / ADC villages from 456 to 600. Strengthening of infrastructure of departmental farms. Development and protection of veterinary infrastructure. Strengthening of infrastructure of the Veterinary College is to be done to its highest standard, to facilitate research and human resource development.
(4) Fishery	• Increasing production to make available the 19 kg/capita of locally produced fish for the expected fish eating populace of the state by the end of the plan period. • Optimum increase in productivity, with special emphasis on first category of fish farmers who obtained productivity much less than the average of the state during 2010-11. • Popularising the High Tech Fish Culture, especially amongst second and third category fish farmers. • Increased emphasis on production of seed and culture of high value species (prawn,

Subsector	Countermeasures
	pabda, magur, chitala). • Encouragement for further entrepreneurship development and increased employment generation (especially in the rural sector). • Economic development of fishermen/fish farmers of the state in general, and forest dwellers, inhabitants of regrouped villages and *patta* holders in particular. • Special emphasis to women and tribal population in all beneficiary oriented development activities.
(5) Soil and Water Conservation	• Creation of substantial water bodies, groundwater recharging structures and also creation and augmentation including management of green vegetation, judicious blending of low cost and high cost treatment measures, vocational development of asset-less farmers /marginal farmers for their self-sufficiency, multi-tier plantation approach for harnessing rain water potential, roof top rainwater harvesting structure in the hilly areas, farming systems approach for efficient use of inputs and natural resources.

Source: 12th Five Year Plan (2012-2017) Executive Summary of Twelve Core Groups, Part-IV, Planning (P&C) Department

The State Government of Tripura is pioneer and leading state in the country in the implementation of the Scheduled Tribes and Other Traditional Forest Dwellers Act 2006 (Recognition of Forest Rights: RoFR Act), which recognises the forest rights of forest dwelling Scheduled Tribes and other traditional forest dwellers over the forest land under their occupation for self-cultivation, rights over minor forest produce and traditional rights. The State Government of Tripura, under the Act, has already allotted 173,325 ha, which is about 17% of the total geographical area of the state, to 121,592 forest dwellers as of 30 June 2014.

As a next step, the Government of Tripura plans to provide sustainable livelihood opportunities to the forest dwellers while retaining their symbiotic relationship with the forest and ensuring their socio-economic development as well as retaining the ecological balance of the area. The holistic approach integrating the agriculture and allied sector, namely, forestry, agriculture, horticulture, animal resource development, and pisciculture shall be taken up for the improvement of production and productivity of the land vested to the forest dwellers under the RoFR Act.

5.1.2 Development Budget and Expenditure under the State 12th Five-Year Plan

The state plan under the State 12th Five-Year Plan (2012-2017) is broadly divided into 12 items as shown in Table 5.1.3 below. The plan budget in respect of agriculture and rural development (items 1 to 4) will share only 20.1% of the total budget. However, it will practically occupy about 50% as other items except for items 11 and 12 which include more or less agriculture and rural development component. Thus, agriculture and rural development is an important sector in Tripura. The approved outlay, however, is not being fully utilised; 98% was used in 2012-13 and 107% in 2013-14.

Table 5.1.3 Tripura State Plan Budget and Expenditure under the 12th Five-Year Plan

SN	Sector	12th Plan Projected Outlay*1	Annual Plan 2012-13		Annual Plan 2013-14	
			Revised Outlay	Expenditure (Audited)	Revised Outlay	Expenditure (Audited)
1	Agriculture and Allied Services	2,157.10	135.64	131.97	188.28	213.42
2	Rural Development	936.20	218.36	215.33	259.40	260.18
3	Special Area Programme	1,978.29	137.00	168.86	146.27	171.23
4	Irrigation and Flood Control	1,283.42	37.77	58.12	31.48	48.26
5	Energy	875.96	83.28	72.16	85.06	78.86

SN	Sector	12th Plan Projected Outlay*1	Annual Plan 2012-13		Annual Plan 2013-14	
			Revised Outlay	Expenditure (Audited)	Revised Outlay	Expenditure (Audited)
6	Industry and Minerals	433.81	40.99	50.99	44.91	72.55
7	Transport	1,610.00	269.84	286.88	409.01	463.34
8	Communication (Police)	2.00	0.00	0.00	0.00	0.00
9	Science, Technology and Environment	696.28	69.94	94.10	101.81	95.64
10	General Economic Services	10,823.45	11.74	11.17	14.99	22.45
11	Social Services	10,244.90	1,094.60	986.86	1,069.56	1,101.56
12	General Services	497.39	88.62	74.25	87.82	75.94
	Total (State Plan)	**31,538.80**	**2,187.78**	**2,150.69**	**2,438.59**	**2,603.43**

*Notes: Unit: Rs. crore, *1= including Rs.10,737.85 crore under the Special Plan Assistance (SPA) / Special Central Assistance (SCA)*

Source: Economic Review of Tripura 2013-14 & 2012-13, Directorate of Economics and Statistics, Planning Department, Government of Tripura

5.2 Social Institution and Local Governance

5.2.1 Social Institution

Tripura is a Hindu dominant state having 85.6% of the total population as Hindus[1]. Other religions including Muslims, Christians, and Buddhists constitute the rest. The population of Scheduled Tribe (ST) in Tripura is 31.8% or 1,166,813 persons and the same for the Scheduled Caste (SC) is 17.8% or 654,918 persons[2]. Although Tripura's tribal population constitutes a minor part of its demography, the tribal communities are the majority until the floods of immigrants, who sought refuge from Bangladesh and other neighbouring states. This has caused the insurgency in the state by the tribal communities in demand for autonomy.

There are 19 tribal communities in Tripura, each of which has distinct culture, tradition, and language. The most populous tribal community is Tripuri accounting for 55% of the total population[3]. Their language, *Kokborok*, is spoken by many other tribal communities as lingua franca. Other tribal communities include Reang, Jamatia, Chakma, etc. Many of the tribal families practises the *Jhum* or shifting cultivation. Tripura Forest Department had identified 27,278 families or 136,000 persons practising the *Jhum* cultivation. The tribal communities had traditional ruling system of village *sardars* (council).

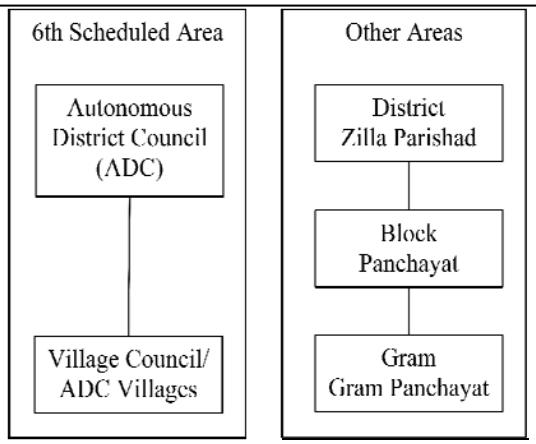
Jhum is practised mostly in the forest area under the management of Forest Department, on which the rights of the *Jhumia* families was not recognised for long. Since the Scheduled Tribes and Other Traditional Forest Dwellers Act (commonly known as Forest Rights Act) 2006 became effective, these families living and cultivating in the forest areas received the land use and ownership right commonly called *Patta.* The *Patta* land can be inherited within the family members but can not be sold or transferred to others[4]. Where the *Jhum* is no longer productive due to the severe degradation of land and forest area, families have been relocated and provided with alternative means of livelihood by the government. If not relocated, the government also provides assistance to the *Patta*

1 Census of India (2001), Refer to Table 2.6.10 in Attachment-2.6.1.
2 Census of India (2011), Refer to Table 2.6.12 in Attachment-2.6.1.
3 Livelihood Based Agri Business and Market Studies for North East Rural Livelihood Project, Final Report, Tripura. April 2011. MART.
4 For a family to obtain Patta, one needs to submit an application to the Grama Sabha (Village Council) where the Forest Rights Committee at the Gram Sabha level is constituted and review the application. If it is deemed valid, the application will be forwarded to the Sub-divisional Level Forest Rights Committee for verification and review. The application will be further forwarded to the District Level Forest Rights Committee for review and final approval.

holders for training and inputs to undertake integrated farming and other alternative livelihood options in order to prevent expansion of the *Jhum.*

5.2.2 Local Governance

In Tripura, the traditional governance system has been given recognition as per the 6th Schedule of the Constitution. The Tripura Tribal Areas Autonomous District Council (TTAADC) was constituted in 1982 and recognised in 1985 on this basis, and governs 68% of the total land area of the state[5]. For the remaining area, Panchayat Raj Institution (PRI) has been installed for local governance.



Source: JICA Survey Team

Figure 5.2.1 Local Governance Structure in Tripura

TTAADC comprised 19 departments to frame laws and rules, and to undertake various socioeconomic development interventions for the tribal areas. TTAADC prepares its five-year plans as well as annual plans. The budget is allocated by the state government for implementation of such plans. At the same time, TTAADC also implements the central and state programmes of various sectors in the areas where the state government assigns them to the TTAADC. Along with the developmental interventions, the programmes to conserve the distinct culture and language of tribal communities are also implemented.

The details of administrative units of PRI and TTAADC are summarised as shown below.

Table 5.2.1 Administrative Units of Tripura

Districts	Sub-Divisions	Blocks	Panchayats (Village)	Revenue Villages	TTAADC Villages
West Tripura	3	9	90	96	77
Shepahijala	3	7	112	119	52
Khowai	2	6	55	78	58
Gomati	3	8	70	134	95
South Tripura	3	8	99	138	70
Dhalai	4	8	41	146	96
Unokati	2	4	59	78	28
North Tripura	3	8	69	89	51
Total	23	58	595	878	527

Source: Economic Review of Tripura, 2012-13. P9. Edited by the JICA Survey Team

[5] Development Initiatives of TTAADC 2013-14

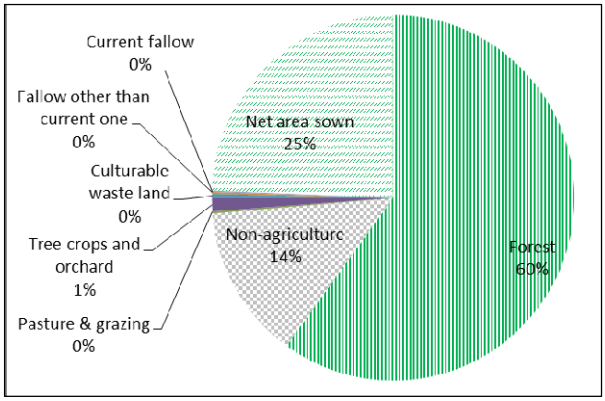
Source: http://tripura.gov.in/districtmap

Figure 5.2.2 District Map of Tripura

5.3 Agricultural Resources

5.3.1 Land

According to the Data of 2011-12 from the Directorate of Agriculture, Government of Tripura, forest covers 60%, agriculture including horticulture land shares 25% and other lands 15%, as presented in Table 5.3.1 and Figure 5.3.1.



Source: Arranged by the JICA Survey Team based on original source, "Some Basic Statistics of Tripura-2012, DES-PD, GoT" or "Directorate of Agriculture, Government of Tripura"

Figure 5.3.1 Land Use in Tripura

Table 5.3.1 Land Use in Tripura

Land Use	Area	
Year (2011-12)	(ha)	(%)
Forest	629,426	60.0
Non-agriculture	143,234	13.7
Pasture & Grazing	1,887	0.18
Tree Crops and Orchard	23,758	1.2
Culturable Waste Land	3,449	0.33
Fallow other than Current One	1,730	0.16
Current Fallow	1,200	0.11
Net Area Sown	255,485	24.4
Total	**1,049,169**	**100.0**

Source: Arranged by the JICA Survey Team based on original source, "Some Basic Statistics of Tripura-2012, DES-PD, GoT" or "Directorate of Agriculture, Government of Tripura"

The number of *patta* holders and area allotted under the RoFR Act, 2006, are shown in Table 5.3.3. The Tripura government identified approximately 122,000 forest dwellers and allotted 173,000 ha of land to them.

The Agriculture Department conducted a sample survey to identify the category of lands, for which the rights have already been vested to the forest dwellers as presented in Table 5.3.2. Out of the total area, an area of 138,000 ha could be categorised through the field survey as summarised in Table 5.3.2. Tilla land or valley slope occupies 86% of the surveyed land.

Table 5.3.2 Status of Land Resources in Tripura

District	Area surveyed under RoFR (ha) as on Feb., 2014			
	Total	Tilla land (vally slope)	Lunga land (valley bottom)	Plain land
Unokoti	7,669	6,048	784	837
North T.	27,347	24,102	1,407	1,838
Dhalai	43,511	39,784	2,990	737
Gomati	18,906	13,712	2,887	2,307
South T.	18,400	16,774	563	1,063
West T.	5,284	4,108	477	699
Khowai	10,757	8,688	843	1,226
Sipahijala	6,200	4,881	603	716
Tripura (ha)	138,074	118,097	10,554	9,423
(%)	100.0	85.5	7.6	6.8

Source: Quick Sample Survey by Field Staff, Agriculture Department

The number of *patta* holders and area allotted under the RoFR Act, 2006, are shown in Table 5.3.3. The Tripura government identified approximately 122,000 forest dwellers and allotted 173,000 ha of land to them. The Agriculture Department conducted a sample survey to identify the category of lands, for which the rights have already been vested to the forest dwellers as presented in Table 5.3.2. Out of the total area, an area of 138,000 ha could be categorised through the field survey as summarised in Table 5.3.2. Tilla land or valley slope occupies 86% of the surveyed land.

Table 5.3.3 District-wise Patta Holders in Tripura

District	Patta Holders	Land involved for vesting of forest rights		Average area
	(Nos.)	(ha)	(%)	(ha/P. Holder)
Unokoti	6,428	9,577	5.5	1.49
North	14,011	27,884	16.1	1.99
Dhalai	31,842	48,331	27.9	1.52
Gomati	22,910	25,166	14.5	1.10
South	19,550	22,040	12.7	1.13
West	5,150	8,054	4.6	1.56
Khowai	15,629	25,348	14.6	1.62
Sipahijala	6,072	6,925	4.0	1.14
Total	121,592	173,325	100.0	1.43

Source: Dept. of Tribal Walfare, Govt. of Tripura as on 30th June 2014

Change of forest cover from 2003 to 2013 is estimated as shown in Table 5.3.4. Forest cover of 227 km^2, 22,700 ha or 2.2% of the state land decreased in the period of ten years.

Table 5.3.4 Forest Cover and Its Decrease in Tripura

Category	Forest cover (km2)		
	2003	2013	Change
Very dense	58	109	51
Moderately dense	4,988	4,641	-347
Open	3,047	3,116	69
Total forest cover	8,093	7,866	-227
Total geog. Area	10,492	10,492	
% of total cover	77.1	75.0	-2.2

Source: FSI Report 2013

5.3.2 Water

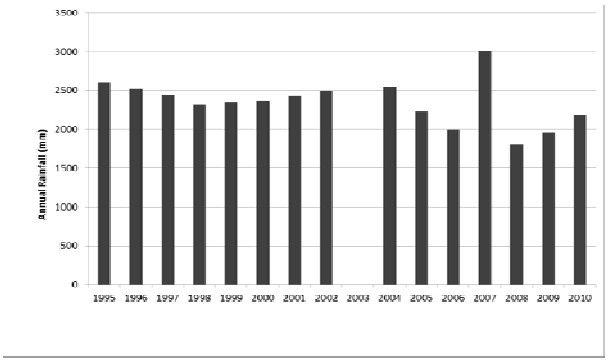
Monthly rainfall data in Tripura from 1995 to 2010 are available as presented in Table 5.3.5. Annual rainfall fluctuated in the said period as shown in Figure 5.3.2, where the early half years seemed to be more stable. The observation period is divided into two parts, namely: the early one from 1995 to 2002 and the later part from 2003 to 2010 for comparison. Averaged monthly rainfalls for the two periods are shown in Figure 5.3.3, where a decrease of rainfall in the driest months is seen. Standard deviations of monthly rainfall in the two periods are compared in Figure 5.3.4, which shows clearly an increase of the standard deviation in the later period. Rainfall data used here are limited and further analysis is desirable to understand more in detail the situation. However, it is broadly mentioned that climate has become more violent and the change may be an effect of climate change. Water shortage may occur more frequently, so development of irrigation system is more required against drought than before.

Table 5.3.5 Monthly Rainfall in Tripura (in mm)

Year	January	February	March	April	May	June	July	August	September	October	November	December	Annual
1995	9.7	80.2	103.8	191.4	481.9	463.1	392.4	367.9	258.5	178.8	47.9	26.2	2601.8
1996	8.0	70.6	125.7	171.8	416.8	482.2	403.5	378.0	246.0	160.0	33.8	25.8	2522.2
1997	5.9	60.2	134.4	156.7	376.9	470.9	454.7	354.9	243.8	122.7	44.7	18.0	2443.8
1998	13.4	38.2	148.5	164.4	296.0	397.1	490.3	366.5	228.6	124.0	54.6	0.8	2322.4
1999	9.0	30.2	104.5	128.6	345.9	409.9	536.9	347.1	235.0	139.7	53.9	7.2	2347.9
2000	14.6	29.8	133.2	163.9	358.6	396.4	486.0	340.3	237.8	168.7	25.1	7.8	2362.2
2001	28.1	39.3	121.2	160.4	420.6	407.1	459.3	345.5	232.1	161.4	45.8	9.2	2430.0
2002	28.6	44.7	116.8	172.7	463.0	391.4	443.3	370.5	224.3	172.2	58.9	8.4	2494.8
2003	-	15.8	82.5	184.2	355.7	808.8	234.1	154.0	250.2	154.4	-	73.3	-
2004	2.4	2.3	4.3	366.0	235.6	569.4	552.7	186.1	474.4	150.7	0.0	0.0	2543.9
2005	4.1	17.1	193.6	172.7	464.1	187.4	354.5	350.2	311.6	167.5	3.9	0.5	2227.2
2006	0.0	0.0	0.4	166.9	510.7	484.4	237.6	265.0	254.2	63.9	9.4	0.0	1992.5
2007	0.0	62.3	52.4	313.4	267.2	638.0	617.3	304.5	399.7	273.5	85.5	0.0	3013.8
2008	36.3	13.0	41.6	53.1	218.5	324.3	321.2	385.5	174.1	237.2	0.0	0.0	1804.8
2009	0.0	2.4	21.9	138.3	366.7	239.9	442.1	381.2	222.2	147.1	0.0	0.0	1961.8
2010	0.0	14.5	79.9	168.9	448.1	438.5	234.0	278.4	237.9	268.9	2.0	17.5	2188.6
Average	10.7	32.5	91.5	179.6	376.6	444.3	416.2	323.5	264.4	168.2	31.0	12.2	2350.8

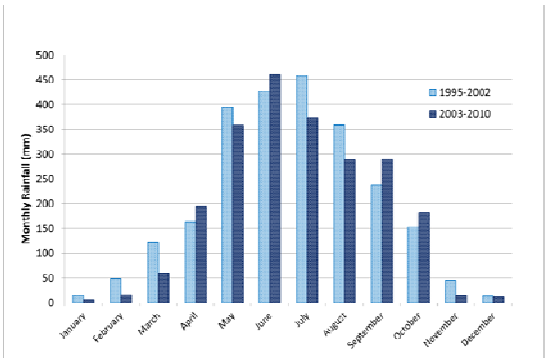
Note: The data are partly revised by the JICA Survey Team.
Source: "Statistical Abstract 2010-11, DES-PD, GoT"

The drainage network of Tripura generally flows in the north-south direction, as if controlled by the north-south aligned hill ranges. The climate of Tripura is humid sub-tropical characterised by high rainfall (average annual rainfall: 2241 mm). Topography is a major limitation for sustainable use of areas under irrigation. These lands are suitable for forestry and tree species, plantation, and horticultural crops.



Source: JICA Survey Team

Figure 5.3.2 Annual Rainfall in Tripura



Source: JICA Survey Team

Figure 5.3.3 Comparison of Monthly Rainfall

5.4 Agriculture Production

5.4.1 Food Grain

It is estimated that more than 50% of the population of Tripura are dependent on agriculture and allied activities. However, only 27% of the land is available for cultivation due to hilly terrain and forest cover. The Cropping pattern in Tripura has typical characteristics of hill agriculture in the North Eastern States where two distinct farming system namely (i) shifting cultivation or *jhum* on the hill slopes and (ii) settled farming in the plain areas. Rice is the pre-dominant crop in both the production systems. The State mainly grows three seasonal rice crops, namely *aush* (April-June), *aman* (July-Nov.) and *boro* (Dec.-March) in the settled farming

Source: JICA Survey Team
Rice Production in Sipahijala

areas including wide range of food and non-food crops. Rice alone contributes 96% to the total food grain production in the Tripura.

Table 5.4.1 Area, Production and Yield of Major Food Grains in Tripura

Crop	Item	2007-08	2008-09	2009-10	2010-11	2011-12	Average Yield of Five Years	Average Yield of All India*
Rice	Area (ha)	252,897	242,966	244,853	262,320	265,999	-	-
	Production (MT)	640,422	627,174	640,948	701,562	718,304	-	-
	Yield (MT/ha)	2.53	2.58	2.62	2.67	2.70	2.62	2.23
Maize	Area (ha)	2,123	2,093	1,918	3,100	3,743	-	-
	Production (MT)	2,125	2,046	1,909	4,101	5,058	-	-
	Yield (MT/ha)	1.00	0.98	1.00	1.32	1.35	1.13	2.36
Wheat	Area (ha)	1,023	635	701	800	274	-	-
	Production (MT)	1,889	1,195	1,328	1,600	536	-	-
	Yield (MT/ha)	1.85	1.88	1.89	2.00	1.96	1.92	2.95
Total Pulses	Area (ha)	5,361	5,796	6,170	7,500	8,582	-	-
	Production (MT)	3,496	4,181	4,126	5,085	6,005	-	-
	Yield (MT/ha)	0.65	0.72	0.67	0.68	0.70	0.68	0.66

Source: Directorate of Agriculture, Gov. of Tripura

** Source: Average Data of 2007-08 to 2011-12, Pocket Book on Agricultural Statistics 2013, Ministry of Agriculture, Gov. of India*

The State is targeting to attain self-sufficient in cereal production in a short time. But it is said that the deficit in pulses and oilseed production is still huge. There is an urgent need for the State to focus on increasing production of food grains to ensure food security and nutrition to the population in the State[6].

Current issues and constraints in food grain production in Tripura are listed as follows[7].

- Low Seed Replacement Rate: The seed replacement rate as per Government of India stipulation are 33% for self pollinated crops, 50% for cross pollinated crops and 100% for hybrid crops. Although the state has promoted seed replacement to attain those rates, seed replacement by farmers is still insufficient.
- Increase in Pulse Cultivation: More areas should be brought under pulse cultivation and technological interventions made for reducing the yield gaps. Inter-cropping of pulses with fruit and plantation crops can yield good result. Enhancing the productivity of maize through promotion of improved technologies should also be done.
- Increased adoption of HYV seeds: Small and marginal farmers find it difficult to afford hybrid seeds on account of higher cost. Suitable interventions for increasing adoption of hybrid seeds by the small and marginal farmers are needed. In addition, adequate seed testing, processing and storage facilities need to be ensured.
- Increase in Cropping Intensity: Cropping intensity needs to be

Source: JICA Survey Team

Pineapple Production in Forest Area (Dhalai District)

Source: JICA Survey Team

Vegetable Production (South Tripura District)

[6] Source: State Focus Paper Tripura 2014-15, NABARD
[7] Source: State Focus Paper Tripura 2014-15, NABARD

increased through appropriate cropping sequence and diversification of existing cropping pattern.

- Chemical Fertilisers & Micro Nutrients: Non availability of chemical fertilisers from manufacturing plants/suppliers as per the need has to be resolved. As a result the productivity of the crop is not obtained at the desired level, efficiency of micro nutrients - zinc, boron etc. has been observed.
- SRI: About 88,000 ha have been covered under SRI and the target is to reach 100,000 ha during 2013-14. This would be about 40% of the total area cultivated for rice in the state.

Source: JICA Survey Team
Jack Fruits at Local Market
(South Tripura District)

- Farm Mechanisation and Drip irrigation: During cropping/peak season, there has been labour shortage. Thus increasing level of farm mechanisation along with adequate repair and maintenance facilities need to be promoted to increase productivity and to resolve the problem of shortage of labour. Use of farm machinery like transplanter, power weeder, drum seeder, power sprayer etc should be popularised and incentive provided for adoption of technologies. Drip irrigation should be accorded special attention as it ensures water-efficiency in usage along with increase in productivity.
- Soil Health: A system may be introduced to ensure soil testing and 100% seed treatment by all farmers. Regular awareness camps along with demonstration programmes may be conducted. Tripura soils mostly acidic in nature. Large quantity of soil ameliorant is required for reclamation of acidic soils of the state. The reclamation with lime is expensive and small and marginal farmers find it difficult to afford. However, for restoration of soil health and fertility and to increase the production and productivity of crops, suitable intervention is required from the government.

5.4.2 Horticulture

Horticulture is one of the potential sectors for the economic development of the State. The agro-climatic condition of sub-tropical climate of the State and the unexploited areas offer large scope for development of horticulture.

Vegetables mostly grown in the State are tomato, brinjal, cowpea, French bean, plantain, cucumber, pumpkin, bottle gourd, cabbage and number of leafy vegetables. Vegetables are known as short duration crops, fit very well in the intensive cropping system and are capable of giving better and constant returns to the farmers. Major fruit crops produced in the State are pineapple, banana, mango, orange, jackfruit, litchi and papaya. Fruit cultivation relatively generate more income than any other food grains like paddy, wheat, maize etc. and it also generates employment opportunity throughout the year and help in maintaining ecological balance.

Vegetables in the State have gradually shifted from kitchen garden for home consumption to large scale commercial production using hybrids seeds. Off-season vegetables like summer cabbage, cauliflower and tomato which provide much higher has spread in the state and the advanced growers are coming forward to adopt the production technique. There is a need to increase the production and productivity of vegetables to meet the demand of growing population to ensure better nutrition and also to increase the income of vegetable growers.

The major plantation crops in Tripura are coconut, arecanut, oil palm, cashew nut, tea, coffee and rubber. The important spices grown in Tripura are chilli, black pepper, turmeric and ginger. Due to steady increase in demand of cut flowers which are mainly used for religious and other ceremonial purposes, floriculture has become one of the important sectors in the State in recent years. The area under floriculture is fast expanding especially around Agartala. Flowers like marigold, gladiolus and tube rose are commercially produced in open field condition and some exotic flowers like gerbera, orchids and anthurium are cultivated under controlled condition.

The production of major horticultural crops, fruits and plantation crops in Tripura in 2013-14 are shown in the following table.

Table 5.4.2 Production of Major Horticultural Crops in Tripura in 2013-14

Category	Name of Crop	Area (ha)	Production (MT)	Yield (MT/ha)	Average Yield of All India (2012-13) (MT/ha)
Summer Vegetables & Flower	Bhindi (Okra)	1,680	15,995	9.52	12.0
	Brinjal	1,616	30,135	18.65	18.6
	Amaranthes	1,507	23,984	15.91	-
	Colacasia	1,313	21,697	16.52	-
	Ridge Gourd	1,108	19,770	17.84	-
	Cucumber	873	10,310	11.81	15.7
	Water Melon	869	22,174	25.52	22.2
	Spine Gourd	833	16,240	19.50	-
	Sweet Gourd	831	16,530	19.89	-
	Cowpea	826	13,794	16.70	-
	Bitter Gourd	791	7,485	9.46	11.3
Winter Vegetables	Cabbage	2,719	76,102	27.99	22.9
	Radish	2,441	49,380	20.23	14.2
	Cauliflower	2,310	50,768	21.98	19.6
	Brinjal	1,909	23,425	12.27	18.6
	Tomato	1,572	38,670	24.60	20.7
	Chilli	1,300	8,814	6.78	-
	Bottle Gourd	1,151	25,506	22.16	18.3
Fruits	Banana	13,644	134,257	9.84	34.2
	Pineapple	11,590	162,260	14.00	14.9
	Mango	10,559	56,279	5.33	7.2
	Jackfruits	10,120	302,183	29.86	17.6
	Orange	6,302	33,905	5.38	10.9
	Lime/lemon	4,836	23,116	4.78	9.9
	Litchi	3,888	20,179	5.19	7.0
	Papaya	3,413	33,823	9.91	40.7
Nuts	Coconut	6,912	19,483	2.82	7.0
	Areca nut	6,443	20,095	3.12	1.4
	Cashew nut	5,368	4,047	0.75	0.8
Spices	Chilli	2,771	5,630	2.03	1.6
	Turmeric	1,907	14,875	7.80	5.0
	Ginger	1,821	15,041	8.26	5.0
Other	Potato	8,721	153,803	17.64	22.8

Source: Directorate of Horticulture and Soil Conservation, Gov. of Tripura

** Source: Indian Horticulture Database 2013, National Horticulture Board, Gov. of India*

Table 5.4.3 Area, Production and Yield of Fruit and Plantation Crops in Tripura

Crop	Item	2007-08	2008-09	2009-10	2010-11	2011-12	Average of Five Years	All India*
Litchi	Area (ha)	2,722	2,762	2,762	2,935	3,200	-	-
	Production (MT)	16,032	16,165	16,972	16,359	16,565	-	-
	Yield (MT/ha)	5.89	5.85	6.14	5.57	5.18	5.73	7.00

Crop	Item	2007-08	2008-09	2009-10	2010-11	2011-12	Average of Five Years	All India*
Mango	Area (ha)	3,981	4,190	4,254	5,408	7,400	-	-
	Production (MT)	11,925	12,706	13,170	14,743	23,861	-	-
	Yield (MT/ha)	3.00	3.03	3.10	2.73	3.22	3.01	7.20
Pineapple	Area (ha)	6,247	6,336	6,476	6,789	11,600	-	-
	Production (MT)	108,009	110,487	117,531	131,587	153,709	-	-
	Yield (MT/ha)	17.29	17.44	18.15	19.38	13.25	17.10	14.90
Orange	Area (ha)	2,972	3,098	3,162	3,845	4,650	-	-
	Production (MT)	20,383	20,926	22,230	23,186	23,592	-	-
	Yield (MT/ha)	6.86	6.75	7.03	6.03	5.07	6.35	9.70
Guava	Area (ha)	336	348	350	384	384	-	-
	Production (MT)	1,510	1,636	1,727	1,892	2,007	-	-
	Yield (MT/ha)	4.49	4.70	4.93	4.93	5.23	4.86	13.60
Jackfruit	Area (ha)	7,666	7,627	7,636	7,796	7,200	-	-
	Production (MT)	252,384	250,619	251,569	279,033	245,773	-	-
	Yield (MT/ha)	32.92	32.86	32.95	35.79	34.14	33.73	
Banana	Area (ha)	7,323	7,416	7,486	7,754	No Data	-	-
	Production (MT)	95,259	96,787	105,615	120,066	No Data	-	-
	Yield (MT/ha)	13.01	13.05	14.11	15.48	No Data	13.91	34.20
Lemon	Area (ha)	2,071	2,106	2,106	2,234	3,250	-	-
	Production (MT)	11,380	11,712	11,716	13,168	15,461	-	-
	Yield (MT/ha)	5.49	5.56	5.56	5.89	4.76	5.45	9.89
Cashew Nut	Area (ha)	4,078	4,087	4,387	4,796	-	-	-
	Production (MT)	2,084	2,122	2,345	2,946	-	-	-
	Yield (MT/ha)	0.51	0.52	0.53	0.61	-	0.54	0.80
Coconut	Area (ha)	5,567	5,746	5,746	5,902	-	-	-
	Production (MT)	7,882.00	8,216.00	11,384.00	10,865.00	-	-	-
	Yield (MT/ha)	1.42	1.43	1.98	1.84	-	1.67	7.30
Areca Nut	Area (ha)	4,434	4,443	4,443	4,698	-	-	-
	Production (MT)	8,361	8,354	8,600	9,918	-	-	-
	Yield (MT/ha)	1.89	1.88	1.94	2.11	-	1.95	1.40

Source: Directorate of Agriculture, Gov. of Tripura

**Source: Indian Horticulture Statistics 2013, National Horticulture Board, Gov. of India*

Current issues and constraints in horticulture in Tripura are listed as follows[8].

- Availability of quality seeds and planting materials: It has been observed that despite establishment of good number of private nurseries, most have not reached the stage of supplying required seeds and planting materials. In Dhalai and North Tripura districts, a few more nurseries should be established to meet the demand of the districts. Production of disease free, quality seed and planting materials in progeny orchards and private nurseries may be accorded priority.
- Productivity of fruits & vegetables: Productivity of fruits is low on account of low surviving density of plants in the first year in absence of proper watering arrangements during dry season and inadequate care and maintenance by growers. Increasing productivity of fruits and vegetable crops through micro irrigation arrangements i.e. through installation of drip/Sprinkler Systems has to be popularised.

[8] Source: State Focus Paper Tripura 2014-15, NABARD

- Diversification: Minor fruit crops like bel (*Aegle marmelos*), jackfruit, ber (*Ziziphus mauritiana*), tamarind, hog plum (*Spondias mombin*), custard apple & karonda (*Carissa carandas*) has to be given emphasis taking into account diversity in production and their income generating capacity.
- Unstable supply of vegetables: Vegetables are mostly grown during summer and winter season without any staggering arrangements for extending the harvests during the lean period from May to August. This results in abnormal rise in prices. It also limits the income generating potential of the vegetable growers. Therefore, promoting off-season production technologies in different areas and crops - cauliflower, cabbage, tomato, capsicum, cucumber etc. may be taken up in a big way.
- Area expansion: Potato is one of the most important vegetable crops in Tripura. However, inadequacy of assured irrigation facilities, certified seed tubers, fertilisers and limited credit has been the reasons for low area expansion under potato. More area, normal as well as FRA, be brought under horticultural crops.
- Awareness: It has been observed that there is lack of awareness among majority of farmers about modern production techniques, post harvest handling and marketing practices. Regular awareness camps and follow up through bodies like Farmers Clubs of NABARD can help in this respect.

5.4.3 Animal Husbandry

Animal Husbandry is one of the major activities for providing subsidiary income to the farming families. The sector plays a vital role in the rural economy and support for farmers' particularly small and marginal farmers both economically and nutritionally. It also plays an important role in employment generation and augmentation of rural income. The State has rich animal resources by variety and number with low productivity of the majority of its livestock and birds. It is deficient in animal origin food. In terms of Livestock Census-2007, the population of animals and birds was as follows.

Table 5.4.4 Population Trend of Livestock in Tripura

Livestock	Livestock Census 2007	Livestock Census 2012
Cattle (Cross Breed)	73,537	74,883
Cattle (Indigenous)	874,735	1,102,167
Buffalo	14,160	14,693
Goat	645,614	875,274
Sheep	3,646	3,714
Pig	263,659	332,210
Poultry	2,486,985	2,804,675

Source: Animal Resource Development Department, Gov. of Tripura

Per capita availability of milk, meat and egg has been 82 gm/day, 6.81 kg/year and 45 nos/year respectively during 2011-12. State availability was 45 eggs per year against national average of 55 eggs per year. However, in milk production, the State was far behind when compared to the national average. Per capita availability was 82 gm per day, whereas the national average was 292 gm per day. The trend of production of livestock products in last 10 years is presented in the following table.

Table 5.4.5 Livestock Production in Tripura in Last 10 years

Item	Unit	Production in 2001-02	Production in 2010-11	Average Annual Growth Rate	
				Tripura	All India
Milk	MT	79,031	110,300	6.7%	4.6%
Meat	MT	7,274	25,000	4.8%	5.7%
Egg	Million Nos.	108	165	5.1%	4.6%

Source: Economic Review 2011-12, Gov. of Tripura

Current issues and constraints in animal husbandry in Tripura are listed as follows[9].

Source: JICA Survey Team
Land Preparation in Patta Land (Dhalai District)

- Filling Gap in Milk Production: The State has been facing a number of challenges in boosting up production of milk. It is, therefore, essential to undertake special drive for augmenting productivity of cattle to mitigate the gap between requirement and availability of milk since no cold chain has developed.
- Feed Cost: High feed cost makes rearing of cross bred cows expensive particularly for the small and marginal farmers.
- Land availability for fodder cultivation: There is lack of pasture land and land for fodder cultivation. Land is put to other gainful uses leaving little scope for fodder cultivation. For example, due to lucrative income, people prefer to use their land for rubber plantation instead of fodder cultivation and dairy milk farming. Development of perennial fodder plots in each block will greatly facilitate dairy development in the State. The available panchayat or individual farmers land may be utilised for developing the community grazing/pasture land without altering its ownership and providing suitable incentive. In case of patta holders under Forest Right Act, the farmers may be encouraged to go for developing perennial fodder after performing necessary land development activities in their allotted land.
- Additional care for pregnant milch cows: Pregnant milch cows require additional care by way of feed supplementation for nourishment of the fetus and also for augmentation of milk production.
- Infertility: It has been observed that fertility is a major problem (in indigenous population 30% and in CB around 20%). Fertility Management Camps and Reproductive Health Camps may be organised on a regular basis.
- Inadequacy of extension support: There is a need to increase the veterinary centres to cater to the growing livestock population. The Department may also promote private veterinary Institutions by encouraging veterinary graduates in potential pockets with institutional credit from banks. The graduates can also establish AI centres for improving the quality of animals.
- Egg Productivity: Demand for egg has been growing faster with the inclusion of egg (at least twice in a week) as nutritional supplement in the Mid Day Meal Programme of the State Govt. Strengthening of government poultry farm to supply required number of germ plasm is the priority area for implementation. At present, three major farms located at Gandhigram in West Tripura, Panisagar in North Tripura and Udaipur in South Tripura districts are supplying birds to the Brooder Houses/field. All these farms need to be strengthened/expanded to cater to the need of supplying adequate number of germ plasm.
- Awareness on Egg Production: It has been observed that there is lack of interest among the poultry farmers for vaccination of their birds against Ranikhet disease.

[9] Source: State Focus Paper Tripura 2014-15, NABARD

- Exotic Piggery: Popularisation of exotic piggery through beneficiary oriented scheme may be adopted. Government Pig Breeding Farms may be strengthened to increase supply of exotic germ plasm to the farmers.
- Pig Feed: Ingredients for pig feed are scarce. Promotion of piggery and goatery in FRA areas and cultivation of tapioca in forest land now available with people is the way forward. In order to reduce the cost of maintenance of piggery units, farmers may be encouraged to grow Tapioca. It is estimated that as much as 30% concentrate feed can be replaced by providing Tapioca.

5.4.4 Fishery

Fishery sector has significant contribution towards food and nutritional security and employment generation in Tripura. Fish is important food of diet for 95% of the population of the state. It is reported that the state annual consumption per capita is the highest among the inland states in India. Realising the importance of fish for the people and economy of the state and its low per capita availability from local production an eight year Perspective Plan of the state to attain nutritional self sufficiency in fish was implemented during the period 2004-12. An area of 33,217 ha (i.e. 3.1% of the total geographical area of the State) is presently under use for fish production in the State. Area under capture fisheries constitutes 23.72%, with remaining 76.28% under culture fisheries.

Current issues and constraints in fishery in Tripura are listed as follows[10].

- Culture fishery is going to be the key to the required increase in fish production in the State. The state has a total culturable area of 23,484 ha (2011-12). There is need to create new culturable area as well as reclaim existing culturable resources to achieve the required fish production.
- Reclamation of old water bodies: Reclamation of existing water bodies is highly needed to increase water retentivety and productivity. As per survey of 2010-11, a total of 2738.13 ha of existing water area in the State needed reclamation. This may be accorded priority.
- Non-perennial Resources: The State has given considerable emphasis on adopting scientific fish culture in water bodies which were perennial in nature and of below 2 ha. This has left a considerable water resources which are non-perennial in nature (retaining water for 6 to 8 months) or were beyond 2 ha in size (big water body) under traditional fish culture. Scientific utilisation of these water bodies naturally would have resulted in significant increase in fish production. The total available area of non-perennial water bodies in the State was 3,359.04 ha, being 14.3% of the total available resources. Water bodies beyond 2 ha in size accounted for 2.7% of the total available resource. Schemes for gradually bringing in both these type of water bodies under scientific fish culture may be accorded priority.
- Inadequate Input application: One of the major factor leading to shortfall in productivity was inadequate input application, especially supplementary feed by farmers who undertook culture without any input assistance from the government.
- Human resource development: Human resource development is one of the most important requisites of any development activity. This has to be both for in-service personnel and fish farmers.
- Post harvest facilities: Increased fish production will also necessitate development of need based post harvest facilities for preservation, transport of produce to the markets, construction of new markets, wholesale and retail marketing facilities etc.

[10] Source: State Focus Paper Tripura 2014-15, NABARD

5.5 Rural Infrastructure

5.5.1 Irrigation

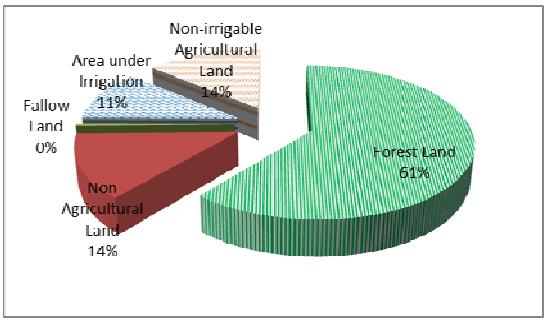
(1) Land use pattern

The area under irrigation as of March 2014 is 112,806 ha, which is about 44% of cultivable land area and 11% of the whole state area as seen in Table 5.5.1 and Figure 5.5.1.

Table 5.5.1 Land Use Pattern in Tripura

Land use pattern	Land use area	
	(ha)	(%)
Non-irrigable Agricultural Land	143,480	13.9
Area under Irrigation	112,806	11.0
Fallow Land	3,925	0.4
Non Agricultural Land	139,678	13.6
Forest Land	629,429	61.2
Total	1,029,318	100.0

Source: "Journey of Tripura, Irrigation and Flood Control, Government of Tripura, PWD (Water Resources)"



(as of 31 March 2014)

Source: "Journey of Tripura, Irrigation and Flood Control, Government of Tripura, PWD (Water Resources)"

Figure 5.5.1 Land Use Pattern in Tripura

(2) Advancement of irrigation from 1972 to 2014

The area under irrigation has increased from 1,956 ha (in 1972) to 4,383 ha (in 1978), and 40,383 ha (in 1998) to 112,806 ha (in 2014). This expansion of irrigation area was realised by the emphasis of the state government, cooperation of people and concerted effort of the departments of Public Works (Water Resources), Rural Development, Agriculture and Forest, and Tripura Tribal Areas Autonomous District Council (TTAADC).

(3) District wise irrigation area

The percentage of irrigation area to cultivated land area is lower in West Tripura District (36%) and Sipahijala District (39%). The districts occupy the northwestern part of the state, where land seems flatter comparatively. The rate is higher in Unakuti (55%) and Gumti (53%) districts.

Table 5.5.2 District-wise Area Brought under Irrigation up to 31 March 2014

District	Area of land under cultivation (ha) (a)	Irrigable land (ha) (b)	Area brought under irrigation (ha) (c)	added columns by the JICA Team			
				(d)=(b)/(a)	(e)=(c)/(a)	(f)=(c)/(b)	Remarks
West Tripura	41,940	15,227	15,194	0.36	0.36	1.00	
Sipahijala	39,891	16,129	15,463	0.40	0.39	0.96	
Khowai	40,179	15,660	16,456	0.39	0.41	1.05	(c): as original
South Tripura	35,278	19,301	17,889	0.55	0.51	0.93	
Gumti	37,495	20,105	19,980	0.54	0.53	0.99	
Unakuti	17,284	11,293	9,573	0.65	0.55	0.85	
North Tripura	20,792	8,933	8,382	0.43	0.40	0.94	
Dhalai Tripura	22,382	10,352	9,869	0.46	0.44	0.95	
Total	255,241	117,000	112,806	0.46	0.44	0.96	

Source: "Journey of Tripura, Irrigation and Flood Control, Government of Tripura, PWD (Water Resources)"

(4) Department-wise irrigation area

As shown in Table 5.5.3 and Figure 5.5.2, the Public Works Department (Water Resources) developed 68% of the irrigation area and the Rural Development Department did 27%. The Agriculture Department, Tripura Tribal Area Autonomous Development Council (TTAADC), and the Forest Department also expanded the irrigation area but the shares are small.

Table 5.5.3 Department-wise Irrigation Area in Tripura

Department	Area under Irrigation	
	(ha)	(%)
PWD (Water Resources)	76,616	67.9
RD Department	30,642	27.2
Agriculture Department	3,594	3.2
TTAADC	1,069	0.9
Forest Department	885	0.8
Total	112,806	100.0

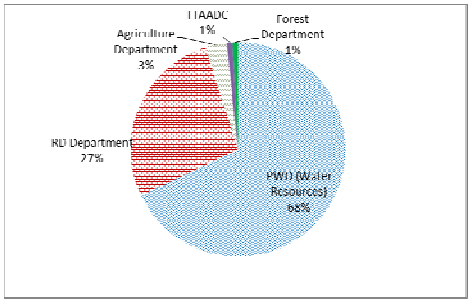


Figure 5.5.2 Department-wise Irrigation Area in Tripura

Source "Journey of Tripura, Irrigation and Flood Control, Government of Tripura, PWD (Water Resources)"

(5) Type of irrigation scheme under PWD (WR)

Lift Irrigation (LI), Deep Tube Well (DTW) and Diversion types accounted for 85%, 12%, and 2.3%, respectively of the number of irrigation schemes implemented by the Public Works Department (Water Resources) (PWD (WR)), as presented in Table 5.5.4. Other types including high power LI, pick-up weir and so on are built up not so many up to 31 March 2014.

Table 5.5.4 Type of Irrigation Scheme by PWD in Tripura

Scheme type	(Nos.)	(%)
Lift Irrigation Schemes	1,588	84.6
Deep Tube Well Schemes	232	12.4
Diversion Schemes	44	2.3
High Power LI Schemes	7	0.4
Medium Irrigation Schemes (on going)	3	0.2
Pick-up Weir	4	0.2
Total	1,878	100.0

Source: "Journey of Tripura, Irrigation and Flood Control, Government of Tripura, PWD (Water Resources)"

(6) Important ongoing projects of PWD (WR)

The total number of important ongoing projects is 52. The breakdown is as follows:

- Diversion schemes: 4 nos., 602 ha in total
- Minor irrigation storage schemes: 10 nos., 1444 ha in total
- Lift irrigation schemes: 3 nos.
- Deep tube well schemes: 35 nos.

(7) Medium irrigation

The present status of four medium irrigation projects are presented in the pamphlet of PWD (WR) and in Table 5.5.5. The work under the Khowai Medium Irrigation Project has been completed. Except for a small portion, the work under the Gumti Medium Irrigation Project is nearly completed. The work under the Manu Medium Irrigation Project will still take some more time for completion.

Table 5.5.5 Status of Medium Irrigation Project in Tripura

Name	Designed command area (1) (ha)	Present coverage (2) (ha)	Coverage rate (2)/(1) (%)	Main canal done (km)	Branch canal done (km)	Structure (Nos)
Gumti	4,486	3,383	75	44.00	9.00	138
Khowai	4,515	4,515	100	31.02	14.50	385
Manu	4,198	1,710	41	17.00	5.00	78
Kalshi	1,950	300	15	12.16	0.00	32
Total	15,149	9,908	65	104.18	28.50	633

Source "Journey of Tripura, Irrigation and Flood Control, Government of Tripura PWD (Water Resources)"

(8) Action Plan for 2014-15, 2015-16, and 2016-17

The action plan has been taken to bring more 27,577 ha (Table 5.5.6) of cultivable land under irrigation coverage for the period between 2014-15 and 2016-17, which would give a cumulative expansion of irrigation up to 140,383 ha. The target works of PWD (WR) in 2014-15 are shown in Table 5.5.7.

Table 5.5.6 Irrigation Action Plan for 2014-15 to 2016-17 in Tripura

Year	Minor Irrigation (ha)			Medium Irrigation (ha)	TOTAL (ha)
	PWD (WR)	Other Deptts.	Total		
2014-15	7,979	1,153	9,132	2,705	11,837
2015-16	3,641	600	4,241	886	5,127
2016-17	9,063	1,550	10,613		10,613
Total	20,683	3,303	23,986	3,591	27,577

Source: Journey of Tripura, Irrigation and Flood Control

(9) Farm Household Survey (Attachment-1.5.1)

As to the major constraints in agricultural production, 81% of North Tripura farmers and 52% of West Tripura farmers pointed out the lack of irrigation facility, and 22% of the former and 64% of the latter indicated the lack of irrigation water.

Collected data of irrigation water source are shown in Table 5.5.8, in which pond/tank/reservoir, river/stream, and others are the main sources in North Tripura, while canal is the main source in West Tripura.

Table 5.5.7 Target Irrigation Works in 2014-15 in Tripura

	Scheme by PWD (WR)	(Nos.)
i	Lift irrigation	24
ii	Deep tube well	89
iii	Diversion	5
iv	on-going Medium Irrigation	3
v	Minor Irrigation storage	17
	Total	138

Source: Journey of Tripura, Irrigation and Flood Control, Government of Tripura PWD (Water Resources)

Table 5.5.8 Irrigation Water Source in Farm Household Survey in Tripura

District/State	source: Main/sub	Irrigation water source (nos.)								
		Canal 1	Pond/tank/ reservoir 2	River/ stream 3	Spring 4	GW by dug well 5	GW by tube well 6	Others 7	Total	No answer
North Tripura	Main	0	17	15	0	0	0	10	42	
	Sub	0	0	1	0	0	0	4	5	
	total (nos)	0	17	16	0	0	0	14	47	3
	(%)	0.0	36.2	34.0	0.0	0.0	0.0	29.8	100.0	
West Tripura	Main	43	7	0	0	0	0	0	50	
	Sub	0	0	0	0	0	0	0	0	
	total (nos)	43	7	0	0	0	0	0	50	
	(%)	86.0	14.0	0.0	0.0	0.0	0.0	0.0	100.0	
Tripura	Main	43	24	15	0	0	0	10	92	
	Sub	0	0	1	0	0	0	4	5	
	total (nos)	43	24	16	0	0	0	14	97	
	(%)	44.3	24.7	16.5	0.0	0.0	0.0	14.4	100.0	

Note: GW = Groundwater
Source: Farm Household Survey, JICA Survey Team

None of the informants have micro-irrigation facilities. Likewise none of them are members of a water user association (WUA) because a WUA in the area has not been organised and there is no/little information about it.

In response to a question whether improvement of irrigation system is necessary or not, 84% of North Tripura farmers answered "necessary", but all the farmers of West Tripura said "not needed". Farmers of North Tripura who affirmatively responded selected the following types of improvement: drainage canal improvement/construction (85.7%), improvement/ repair of diversion weir/pump (7.1%), and improvement/ repair of irrigation canal structure (2.4%).

5.5.2 Rural Road

Road transport is not only the dependable means of transport but also lifeline of the state through its hilly terrain. The National Highway (NH-44) is the only link road with the rest of the country which passes through the states of Meghalaya and Assam. International bus service between Agartala and Dhaka was introduced in 2003 and now, people of the state enjoy road transport facilities to Kolkata via Dhaka bus service, which saves money as well as time for the people. (*Source: "Economic Review of Tripura 2012-13, DES PD, GoT"*)

5.5.3 Rural Water Supply

Recently, the State Public Works Department (PWD) – Drinking Water and Sanitation (DWS) wing has given priority to surface water supply schemes including mini treatment plants in remote rural areas, particularly where drilling of deep tube well (DTW) is not feasible and also where population growth is high. PWD (DWS) is also considering introduction of deeper drilling rig machines for sinking of DTWs particularly in hilly areas where suitable water bearing strata is available at much lower depth. PWD has also attached top priority to the installation of Iron Removal Plants (IRPs), since the underground water is mostly infested with high iron content.

As seen in Table 5.5.9, a lot of road side stand post and spot sources are functioning. As main source of drinking water in the rural area, uncovered well occupy 32% of the households as presented in Table 5.5.10.

Table 5.5.9 Status of Water Supply in Tripura

As of 1st April, 2013

Water Supply	Unit	Rural	Urban	Tripura
Deep tubewell in operation	nos.	1,259	124	1,383
Overhead reservoir commissioned	nos.	79	52	131
Iron removal plant commissioned	nos.	567	59	626
Pipeline laid	km	8,101	1,345	9,446
Water treatment plant	nos.	29	14	43
Small bore tube well	nos.	1,926	8	1,934
Domestic connection	nos.	7,974	50,376	58,350
Road side stand post	nos.	32,460	6,342	38,802
Functioning spot sources	nos.	24,416	-	24,416
Population covered with piped WS scheme	nos.	2,238,183	690,952	2,929,135

Source: PWD (DWS) Department, Tripura

Table 5.5.10 Main Source of Drinking Water in Tripura

	Main source of drinking water (2011)	Tripura (Households)			Tripura (%)			All India (%)
		Rural	Urban	Tripura	Rural	Urban	Tripura	
1	Tap water	152,888	126,901	279,789	25.2	54.0	33.2	43.5
	from treated source	(69,003)	(102,164)	(171,167)	(11.4)	(43.5)	(20.3)	(32.0)
	from un-treated source	(83,885)	(24,737)	(108,622)	(13.8)	(10.5)	(12.9)	(11.6)
2	Well	215,219	15,357	230,576	35.4	6.5	27.4	11.0
	Covered well	(21,196)	(3,147)	(24,343)	(3.5)	(1.3)	(2.9)	(1.6)
	Un-covered well	(194,023)	(12,210)	(206,233)	(31.9)	(5.2)	(24.5)	(9.4)
3	Hand pump	102,071	50,294	152,365	16.8	21.4	18.1	33.5
4	Tubewewll/Borehole	98,270	38,710	136,980	16.2	16.5	16.3	8.5
5	Spring	15,769	191	15,960	2.6	0.1	1.9	0.5
6	River/Canal	14,954	460	15,414	2.5	0.2	1.8	0.6
7	Tank/Pond/Lake	3,772	303	4,075	0.6	0.1	0.5	0.8
8	Other sources	4,836	2,786	7,622	0.8	1.2	0.9	1.5
	Total	607,779	235,002	842,781	100.0	100.0	100.0	100.0

Source: Census of India, 2011

According to Farm Household Survey, 74%, 24%, and 8% of North Tripura informants have access to tap water, tube well, and tank/pond/lake for drinking water, respectively. In the district, 64% of the interviewees said that water is sufficient and 36% said otherwise. In West Tripura, 100% of informants get their drinking water from tap water as main source and shallow well as the second source.

5.5.4 Rural Electricity

Being endowed with natural gas, Tripura has two sources of generation mainly, thermal (93%) and hydro (7%). The present peak power demand of the state is 240 MW. Total available generating capacity of the state is 93 MW (113-20), and 95 MW is available from north-eastern power grid. With the new power projects, Tripura has become a surplus power state with 50 MW in peak hour and 100 MW in off peak hour. The total unit sold in 2012-13 was 998.37 MU (GWh), of which domestic consumption was 365.47 MU, irrigation/public water purposes were 98.81 MU, commercial consumption was 67.18 MU and industrial was 37.99 MU. According to the "Census of India, 2011", sources of lightning in rural area in 2011 are: electricity (59.5%), kerosene (37.7%), solar (2.2%), other oil (0.2%), any others (0.04%), and no lighting (0.4%)[11].

From the results of the Farm Household Survey, 94% of informants in North Tripura have electricity connected to the power grid as main source of light, and 100% of them in West Tripura received power from the grid and use kerosene lamp as second source of light.

5.6 Market, Distribution, and Processing of Agricultural Produces

5.6.1 Market

In Tripura, there are 554 (daily, weekly, biweekly) agricultural markets of different sizes, out of which 31 are daily markets. There are about 84 major wholesale aggregation markets in Tripura including 21 regulated markets managed by the Agricultural Produce Marketing Committee (APMC).

Tripura has notified the reforms in their APMC Act as suggested in the Model Market Act circulated by the Department of Agriculture and Cooperation. But the present State Market Act and Regulation

[11] Economic Review of Tripura 2012-23, DES-PD, the Government of Tripura.

did not adopt the new provisions of the Model Market Act fully, and then direct retailing by producers is prohibited yet in these markets as well as contract production by producers. Revision of the Act and Regulation is ongoing and above condition will be improved soon.

(1) Management System

All markets belong to the Tripura Agricultural Produce Market Board (TAPMB). Under TAPMB, regulated markets are managed by APMC and the rest are managed by each community. The organisation of market management differs between the Autonomous Area of Tribes and other areas as shown in Table 5.6.1.

Table 5.6.1 Market Management Institutions Other Than APMC in Tripura

Category	Tribal Autonomous Area	Other Area
District	Tripura Tribal Area Autonomous District Council (TTAADC)	Zilla Panchayat
Block	Block Advisory Council	Panchayat Sarity
Village	Village Development Council	Gram Panchayat

Source: Marketing and Statistics Section, Department of Agriculture, Tripura State

As same as Meghalaya, in the rural markets, market stalls are not properly laid down and are mostly of temporary structure (broken and in shambles) made of thatches and bamboo. Basic amenities like auction yard, storage facilities, drainage and pavement, parking facilities, and supply of drinking water are generally not available in these markets.

Source: JICA Survey Team
Fishes from Bangladesh (big) and local fish in Bisalgash Market

(2) General Condition

The rural markets in Tripura are generally similar to Meghalaya, and perform three functions: (i) selling of local produce within the area, (ii) assembly of local products for selling to other areas, and (iii) retailing of wholesale lots from other areas in the local area. Markets mix the functions of wholesaling and retailing.

Source: JICA Survey Team
Market in Teliamura

The market stalls are not properly laid down and are mostly of temporary structure (broken and in shambles) made of thatches and bamboo. Basic amenities like auction yard, storage facilities, drainage and pavement, parking facilities, and supply of drinking water are generally not available in these markets.

Other findings are as follows:

- Almost all agricultural products come in Tripura markets from other states and Bangladesh through the year. Even in January during the survey time, the production season of local vegetables, many products like potato, onion, tomato, carrot, green bean and cauliflower are imported from outside the state, and these products could be seen in the markets together with local products like cabbage, potato, pumpkin and leafy vegetables.
- Animal meat, egg, potato, onion, garlic, and fish are the popular import products same with other states in the north eastern region (NER). Fish is imported from Bangladesh as well as Andhra Pradesh and are being sold with local fish.

- Horticulture Development Plan (2002-2012)[12] targets a surplus to the local demand of 4.7 lakh tons from 6.1 lakh tons of fruits production and 1.4 lakh tons from 5.5 lakh tons of vegetable production. The market information provided by the stakeholders showed huge volume of various horticultural products arriving from outside the state and the local production is still far below the local demand.

(3) Storage Facilities

In Tripura, warehouses used for storage of grains, mainly rice, are 46,130 MT in capacity in total and almost all of which belong to government organisations such as the National Warehouse Organisation and the Co-op Society except for storages regarding public distribution system (PDS).

On the other hand, there are 14 existing cold storage facilities that can be used for vegetables and fruits and six more are under construction as shown in Table 5.6.2. Amongst the 14 existing cold storage facilities, 11 facilities belong to the Department of Agriculture (DoA), while the two facilities are owned by private enterprises and the remaining is owned by the cooperative. All cold storage facilities of DoA are used by the seed growers for storage of seed potatoes from April to October after harvesting while growers pay an amount of Rs.1.3/50 kg (bag) during the period and these are not used for general commercial activities like distribution facilities. DoA plans to use the six new cold storage facilities for the same purpose i.e., for storage of seed potatoes. Only the two private enterprises may use their facilities for commercial activities.

Table 5.6.2 Cold Storage Facilities in Tripura

No	Name	Location	Ownership	Capacity (MT)		
				Total	Potato	Fruits and Vegetables
1	Teliamura	Gamaibari, Talimura, Khowai Dist.	DoA	500	500	
2	Melaghar	Chandigarh, Melaghar, Sipahijala	DoA	3,500	2,500	1,000
3	Baikhora	Santirbazzar, South Dist.	DoA	2,000	2,000	
4	Satchand	Silachhari, Sabroom, South Dist.	DoA	1,000	750	250
5	Kumarghat	Kumarghat, North Dist.	DoA	2,000	2,000	
6	Sherowali Himghar Private Ltd.	Mara Cowmuhani, West Dist.	Private	5,000	2,500	2,500
7	Haflong	Haflong, Dharmanagar, North Dist.	Private	5,000	5,000	
8	Khumataya cold storage	Badharghat, Agartala	MARKFED (Coop.)	2,000	No operation at present	
*	Khowai	Singicherra, Khowai	DoA	1,000		
*	Udaipur	R.K.Pur, Gomati Dist.	DoA	2,000		
*	Belonia	Belonia, South Dist.	DoA	2,000		
*	Amarpur	Dalak, Gomati Dist.	DoA	1,000		
*	Dharmabnagar	North Dist.	DoA	2,000		
*	Ambassa	Ambassa, Dhalai Dist.	DoA	1,000		

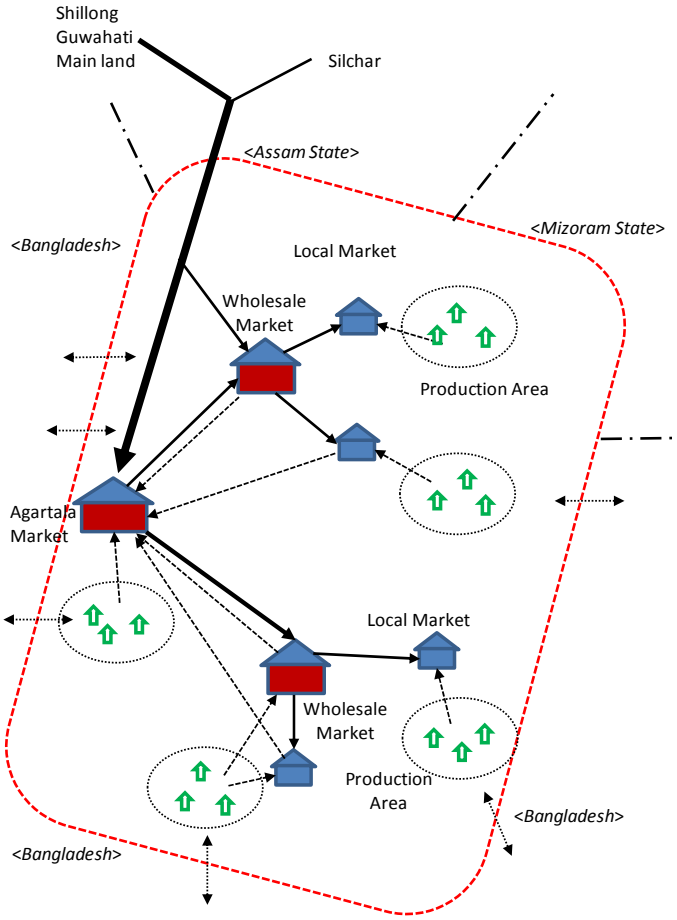
*Note: *) Under Construction*
Source: DoA, Tripla State,

[12] "Respective Plan (2002-2012) for Development of Horticulture in Tripura", Directorate of Horticulture and Soil Conservation, Department of Agriculture, Government of Tripura

5.6.2 Distribution of Agricultural Produces

(1) Distribution Route

Almost all agricultural products from the other states and Bangladesh come in Tripura markets throughout the year. Local surplus products are mainly transacted in the rural markets and some of them are distributed to city markets like in Agartala. These routes are illustrated in Figure 5.6.1.



Source: JICA Survey Team

Figure 5.6.1 Distribution Routes of Agricultural Produces in Tripura

Characteristics of the distribution system are as follows:

- Even if Tripura State is located far distant from the mainland of India, various products such as animal meats, eggs, and fishes come in from mainland of India taking more than a week and cost for transportation.
- In summer, imported vegetables are mainly from the Shillong area while in winter they come from Barpeta and Kharupatia areas. Some vegetables are coming via Silchar from its hinterland.

Source: JICA Survey Team
Imported Eggs
(Bisalgash Market)

- Amongst the imported products from Bangladesh, fresh and dry fish is the major product but various vegetables arrive even in small units to meet the market demand. On both sides of the border line with Bangladesh, their agro-ecological conditions are the same and a more flexible

transportation of products beyond the border may exist amongst villagers.

- Agartala is the major market in the state accessed by the villagers for sourcing of inputs, households' commodities, and selling of agriculture and livestock-based products. It is said that Dharamnagar and Silcher (Assam) are such major markets for the villagers in North District.

(2) International Trade with Bangladesh

There are a total of eight land custom stations (LCSs) but only seven LCS is being operated. The trade volume by each LCS is shown in Table 5.6.3. The data shows more import volume than export which is an opposite condition to the experience of Meghalaya and Assam states.

Table 5.6.3 Export and Import by LCSs in Tripura (2013-14)

LCS	Export (Rs. Lakh)	Import (Rs. Lakh)	Major Export Commodities	Major Import Commodities
Agartara	36	16,430	Paper, rubber tread, mango, iron products, bamboo, dry fish, dry chili	Crushed stone, float glass, cement, plastic products, iron processed, furniture, fish
Srimantapur	5	2,714	Raw hide, sanitary ware, palm oil, agarbatti, motorcycle parts	Crushed stone, brick crusher, cement, plastic products, iron processed
Dhalaighat	0	0	Passengers movement only	
Khowaighat	0	92		Cement, stone chips, brick, tile, plastic products
Manu	1	585	Banana, fruits	Cement, processed food, crushed stone, furniture, plastic products, fish
Muhurighat	0	3,516		Crushed stone, cement, fish, processed food, furniture, plastic products, brick
Old Ranghnabazar	1	121	Citrus fruits, jackfruits, betel leaves, ginger, fruits	Weavings, plastic products, fish, soap, processed drinks, fishing net, brick

Source: "Land Custom Station at a Glance, 2014", Commissionerate of Custom NER

(a) Border Haat (Market)

The Government of Tripura State plans to regulate traditional informal trading by constructing a net fence at 140 m (150 yards) from inside the border, which was completed along the border line excluding about 100 km. However, many people in the markets said that informal trade with Bangladesh has not reduced significantly yet.

Source: JICA Survey Team
Border Haat

Under such situation, the Border *Haat* in Srinagar near Sabroom just inside of the fence mentioned above was constructed and has started its operation recently through an agreement made with the Bangladeshi government. It is expected that the local retail market for the villagers on both sides, where 25 retailers of villages in both sides each who registered in advance retail various commodities including agricultural products. Transactions in the *Haat* are exempted from trade tax and the District Council managing the *Haat* said that some charges may be collected in the future for the maintenance of the facility. The

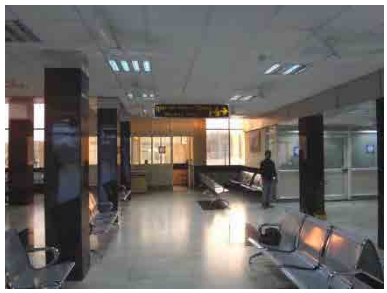
function of the Haat is followed to the traditional informal trading of villagers and will not affect official export to Bangladesh.

Source: JICA Survey Team
Border Fence near Haat

(b) Integrated Check Point (ICP)

The Government of India (GoI) has upgraded the LCS in Agartala as an Integrated Check Point (ICP) after Atari (near Wagha) in Punjab. This is the first ICP located in Bangladesh border. Similarly, more ICPs will be put up in Manipur in Myanmar border, where work is in progress for ICP.

The ICP has been set up in 12 acres of land. It accommodates airport-type facilities with online system for immigration and custom clearance. In the ICP, there are healthcare facility, prayer room, provisions for quarantine, bank counter, warehouses for transit storage, cold storage facility, and a cargo complex for incoming and outgoing materials. The Central Ware Housing Corporation is designated as the materials custodian. Similar facilities have not yet materialised on the Bangladeshi side. However, in the future, there is a possibility for both countries operating together in the same complex.



Source: JICA Survey Team
Passengers Area in ICP

The minimum import duty in Bangladesh is 68% for agriculture produces. This goes up depending on the produce. This is affecting the export of agriculture produces from North East India. However, import duty in India is 0%, guided by the South Asian Free Trade Agreement (SAFTA). There is a provision of Countervailing Duty (CVD) of 5-7% to protect the local industry. Therefore, the cold storage and warehouses in the ICP have not been used well for export commodities yet.

(c) Information From Exporters

- Through informal trade, jackfruit and orange go to Bangladesh. Informal trading is practised mainly in non-fenced areas (about 100 km of boarder line). The high transportation cost is also affecting trading of agriculture produces. It is cheaper for Bangladesh to import from West Bengal than from North East India. If transit is allowed in Bangladesh, there is a possibility to distribute local agricultural products to mainland of India directly avoiding the long route via the chicken neck and even exporting to third countries like the Arab countries. In the future, there is a possibility of exporting jackfruit and pineapple through formal trade.
- About 5-6 years back, 50 tons of dry fish were exported, which have now been stopped because the Marine Products Export Development Authority (MPEDA) requirement of processing centre is applied as a main condition, also the registration is only for one year affecting the export of dry fish. It is not viable to set up a processing unit for dry fish costing an amount of Rs.1.5 crore in Tripura.
- Similarly, there is a need for export licence for each spice, which need to be obtained from the Spices Board located far off in Kerala. As exporters deal in small volume and multiple products, they expect single licence and/or single window system.
- Recently, the PDS for rice was transported by FCI from Kolkata through Bangladesh. Similarly, heavy hydropower generators were brought from Andhra Pradesh through Bangladesh. The

Government of India is planning to assist in the development of a four-lane road from Asugang Port to Agartala. Additionally, up-gradation of railway line to broad gauze has taken place. Tripura is likely to become as a trading hub, more as a gateway to South East Asia through Chittagong Port in Bangladesh.

(3) Findings of the Farm Household Survey

Major findings of the Farm Household Survey carried out in two blocks in North Tripur and three blocks in West Tripura are as follows:

(a) Post-harvest processing field

Paddy, as the main product, is subjected to various processing like threshing and drying even by traditional way without machine, while other products are not provided special treatment and few cases showed that producers wash, clean, and grade by size their products by hands.

1) Storage conditions of products

For products listed in Table 5.6.4, bag is the major and only container for storage in both surveyed areas except for bamboo basket which is used for paddy in the area of North Tripura. “On the ground of the house” is only the storage place chosen for the six listed products in West Tripura. Paddy as the only product in the area of North Tripura is mainly stored in sheds and on the ground of the house in a few cases.

Table 5.6.4 Storage Conditions of Produces by Farmers in Tripura

		N. Tripura	West Tripura					
	Product	Paddy	Beans	Bitter gourd	Chilli	Paddy	Potato	Radish
	No. of respondent	47	38	29	46	13	48	34
Storage way	Bulk	0	0	0	0	0	0	0
	Bag	47	38	29	46	13	48	34
	Wooden Box	0	0	0	0	0	0	0
	Bamboo Basket	10	0	0	0	0	0	0
	Plastic corner	0	0	0	0	0	0	0
	Metal Bin	0	0	0	0	0	0	0
	Others	0	0	0	0	0	0	0
Storage place	Storage Shed	47	0	0	0	0	0	0
	On ground in house	3	38	29	43	13	45	34
	On floor in house	0	0	0	3	0	3	0
	Others	0	0	0	0	0	0	0

Source: Farmer Household Survey, JICA Study Team

2) Storage period

The storage period of above products is very short at an average of less than four weeks even for paddy. Respondent farmers may be commercialised already.

Table 5.6.5 Storage Periods of Produces in Tripura

	Products	No. of Responde	Storage Period (day)		
			Min.	Max.	Average
N. Tripura	Paddy	50	15	30	27
W. Tripura	Beans	38	2	2	2
	Bitter gourd	29	2	2	2
	Chilli	46	2	90	8
	Paddy	13	7	30	12
	Potato	47	2	15	6
	Radish	34	2	2	2

Source: Farmer Household Survey, JICA Study Team

3) Constraints

It is noted that the "lack of labour" is the first constraint and "lack of storage facilities" follows in the area of North Tripura. In West Tripura, the major constraints are "lack of storage facilities" and "lack of skills and knowledge on post-harvest treatment".

Table 5.6.6 Constraints of Post-harvest Processing in Tripura

	North Tripura		West Tripura	
No. of Respondent	50	(%)	50	(%)
Lack of labour	8	16.0	4	8.0
Lack of skills and knowledge on post-harvest treatment.	0	0.0	11	22.0
Lack of storage facilities	7	14.0	28	56.0
Lack of processing machines.	0	0.0	1	2.0
Others	0	0	0	0.0

Source: Farmer Household Survey, JICA Study Team

(b) Marketing field

1) Sales place, time, and buyer

The respondents in the surveyed area in North Tripura who provided answers on paddy sell their products at the village market to retailers as well as consumers when they need cash. The respondents in West Tripura who responded vegetables as their products sell their produce at the village market immediately after harvest mainly to retailers.

Table 5.6.7 Sales Place, Time and Buyer of Produces in Tripura

North Tripura

Sales Place	1st	2nd	Sales Time	1st	2nd	Buyer	1st	2nd
Farm gate	0	0	Immediately after harvest	0	0	Consumer	5	0
Village market	13	0	when cash is needed	13	0	Retailer	0	0
Roadside market	0	0	When price is high	0	1	Collector/Broker/Agent/Wholesaler	8	3
Urban market	0	0	Others	0	0	Processing factory	0	0
Outside state	0	0				Others	0	0
Others	0	0						

West Tripura

Sales Place	1st	2nd	Sales Time	1st	2nd	Buyer	1st	2nd
Farm gate	3	0	Immediately after harvest	50	0	Consumer	0	4
Village market	47	0	when cash is needed	0	0	Retailer	50	0
Roadside market	0	0	When price is high	0	0	Collector/Broker/Agent/Wholesaler	0	1
Urban market	0	0	Others	0	0	Processing factory	0	0
Outside state	0	0				Others	0	2
Others	0	0						

Source: Farmer Household Survey, JICA Study Team

2) Mode of transportation and packaging

In the area of North Tripura, the number of respondents is very little therefore it is difficult to determine their sales behaviour. They may transport their products to village market by foot, by cart or by bicycle, and also sell to collectors/middlemen coming to their villages in bulk. In West Tripura, they use their bicycles in transporting their products to nearby markets and rely on collectors/ middlemen coming to their places for bulk sales.

Table 5.6.8 Mode of Transportation and Packaging in Tripura

North Tripura

Transportation Way	1st	2nd	Package	1st	2nd
On foot	1	0	No arrangement	28	0
Collected by collector/middleman	2	0	Bags	18	0
Cart	4	0	Bomboo basket	4	0
Truck	1	0	Wooden box	0	0
LMV	1	0	Others	0	0
Three wheeler	0	0			
Motorcycle	0	0			
Bicycle	4	0			
Others	0	0			

West Tripura

Transportation Way	1st	2nd	Package	1st	2nd
On foot	0	0	No arrangement	36	1
Collected by collector/middleman	3	0	Bags	2	3
Cart	0	0	Bomboo basket	3	0
Truck	0	3	Wooden box	0	0
LMV	0	0	Others	0	0
Three wheeler	0	0			
Motorcycle	4	0			
Bicycle	43	0			
Others	0	0			

Source: Farmer Household Survey, JICA Study Team

3) Market information

Only a few respondents in North Tripura get their market information from “shops in the village”. In contrast, almost all respondents in West Tripura received market information from “neighbours/relatives”. The agricultural marketing information system by SMS (mobile phone) is not yet popular in Tripura.

Table 5.6.9 Sources of Market Information in Tripura

Item	N. Tripura	W. Tripura	Total
Neighbours/Relatives	0	50	50
Radio	0	0	0
Shops in village	14	3	17
Mobile Phone	0	0	0
Newspaper	0	4	4
Trader/ Retailers in market	0	0	0
TV	0	3	3
Trader coming to village	0	0	0
Government officials/ Extension officer	0	0	0
Others	0	0	0

Source: Farmer Household Survey, JICA Study Team

4) Constraints

The major constraints in the area of North Tripura are “low price” and “limited buyer”. “Fluctuation of price”, “difficulty of market access” and “lack of transportation facilities” are major constraints in West Tripura.

Table 5.6.10 Constraints of Marketing in Tripura

North Tripura				West Tripura			
Constraints of Marketing	1st	2nd	3rd	Constraints of Marketing	1st	2nd	3rd
Low price	7	6	0	Low price	3	0	0
Fluctuation of price	0	0	0	Fluctuation of price	47	0	0
Lack of market information	1	1	7	Lack of market information	0	0	0
Limited buyer	4	4	1	Limited buyer	0	0	0
Difficulty of market access	0	0	0	Difficulty of market access	0	50	0
Lack of transportation facilities	0	0	3	Lack of transportation facilities	0	0	47
Lack of knowledge on marketing way	0	0	1	Lack of knowledge on marketing way	0	0	3
Luck of labour force	1	2	1	Luck of labour force	0	0	0
Others	0	0	0	Others	0	0	0

Source: Farmer Household Survey, JICA Study Team

5.6.3 Agro-processing

(1) Outline

The state is backward in terms of industrialisation but has the potentiality for industrial opportunities and improvement which in turn will increase employment generation in the state. One of the main thrust areas of the State Industries and Commerce Department is to promote and develop the rural, micro, small, and medium enterprises, agri-based food processing industries. Tea and rubber-based industries have taken place already the development of industrial base in Tripura.

Source: JICA Survey Team
Cashew nuts Factory (Agartala)

The published results of the 4th Census of Micro-Small and Medium Enterprises (MSMEs) showed that the total working units was 1,343 in March 2007. Thereafter, 1,189 new units have been registered, increasing the total number of registered units to 2,532 units as of 31 March 2013. The level of industrialisation of the state is evident from its contribution to the state's GSDP at current price, and the contribution of the manufacturing sector was 3.01% in 2012-13, which shows low level of industrialisation.

Source: JICA Survey Team
Snack Making Factory (Agartala)

Tea, rubber, and food processing as well as traditional crops such as tea, bamboo, etc., based industries have immense potentiality for industrial development in Tripura. Besides, the State Department of Industries and Commerce is also developing the industrial area and infrastructure in different parts of the state. Moreover, the Entrepreneurship Development Programme and Skills Development Programme is also regularly conducted by the State Department of Industries and Commerce.

(2) Industrial Infrastructure

(a) Bodhjungnagar Industrial Complex

The Bodhjungnagar Industrial Complex has been developed adjacent to the state capital Agartala. The utilisation of the infrastructure at the Bodhjungnagar Industrial Complex as of 31 December 2014 is presented as follows:

Table 5.6.11 Status of Bodhjungnagar Industrial Complex in Tripura

Area	Total land (Acre)	Total Unit (No.)		Total Agro-processing Unit (No.)	
		Functioning	Construction	Functioning	Construction
Industrial Growth Centre	477.96	20	12	6	0
Food Park	30.00		6		6
Export Promotion Industrial Park	126.12	6	7	3	2
Rubber Park	58.81	1	9	1	9
Bamboo Park	70.00	1	2	1	1
Total	761.89	28	36	11	18

Source: Department of Industries and Commerce

In the table above, the major products of 17 agro-processing units excluding rubber park and bamboo

park units, consist of milled rice, betel product, butter and ghee, extracted oil, agarbati, spices, fruits drink, baked products, wheat flour, and packed water.

(b) Information on Rice Mill Unit

In the local market there is a fetch demand where consumers prefer to buy qualified par-boiled (PB) rice. Actually, PB rice from Delhi (Rs.45 /kg) and from Andra Pradesh (Rs.35/kg) together with local milled rice (Rs.25/kg) are sold in the markets. These are the target markets of this PB rice mill unit.

Source: JICA Survey Team
Rice Mill (Industrial Complex)

Most of the farmers are not using high yielding variety (HYV) and hybrid seeds. They usually cultivate Swarna Masuri variety of paddy. Shatabdi variety of paddy fetched more money, but available in less quantity. The rice mill purchases paddy directly from farmers through traders and also through local weekly paddy market. The farmers also directly bring paddy to factories. There is a steady increase in demand for such qualified PB rice. The factory sells PB rice through wholesalers in Agartala and even in Silchar and Karimganj in Assam.

The installed capacity of the rice mill factory is 48 tons per day, the total capacity is 14,400 tons per year. As less quantity of surplus paddy is available in the area, which accounts about 50% of factory requirement. The rice mill is faced with a scenario that there is a need to produce more qualified paddy like Shatabdi variety amongst producers in the area to meet its requirement.

(c) Information on PRAN Food Processing Unit

PRAN is a leading food processing company based in Bangladesh. The product range includes potato crackers, instant noodle, and bakery products. PRAN already has market presence in North East India, East India, and also in South India/Kerala through access to the sea port. The favourable governance in Tripura motivated the company to set up a processing unit in Tripura.

Agro-based industries like PRAN need agriculture products. However, most of the raw materials required by PRAN are not available locally. Hence, it purchases such raw materials either from Bangladesh or mainland India. PRAN is already working with 80,000 farmers in Bangladesh through contract farming.

(d) Other Infrastructure Project in Tripura

Other infrastructure projects in Tripura are shown in Table 5.6.12 below.

Table 5.6.12 Other Infrastructure Projects in Tripura

Name	Content
Dukli Industrial Area	Currently, the Dukli industrial area is spread over 44.88 acres of land. Expansion of the area and upgradation of the infrastructure are planned.
Industrial Estates	There are five industrial estates in Arundhuti Nagar, Badharghat, Dhajanagar, Dharmangar, and Kumarghat. Total area under these industrial estates is about 95.35 acres.
Integrated Infrastructure Development Centres (IIDCs)	The IIDCs are to be set up in Dewanpasha, North Tripura; Lalchari in Dhalai; and Sarasima in Belonia in South Tripura districts. Each IIDC is to be developed over an area of about 40-50 acres. Moreover, in Jalefa, Sabroom, 38.62 acre of land has been identified.

Source: Economic Review of Tripura 2012-13, Directorate of Economics & Statistics Planning Department, the Government of Tripura

(3) Industrial Training Institute (ITI)

Other than the various central support programs for entrepreneurship and special skills training in Tripura, there is a good network of 12 training institutes, therefore it is planned to establish one in each sub-district. Unlike in mainland India, where ITI is taken as profession, ITI supplements the basic qualification. However, studying in ITI does not support the setting up of enterprises in the state. Most of the qualified students from Tripura migrated to key cities in India.

(3) Other information

- The most difficult part of starting a business is the ability to access finance. The entrepreneurs in Tripura are mostly 1st generation entrepreneurs. There is no business culture amongst migrant Bengalis or tribal population in the state. Most of the successful entrepreneurs in the state come from outside the state.
- As there is no agricultural surplus, it is difficult to promote agriculture-based enterprises.
- The industrial units in Tripura include rubber thread, GI sheets, plastic, construction materials, mechanical brick, rice mill, packaged drinking water, wood-based essential oil, block rubber, distillery, and transformers. Promotion of rubber cultivation has been quite successful. This could bring money to Tripura.

5.7 Farmers' Organisation and Livelihood

5.7.1 Farmers' Organisations

(1) Overview

The number of SHGs formed in Tripura was the highest amongst the three states surveyed. Most of the SHGs were organised under the initiatives of SGSY and currently revived by the National Rural Livelihood Mission and NERLP. The number of cooperatives was also high but similar to the condition of other states, many of them are not functioning. Farmers' clubs were promoted by NABARD. As of 30 September 2013, 263 farmers' clubs were established in Tripura[13]. The activities of the farmers' clubs include: 1) bulk purchasing of the farm inputs; 2) facilitate

[13] This section is based on "State Focus Paper, Tripura 2014-15" (Tripura Regional Office, National Bank for Agriculture and Rural Development).

cooperation between the farmers in collection, processing, and marketing of produces; 3) implement community development activities; and 4) facilitate the farmers' credit linkage with the financial institutions. Three farmer producer organisations were established in Tripura with an aim of improving the production and marketing through collective action. In the subsequent sections, the status of cooperatives and SHGs in Tripura are reviewed.

Table 5.7.1 Status of Farmers' Organisations in Tripura

Type of Organisation	No
Cooperatives	1,748
SHGs	40,380
Farmer Producer Organisations	3
Farmers Clubs	263
JLGs	11
WUAs	-

Source: JICA Survey Teambased on the records of Dept. Of Cooperation, Agriculture, NABARD and others.

(2) Cooperative Societies

Cooperative societies in Tripura have a long history; and the formation of such societies has started in the 1970s. In recent years, many of the cooperatives have become dormant excluding for few. The Department of Cooperation emphasises on reviving the existing cooperatives by technical and managerial guidance instead of formation of new cooperatives. The cooperatives in Tripura are registered under the Tripura Cooperative Societies Act 1974 (amended in 1976 and 2009) and Tripura Cooperative Societies Rule 1976 (amended in 1976 and 2012). The recent amendment was done in order to allow more autonomy in management of cooperative societies.

The primary cooperative societies are formed at the village level and some of them have their apex cooperative constituted at the state level. The cooperatives are engaged in various activities including credit, fisheries, livestock, handloom, sales of the farm inputs and daily necessities, etc. In 2013-14, 414 cooperative societies were engaged in agriculture related activities and 305 cooperatives are engaged in industrial activities. The substantial numbers of weaver's cooperatives (203 cooperatives) and consumer's cooperatives (219 cooperatives) were also established. The Department of Cooperation provides the managerial and technical guidance to the cooperative societies whereas the cash subsidies are on the decline. Different types of the cooperatives societies operating in the state are given below.

Table 5.7.2 Types of Cooperative Societies in Tripura (2011-12 to 2013-14)

Type of Cooperatives	2011-12	2012-13	2013-14	
Agriculture	399	401	414	23.7%
Non Agriculture	19	21	19	1.1%
Marketing	14	14	14	0.8%
Milk Supply	113	113	113	6.5%
Apex Society	11	11	11	0.6%
Weavers	194	196	203	11.6%
Consumers	211	213	219	12.5%
Housing	3	3	3	0.2%
Farming	2	2	2	0.1%
Non Agricultural non Credit	259	259	260	14.9%
Fishery	146	148	150	8.6%
Industries	313	315	305	17.4%
Others	36	36	35	2.0%
Total	1,720	1,732	1,748	100.0%

Source: Economic Review for the Year 2013-14, The Registrar of Cooperative Societies, Government of Tripura, Department of Cooperation, Government of Tripura.

The Department of Cooperation attempts to extend their banking services through the cooperatives to the communities where they are not easily accessible. This could be done by establishing banking counters at the primary cooperative societies. The linkage between the primary cooperative societies to the Tripura State Cooperative Bank (TSCB) has been established so that the village level cooperative societies can extend their banking services to its members. About 49 banking counters were reported to be opened at the Large Size Agriculture Multipurpose Cooperative Societies (LAMPS) / Primary Agriculture Cooperative Societies [14] . Successful cooperatives are equipped with experienced and full-time management staffs employed by the cooperatives or are receiving support from the Department of Cooperation in their management. This is an indication that the management capacity affects the performance of the cooperative societies.

Daldali Large Size Agriculture Multipurpose Cooperatives/ LAMPS, Simna, West Tripura district

Daldali LAMPS has a total of 2,929 members, of which 2,119 are STs. LAMPS runs consumer store, fertiliser store, bamboo garden, fish ponds, etc. Banking service is also available at the office of LAMPS.

The banking counter of LAMPS offers savings and credit facilities. It also facilitates its members' application for loan from the cooperative bank. In the case of borrowing from the cooperative's own fund, an application can be processed within 7 days and 30 days for Kishan credit card, which takes longer time as it goes to the board meeting of the cooperatives and to the bank. This banking counter of the cooperative is the only financial institution in the area. About 76 individual members are taking loans using Kishan credit card*(7% of interest rate per annum) and 62 members are taking loan from the cooperatives' own fund with an interest rate of 12% per annum. The maximum amount of loan taken by an individual member is Rs.45,000. The recovery rate is good as the supervisors regularly visit the members for follow up.

LAMPS has 5 staff with salaries ranging between Rs.3,000 and Rs.6,500 per month paid by the cooperatives. The government provides an annual grant of Rs.50,000. The turnover of the business during the FY 2013-14 was about Rs.11 million with the gross profit amounting Rs.0.8 million.

*Kishan credit card (KCC): This is an intervention supported by the Central Government of India, NABARD, and Reserve Bank of India, which commenced in 1998. The aim is to enable the farmers to access loan when they require. KCC is valid for three (3) years subject to annual renewal. Repayment schedule may be adjusted in case of poor harvesting year.

Source: JICA Survey Team compiled based on Information provided by the Daldali LAMPS.

(3) SHGs

Similar to other states, SHGs are mostly promoted under SGSY that aimed for improving the rural livelihood through women's economic empowerment. SGSY was implemented between 1999 and 2012 and thereafter the National Rural Livelihood Mission was launched to further advance the intervention in 2011. In Tripura, 39,089 SHGs were formed under SGSY and 13,700 SHGs took loans from the bank[15]. The SHGs formed under SGSY are being screened for their status and assessed whether they are eligible for further support by the Tripura Rural Livelihood Mission (TRLM) under the National Rural Livelihood Mission and North East Rural Livelihood Project (NERLP).Under their initiatives, new SHGs are also formed at the same time.

[14] Economic Review for the year 2013-14, The Registrar of Cooperative Societies, Government of Tripura, Department of Cooperation, Government of Tripura.
[15] Data provided by TRLM in January 2015.

Hand woven clothes in Tripura

A woman is weaving using the traditional loom. She weaves for her own use and not for sale.

Source: JICA Survey Team

Figure 5.7.1 Traditional Weaving in Tripura

Activities preferred by SHGs in Tripura include piggery, incense stick and bamboo crafts making, handloom, etc. Some of the challenges faced by the SHGs observed during the field visits are: 1) lack of access to market, and 2) high cost of inputs. When agriculture-related activities are promoted, the produces need to be transported to the market within a short period of time. The SHGs are often located in remote area and thus, naturally their accessibility to commercial centre is difficult. If they are not organised into cluster, their scale of production is small, therefore, it is difficult for the buyer to purchase their produce from the villages. Many SHGs stop functioning as they are unable to sell their produce. Secondly, high cost of inputs also deters them from taking up an income generating activity. Piggery is one of the most preferred activities amongst SHGs in the tribal communities. They often keep one or two at their backyards and feed them with leftover food. Once the number of pigs reared increases, they need to buy feeds from outside, which can be very expensive, thus, forcing them to sell the pig before it is fully mature. Small-sized pigs fetch lower prices in the market and as a result, SHGs can end up on the losing end.

These issues can be addressed through a cluster based planning approach, which could create an enabling environment for SHGs. Although a number of attempts for cluster development were made, SHG based income generation activities are still unorganised and require constant and consistent interventions for capacity building of SHGs and creation of enabling environment.

5.7.2 Livelihood of the Farm Households

(1) Overview

According to the survey report of the "Livelihood-based Agri Business and Market Study in Tripura" conducted in 2011[16], farm households were involved in a multiple number of activities to meet their ends. Farmers grow paddy and other horticulture crops and rear livestock such as cattle, poultry, and duck. Pig rearing is commonly practised amongst the tribal communities. The average operational landholding was reported to be 0.56 ha in 1995-96 and now it is further reduced to 0.5 ha. To supplement the income, many families are engaged in non-farm activities like daily wage labour including MGNREGA, government services, handicrafts making, etc. Based on the data collected through the Farm Household Survey conducted by the JICA Survey Team, an attempt was made to

[16] Livelihood Based Agri Business and Market Studies for North East Rural Livelihood Project. Final Report, Tripura (2011). MART; Noida.

understand the livelihood of the farm households in the subsequent section.

Raiya Molsom Village, Gomati District

Raiya Molsom Village received interventions from the World Vision (1995–2005) and TFIPAP (2008– until date). Most of the villagers are *patta* holders. They earn living from *Jhum* or the sale of the trees they get from the forest and daily wage earned through different types of works including MGNREGA. More or less all the families need to buy rice and all the vegetables from outside of the village. The forest is degrading fast as people cut trees for livelihood.

Villagers may take loan from the bank if they need cash up to the amount of Rs.20,000. The SHGs were formed by the World Vision (two SHGs) and TFIPAP (three SHGs). These groups comprised both men and women. This was because women could only speak their local language and needed help from men in communicating with others coming from outside of the village. Unfortunately, SHG members failed to repay their loan they took from the SHGs and none of the SHGs were operational at the time of the visit. SHG members could not plan any long-term income generation activities (IGA) but they did it once. They started piggery and goat rearing but they spent all their earnings in school fees of their children and did not reinvest to continue the IGA. Many villagers know how to weave or make baskets but they only make the fabrics and baskets for household use or only when one places an order. The traditional skills are slowly disappearing from the village.

Source: JICA Survey Team

Out of the 100 sampled households interviewed during the household survey, 99 were Hindus and 1 was Christian. The social groups of the sampled households are given in the table below.

Table 5.7.3 Social Groups of the Surveyed Households in Tripura

(Unit: Households)

	North Tripura	West Tripura	Total	% to Total
General Caste	13	3	16	16.2%
SC[17]	13	23	36	36.4%
ST		5	5	5.1%
OBC[18]	23	19	42	42.4%
Total	49	50	99	100.0%

Source: Farm Household Survey, JICA Survey Team

According to the household survey conducted in North Tripura and West Tripura districts, the sampled households in North Tripura were largely BPL households whereas those in the West Tripura were APL households. No sample households indicated food shortage during the year unlike in Nagaland and Meghalaya.

Table 5.7.4 Economic Status of Surveyed Households in Tripura

District	APL		BPL		AAY19		Total	
	No of HH*	% to District Total	No of HH	% to District Total	No of HH	% to District Total	No of Response	No Response
North Tripura	19	38.8%	30	61.2%	-	-	49	1
West Tripura	39	78.0%	9	18.0%	2	4.0%	50	0
Total	58	58.6%	39	39.4%	2	2.0%	99	1

*Note: *HH: Households*
Source: Farm Household Survey, JICA Survey Team

[17] 34 SC communities in Tripura are recognised by the government. (http://socialjustice.nic.in/pdf/scordertripura.pdf accessed in April 2015)
[18] 41 OBC communities in Tripura are recognised by the government. (http://tripurascobcrm.nic.in/listobc.pdf accessed in April 2015)
[19] AAY stands for Antyodaya Anna Yojana. This is a central government scheme to provide the rice and wheat at the concession rate. The poorer households among the BPL households are eligible.

(2) Household Income and Expenditure

The average income amongst the surveyed households during 2014 was Rs.82,135.0 and the average expenditure was Rs.77,128.2. The district-wise distribution of average income and expenditure is given in the table below.

Table 5.7.5 Total Average Income and Expenditure of the Farm Households in Tripura between January and December 2014

(Unit: Rs.)

Distance from the District Centre	Income			Expenditure		
	North Tripura	West Tripura	Total Average	North Tripura	West Tripura	Total Average
<15 km	66,128.0	118,284.0	92,206.0	63,873.2	114,112.0	88,992.6
>30 km	43,928.0	100,200.0	72,064.0	41,199.6	89,328.0	65,263.8
Total Average	55,028.0	109,242.0	82,135.0	52,536.4	101,720.0	77,128.2

Source: Farm Household Survey, JICA Survey Team

In West Tripura all the sampled households were engaged in crop production, whereas only 22 households out of 50 households in North Tripura were engaged in the same activity. The number of families engaged in livestock/dairy was 39 households or 74.0% of the sampled households in West Tripura and 10 households or 20% of the same in North Tripura. Casual wage labour is the most common source of income with 71 households. The number of households engaged in various livelihood activities is given in Attachment-5.7.1.

The itemised average income is given in Attachment-5.7.2. In West Tripura, crop production provided a substantial income of Rs.75,796.0 on an average, while the wage labour was the main source of income in North Tripura with an average amount of Rs.36,285.7. No households earned income from sericulture and cottage industry/processing.

In both districts, the expenditure on food was the highest accounting for 49.9% (Rs.30,018.0) in North Tripura and 39.9% (Rs.47,112.0) for West Tripura during 2014. The average amount of Rs.4,066.7 in North Tripura and Rs.21,944.4 in West Tripura districts are kept for savings. About 15 households in North Tripura and 36 households in West Tripura saved money. The itemised expenditure is given in Attachment-5.7.3.

(3) Farmers' Groups and Access to Financial Services

In total, 31 households out of 100 sampled households acquired their membership from agriculture/ farming cooperatives or SHGs. Only seven households in the North Tripura and none in West Tripura took part in the agriculture/farming cooperatives. The number of households having membership with production and market oriented cooperatives was very small; and farmers are working mostly on an individual basis in terms of production and marketing.

In the case of SHGs, 16 households or 32.0% of the 50 sampled households in North Tripura and eight households or 16% of the 50 sampled households in West Tripura had membership. There are benefits of joining the groups, one is to receive subsidy. On the other hand, some members also did not see the benefits of becoming a group member. The most common reason of not joining a group was that there is no group of their interest nearby and their lack of trust in the management.

Table 5.7.6 Membership in Groups/Organisations in Tripura

(Unit: No. of Responses)

Type	North Tripura (N=50)				West Tripura(N=50)				Total
	<15 km	>30 km	Total	% to N	<15 km	>30 km	Total	% to N	
Agriculture/ Farming	7	-	7	14.0%	-	-	-	-	7
SHG	3	13	16	32.0%	-	8	8	16.0%	24
Total	10	-	23	46.0%	0	-	8	16.0%	31

Source: Farm Household Survey, JICA Survey Team

Access to financial institutions is limited in Tripura like in other states. Only two households took loan for agriculture purposes between 2012 and 2014 in West Tripura. These households took loan from SHGs in the amounts of Rs.20,000 and Rs.5,000. One of the constraints is the complicated procedure in applying loan.

(4) Land[20]

All the 50 sampled households in West Tripura and one household in North Tripura were engaged in settled cultivation. The average area under settled cultivation in West Tripura was 2.0 acre and 1.0 acre in North Tripura. Land used for settled cultivation is mostly obtained through the land settlement certificate/regular land *pattas* (ownership document).

(5) Household Assets

(a) Electrical and Communication Devices, and Agriculture Equipment

The sampled households in Tripura have more different kinds of household assets compared with those in Nagaland and Meghalaya. Mobile phones and televisions were available to 93.0% and 70.0% of the sampled households, respectively. As settled agriculture is the major source of livelihood in West Tripura, 19 households owned pump set for water lifting and 46 households out of 50 households owned sprayers. The number of sprayers owned per household was 2.1 in West Tripura. The detailed data on household assets are given in Attachment-5.7.4.

(b) Livestock

Similar to Nagaland and Meghalaya, livestock was the common asset amongst the sampled households. About 41 households in North Tripura and 49 households in West Tripura owned cow. The average number of cows per household was 2.9 in North Tripura and 2.7 in West Tripura. Goat is also popular in West Tripura, 40 households or 80.0% of the sampled households have goats, whereas 17 households owned goats in North Tripura. The average number of goat per household was 4.8 heads in West Tripura and 2.1 in North Tripura. No household in North Tripura kept pigs while 1.2 pigs on an average were kept by 20 households out of 50 sampled households in West Tripura. About 19 households in North Tripura kept 4.8 head of poultry on an average. The details are given in Attachment-5.7.5.

5.8 Interventions by Donor Organisations and Civil Society Organisations

5.8.1 Indo-German Development Cooperation (IGDC) Project, Tripura

In 2009, IGDC was commenced and operated for six years with the joint funding of the German Development Bank (KfW), the Government of India, and the State Government of Tripura. The

[20] The status of shifting cultivation could not be confirmed during the farm household survey.

project area includes 70 villages in 11 development blocks in Dhalai and North Tripura districts. The project got an extension of two years. The project aimed to improve the socio-economic condition of the *Jhum* cultivators of tribal communalities who have obtained the rights over the forest land under the Forest Rights Act 2006 and to promote sustainable natural resource management.

Comparison between IGDC and TFEIPAP (JICA Forestry Project) and Lessons Learned

Some of the distinct differences observed between Indo-German Project and TFEIPAP (JICA Forestry Project), are summarised in the table below.

Comparisons between IGDC and TFEIPAP

	Indo-German	TFEIPAP
Objectives	- Sustainable - resource utilisation socio-economic improvement and livelihood enhancement of *Jhum* families/ rural poor - Enhancement of forest and environmental productivity to address environmental degradation	- Restoration of environment - Livelihood improvement of forest dependents
Approach	- Holistic interventions through convergence based on the village level plans - Takes advantage of the existing implementation structure of the rural development in the state - Devolution of power and control over decision making and financial resources/ convergence to the village level	- Combination of departmental mode of implementation and village-based participatory mode of implementation
Convergence	- Having a village *Pradhan* as the leader of the village level planning and implementation unit, the requirement of the villagers can easily be communicated to the line departments - Block level meeting, where all the line departments convene, provides a platform to work out and discuss the contribution of the stakeholders	- District Level Advisory Committee for convergence with the facilitation of the Divisional Forest Officer
Fund Flow	- Directly from State PMA to the village institutions/ Village Development Planning Implementation Committee (VDPIC)	- State – Division-Range-JFMC/ EDC/ SHG

Based on the above, key lessons learned are presented below.

i) Implementation structure of IGDC has given more control to the village level planning and implementation authorities formed in the project villages as the fund is directly transferred to them.

ii) The progress of the planning and implementation of activities may require longer time when the planning is to be done properly as the progress would depend on the capacity of the village level planning and implementation authority. If the project framework can allow such flexibility, this approach will create long-lasting capacity amongst the village level institutions for planning and implementation. Furthermore, the intensive facilitation is also required to capitalise on the village level planning process, which requires a bulk of manpower. This will have an implication of the project cost and inability to deploy sufficient number of qualified field level staffs would dilute the process of grassroots planning.

iii) Convergence was better facilitated through the existing rural development line and making the village Pradhan responsible for the planning and implementation as it was the case in IGDC.

iv) Livelihood activities were implemented as a package. One family or SHG may benefit from the multiple interventions of the projects. This will minimise the risks of complete failure of livelihood interventions as alternative interventions may result into positive outcome. It was also observed that SHG interventions that did not yield positive interventions were those that did not suit the local condition and lack of proper production/business management and linkage with the market. These individual families or SHGs need to be linked with the buyers and market while planning their business activities.

Source: JICA Survey Team

IGDC empowered the village level institutions to plan and implement activities by channelling the project funds directly from the Project Management Agency established at the state level to the village level. Convergence with other schemes of the central and state government also provided

significant benefits to the participating families. This was made possible as the village *Pradhan* being the head of the village development planning implementing committee of IGDC. The project component includes income generation activities, promotion of effective farming methods in *patta* land, training, etc.

5.8.2 Tripura Forest Environmental Improvement and Poverty Alleviation Project (TFEIPAP/ Tripura JICA Forestry Project)

TFEIPAP aimed at the restoration of forest resources while improving the livelihood of the forest dependants. Its implementation started in 2007-08. The total project cost was JPY 9,216 million of which JICA loan was provided for the amount of JPY 7,725 million. The project component includes: formation of JFM committees and micro planning, afforestation (artificial regeneration, aided natural regeneration, bamboo plantations, etc.), agro-forestry, farm forestry (decentralised people's nurseries for raising seedlings), formation of SHG and IGA, soil and water conservation, establishment and promotion of NTFP Centre of Excellence, development of regrouped villages of tribal communities, biodiversity conservation, etc. Although a separate society was created to implement the project and a PMU was established at the state level the project implementation structure used the existing operational structure of the Forest Department at the division and range level, which differs from the line of rural development interventions: village – development block – district.

Overview of TFEIPAP

- 8 divisional management units (Forest Division), 40 range management units (in 35 blocks) in 7 districts are covered by the project.
- Project area is 7,023 km^2.
- Project period is 8 years beginning from 2007/08 to 2014/15.
- Total budget of the project is JPY 9216 million and JICA contribution is JPY 7725 million.
- Target villages/hamlets = 456 (400 JFMCs + 40 EDCs + 16 re-grouped villages) – 463 JFMCs and EDCs are already constituted and project activities are being implemented through them.
- Afforestation activities have been undertaken in 49,069 ha as against the target of 61,297 ha. About 223 decentralised people's nurseries have been set up for promotion of farm forestry.
- Agro-forestry has been undertaken in 4,325 ha as against the target of 8,297 ha
- 1,477 SHGs have been constituted and 801 SHGs have taken loans from the JICA Project and District Rural Development Agencies (DRDAs) to implement 1,481activities. Common IGAs are fishery, piggery, duck rearing, poultry, mushroom cultivation, beekeeping, collection and processing of broom grass, incense stick making, etc.

Source: JICA Survey Team

5.8.3 North Eastern Rural Livelihood Project (NERLP)

NERLP has been implemented in the four states of Mizoram, Nagaland, Sikkim, and Tripura with an aim to empower the rural communities and create sustainable institutions that can manage the livelihood activities and natural resource management. In Tripura, the field level project activities commenced in October 2013. To date, activities have been implemented in 16 blocks in West and North Tripura districts. The project works with women SHGs formed under SGSY and also newly formed ones. The skills training for the unemployed youth has also been given to facilitate the employment of the rural youth. In the future, NERLP in Tripura plans to promote producers' groups for medium-scale enterprises by involving both male and female members of the communities.

5.8.4 Tripura Rural Livelihood Mission (State Mission of National Rural Livelihood Mission - Ajeevika)

The interventions under the National Rural Livelihood Mission are implemented through the Tripura Rural Livelihood Society constituted in 2011. The transition from SGSY to TRLM required some time and thus the field level activities commenced in 2013. Along with NERLP, TRLM takes advantage of the women SHGs formed under SGSY and makes an attempt to capacitate such groups to undertake economic activities. Six blocks are selected from Dhalai, Gomati, and South Tripura districts as model blocks, from where the rest of the project areas will learn. There are 39,089 SHGs formed under SGSY. TRLM has screened SHGs that are functional and can be further developed under TRLM.

5.9 Constraints and Countermeasures

In order to achieve the agricultural development in Meghalaya, all the allied sectors contributing to the food production are to be developed by strategic interventions based on the existing production systems in each sector. The result of SWOT analysis and recommendation of countermeasures are as follows.

5.9.1 Agriculture and Horticulture Production

SWOT analysis of agriculture production and horticulture is as follows.

Table 5.9.1 SWOT Analysis of Agriculture Production and Horticulture in Tripura

	Helpful	Harmful
Internal Origin	**Strength** ・Sufficient land for area expansion ・Abundant water resources during monsoon season ・Favourable agro climatic condition ・Various crops from sub-tropical to temperate ・Availability of germplasm of good quality for crop and livestock for breeding ・Availability of indigenous fruits ・Availability of indigenous technological knowhow ・Availability of family labour ・Higher literacy rate ・Fair social stratification compared to main land of India ・Organic farming ・Good productivity in bamboo plantations ・Sub-tropical climate	**Weakness** ・Undulating topography ・Requirement of soil conservation measures for land expansion ・Small quantities of produces for marketing ・Lack of irrigation water for dry season ・Lack of irrigation facility ・Lack of organised markets ・Poor transport and storage ・Lack of agro based industries ・Non availability of quality planting materials and farm inputs ・Unsustainable farming practice due to shortening of Jhum cycle ・Rigid mind-set of farmers to introduce new farming practice ・Dependence on migrant labour
External Origin	**Opportunity** ・Promotion of organic production for export to other states and international market ・Eco tourism ・Permission for cultivation in forest area under Forest Right Act	**Threat** ・Pests and diseases outbreak ・Natural calamity like, hail storm, land slide, wildfire ・Dependence on import from other states ・Migration of man power from rural to urban

Source: JICA Survey Team

Based on the interviews, field survey and analysis, the following focus areas are recommended for the development of agriculture and horticulture production in Meghalaya.

Agriculture Production

1. Increase in cropping intensity by introduction of short duration high yielding varieties by replacing the existing long duration local varieties followed by cultivation of other crops like oilseed, pulses, wheat.

2. Proper nutrient management practices along with crop protection measures to be under taken to increase production and productivity of crops.
3. Maximum utilization of available water sources for irrigation purpose and creation of extensive rain water harvest structures to reduce the runoff loss and soil erosion.
4. Farm mechanisation, wherever possible, in order to meet the agricultural labour demand and to reduce the time required for agricultural operations.
5. Manual preparation and extension of know-how in previous projects to mitigate and modify jhum and existing good practice.
6. Promoting of bamboo production for supplemental income of farmers utilising its good productivity in Tripura
7. Livelihood enhancement in patta land which is officially permitted to farming in forest area under Forest Right Act with sustainable agro-forestry

Horticulture

1. Natural advantages such as topography, climatic conditions are to be best utilized by cultivating wide range of horticultural crops like fruits, flowers, spices, medicinal and aromatic plants. Exotic crops like strawberry having very high demand in local, domestic and international markets can accelerate the enhancement of farmers' income.
2. Promotion and commercialisation of horticulture by means of value addition through Common Interest Groups (CIGs) or SHGs.
3. The protection of existing forest areas through awareness programmes and planting of fast growing species of fruit trees in Jhum areas. To release the pressure on existing forests, cultivation should be encouraged in waste land and other marginal lands.
4. Development of high value and specialised tissue culture laboratories to enhance food production capacity and benefit farmers by supplying the required quality seedlings for horticultural crops.
5. Cluster creation of sub-tropical crops utilising its climate advantage compared to other states in north eastern area for value adding

5.9.2 Animal Husbandry and Dairy Farming

SWOT analysis of animal husbandry and dairy production is as follows.

Table 5.9.2 SWOT Analysis of Animal Husbandry and Dairy Production in Tripura

	Helpful	Harmful
Internal Origin	**Strength** ・ High demand in local markets ・ Availability of family labour ・ Using as emergency cash income as stock ・ Large area for grazing	**Weakness** ・ Secondary source of income ・ Lack of improved breed ・ Lack of piglet supplier ・ Problem in animal health care ・ Poor nutritious feed ・ Poor accessibility for extension work
External Origin	**Opportunity** ・ None	**Threat** ・ Avian influenza for poultry industry ・ Swine fever for pig rearing ・ Dependency on the outside source for feed with high cost ・ Support by central government for piggery sector is not enough

Source: JICA Survey Team

Based on the interviews, field survey and analysis, the following focus areas are recommended for the development of animal husbandry and dairy production in Tripura

1. Development of piggery and poultry including small ruminants for meat production and dairy cattle for milk by encouraging revived and improved backyard farming.
2. Encouragement to each household in the rural area for rearing three nos. of pig, 50 nos. of poultry birds, and one dairy cow in every 10 household.
3. Implementation of programmes such as, induction of quality dairy cattle, community cattle rearing, rural dairy farming, and artificial insemination.
4. Establishment of Dairy co-operatives/CIGs/SHGs for easy marketing
5. Establishment of small scale milk product processing industries for value addition
6. Improvement of technical dissemination network from Departmental farm to individual farms
7. Consolidating the existing livestock and poultry breeding farms, so as to evolve suitable crossbred in sufficient numbers from departmental farms for breeding and propagation.
8. Establishment of piggery clusters composed of core breeding farm and satellite fattening pig farms
9. Intensification of fodder development. Fodder stock and grass land reserve in all districts such as hay and silage making units to meet the requirement of fodder in lean period are to be set up.
10. Consolidating entire animal health care programme.

5.9.3 Fishery

SWOT analysis of fishery is as follows.

Table 5.9.3 SWOT Analysis of Fishery in Tripura

	Helpful	Harmful
Internal Origin	**Strength** ・ Low lands below water catchment area are available ・ Sufficient rainfall in monsoon season	**Weakness** ・ Acidic soil ・ Lack of awareness among farmers ・ Non availability of quality fish seed ・ Scarcity of water in dry season
External Origin	**Opportunity** ・ Good demand in neighbouring state like Manipur	**Threat** ・ Diseases ・ Dependent on Migrant Labour

Source: JICA Survey Team

Based on the interviews, field survey and analysis, the following focus areas are recommended for the development of fishery in Tripura.

1. In order to increase fish production in the State low lying area to be brought under aquaculture
2. Paddy cum fish culture to be encouraged in low lying paddy fields
3. Emphasis to be given for demand driven timely supply of quality fish fingerlings
4. Specialized transport vehicles for transportation of fish to the distant markets
5. Production of quality nutrition rich fish feeds to cater to the needs of fish farmers

5.9.4 Farmers Organisation and Livelihood

Based on the interviews, field survey and analysis, the following focus areas are recommended for the development of farmers organisation and livelihood in Tripura.

Table 5.9.4 Issues and Possible Countermeasures in Farmers Organisation and Livelihood in Tripura

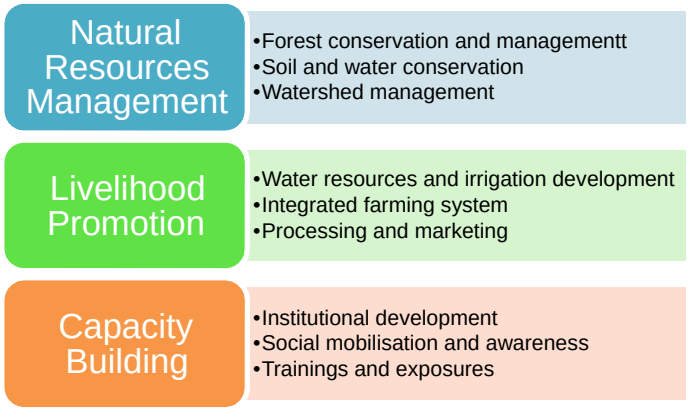
Category	Issues	Possible Countermeasures
Farmers' Organisation	➢ Cooperatives and SHGs both require support in enterprise planning, management and marketing. ➢ Farmers are not organised for collective production and marketing. Such need does not seem to be strong enough to motivate them to join a group. Some farmers also lack faith in the leadership and management of an organisation. ➢ SHGs require intensive handholding in group management and building linkages with different livelihood opportunities.	➢ Like in Meghalaya, the Enterprise Facilitation Centre can be established to provide specialised support for cooperatives and SHGs. ➢ The capacity and monitoring of the field level staffs need to be enhanced/ensured. ➢ The production of farm produces need to be enhanced to create a need to sell the produces while the facilitation to establish a cluster to aggregate the produces is required. It would also help to establish a successful case for demonstration. ➢ Strengthening the leadership and management capacity of farmers' organisations is mandatory to build trust with the members as well as with the public. ➢ Emphasis may be given on selection of product specific clusters and promotion of cluster level organisation of SHGs/ producers.
Access to Financial Services	➢ The access to financial services is limited. However, savings seems to be a common practice.	➢ Since the savings will provide security to the household economy, it should be further encouraged by increasing the number of banking counters at LAMPS and strengthening the SHGs. ➢ SHG federations may be trained and supported in organising micro-financing activities.

Source: JICA Survey Team

CHAPTER 6 PROSPECT FOR JICA'S INTERVENTIONS IN THE AGRICULTURE SECTOR IN THE NORTH EASTERN REGION

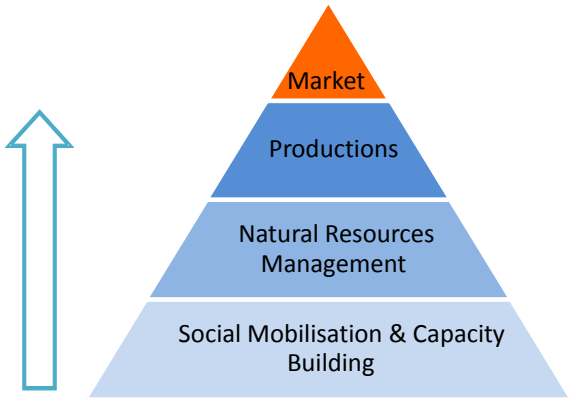
6.1 Basic Approach and Concept for Agriculture Development in the North Eastern Region

The three target states in the north eastern region (NER) have a commonality in the basic development approach in the agriculture sector by reason of similarities of its socioeconomic and natural conditions. The priority areas can be summed up into: (i) natural resources management, (ii) livelihood promotion, and (iii) capacity building as indicated in Figure 6.1.1, which are consistent with the 12th Five-Year Plan of the respective states.



Source: JICA Survey Team

Figure 6.1.1 Basic Development Approach



Source: JICA Survey Team

Figure 6.1.2 Basic Development Concept

The basic development concept is framed, as shown in Figure 6.1.2, in due consideration of the major components of the proposed project. Needless to say, a livelihood promotion shall be in a step-by-step manner from social mobilisation to market.

(1) Natural Resources Management

The three target states have rich natural resources but have not yet been explored due to difficult terrain, acid soils, climate change, and other reasons. It is required to restore the ecological system and to recharge groundwater through joint efforts in forest management, soil and water conservation, and water shed management. The shifting (*Jhum*) cultivation shall be addressed in the context of natural resources management.

(2) Livelihood Promotion

Majority of the farmers in the three target states are engaged in traditional shifting (*Jhum*) cultivation which is a subsistent agriculture because if they use pure organic farming on rain-fed condition, the productivity is far below the national average. As an alternative for shifting cultivation, an integrated farming system, which is a topo-sequential land utilisation with a combination of silviculture-horticulture-agriculture-animal husbandry-fishery, etc. on hilly slopes, shall be introduced along with water resources and irrigation development. The system can also be helpful in

terms of income generation as well as doing risk hedge. Since the market linkage of agriculture products is crucial for commercial agriculture, it should be taken into account at the initial planning stage and review from time to time during the implementation stage.

(3) Capacity Building

Institutional development is fundamental in building organisational capacity and sustainable organisations at every stage of development. It includes management, planning, design, and implementation capacity building of executing agency and hundreds of village councils through social mobilisation, awareness, trainings, and exposures.

6.2 Some Implications from the Past on Agricultural Development in the North Eastern Region

The development of the north eastern region is a long policy issue of the Government of India, and also the ambition of the people and its state governments. The following implications are indicated in the report entitled the 'Agricultural Development in North-East India' that was published in 2008.

Table 6.2.1 Issues and Lessons Learned for Agriculture Development in the North Eastern Region

No.	Issues and Lessons Learned
(1)	Since the independence in 1947, continuous efforts have been put forth particularly during the preceding decade and several aggressive policy initiatives has been taken up for all-round development of these states. Though there are some success stories in few fronts, in general, the region still has to bear the stigma of 'outlays without outcome'. There are several reasons that can be attributed to this economic laggardness, such as (i) difficult geographical terrain, (ii) improper perspective planning and failing to have a holistic road map covering various sectors, (iii) problems of leakages in most developmental projects due to non-imposition of strict accountability, and finally (iv) failure to ensure the synergies between developmental goals and efforts with security needs which must go hand-in-hand to achieve development targets. Despite these difficulties, the region has enormous potentials due to its rich endowment of natural wealth and location advantages. The perceived weakness of this region can be converted into strengths through proper planning and implementation of development projects. The income-level of rural families can be substantially enhanced particularly on a mass scale by harnessing the vast readily available potential in the field of agriculture, horticulture, medicinal, aromatic herbs, bamboo, water, wind power, and minerals, to name just a few sectors (Singh, 2005).
(2)	Agriculture in the North East Hill Region is predominated by subsistence farming where shifting cultivation still remains important. Since subsistence agriculture is still uncertain and therefore risky, particularly when survival of the people is at stake, it remains a dominant factor not to change the traditional farm practices even in the face of great opportunities. The poor farmers are naturally risk averter and prefer to be safe than sorry; they tend to prefer an inferior outcome that is relatively certain than having a higher average return with a greater degree of risk attached to it (Thirwall, 1999).
(3)	The sectoral transformation is happening at a slow pace where the agriculture sector is playing a passive and supportive role in the process of economic development. However, to cater the economic development, the agriculture sector must be strengthened to play much more active and crucial role in any strategy for economic progress (Tadaro & Smith, 2004)

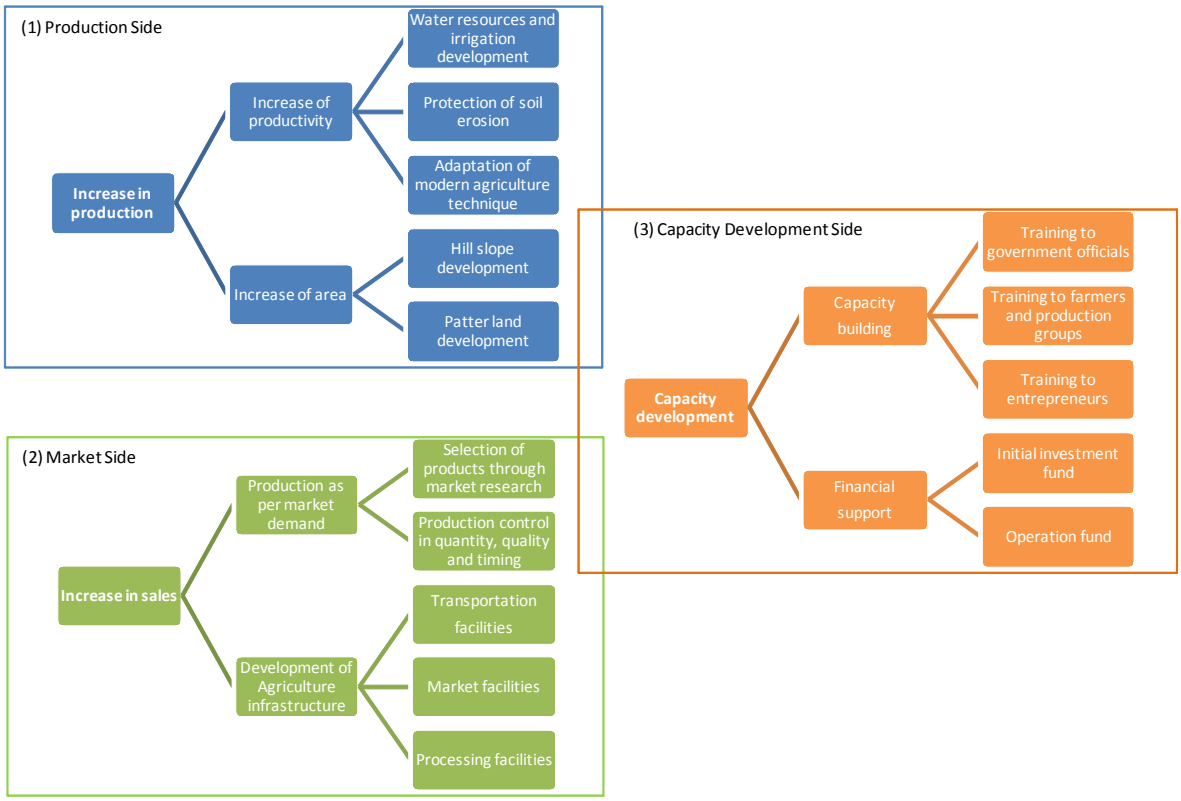
Source: Agriculture Development in North-East India, Issues and Options in 2008, K.K. Bagchi

Since the agriculture sector is dominant in this region, agriculture prospective plans for these states need to be assessed with regard to its performance, contribution, and role.

6.3 Priority Areas for Agriculture Development in the North Eastern Region

Majority of farmers in the north eastern region have been engaged in traditional shifting (*Jhum*) cultivation in hilly terrains. It is a major challenge to change their mind-set from practising

subsistence farming to adopting commercial farming. In achieving livelihood improvement for farmers, under such condition, it is essential for the state government to intervene in the following priority areas; i) production, ii) market, and iii) capacity development as shown below.



Source: JICA Survey Team

Figure 6.3.1 Priority Areas for Agriculture Development in the North Eastern Region

The proposed project must include the abovementioned priority areas as a project component and should be implemented in an integrated mode and in appropriate order. The flow of the project implementation should be in this order: (i) agricultural production as per market demand based on market research, (ii) increase the production by means of increasing productivity and cultivation area, and (iii) capacity development necessary for items (i) and (ii) in a timely manner.

6.4 Prospect for JICA's Assistance in Agriculture Sector in the North Eastern Region

The JICA Survey Team proposed to give priority on the implementation of the projects/programmes consisting of (i) promotion of topo-sequential integrated farming systems and (ii) enhancement of farmers' livelihood through the linkage between agriculture production and market demands. The details are discussed hereunder.

6.4.1 Horizontal Integration of Agriculture Sector

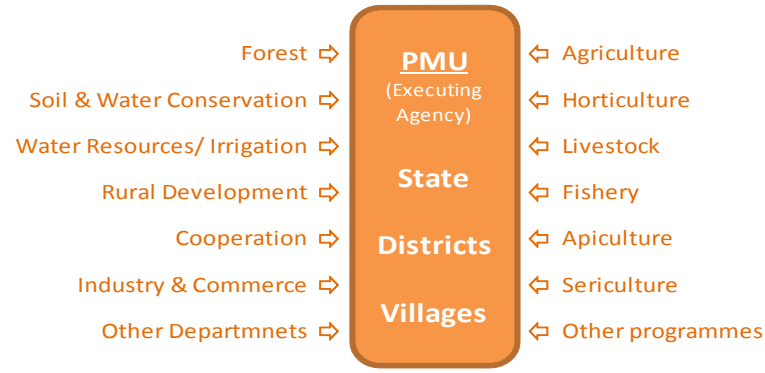
The horizontal integration of agriculture sector is to put in limited resources (manpower, funds, technology, and information) into certain areas in a concentrated manner and strategic way to maximise the synergistic effect. At present, every department and/or agency of the state government executes their livelihood programme in random manner or only a part of the livelihood programme.

Furthermore, there are reported cases that same groups of farmers are getting support from different programmes. Therefore, it seems to be a very inefficient system in terms of cost effectiveness.

(1) Platform for Integrated Agriculture Development

Although the departments concerned may be different state by state, the departments of Forest, Soil and Water Conservation, Water Resources and Irrigation, Agriculture, Horticulture, Animal Husbandry, Fishery, Cooperation, Industry and Commerce, etc. should work together within their scope of service and be responsible for the proposed project. It is proposed, therefore, through the initiatives of the respective state governments, the establishment of a platform for planning and implementation of the project which will act as the Project Management Unit (PMU).

In Meghalaya, the Integrated Basin Development and Livelihood Promotion (IBDLP) which is a cross-departmental programme was launched in 2012 under the State 12th Five-Year Plan based on the past bitter experiences. Since this integrated approach is now on trial in some pilot projects, it needs to keep close watch on the performance. To attain good results with the cross-departmental platform, it needs a strong leadership and committee having regulating function with roles and power. In case an autonomous society forms PMU, it is fairly possible that the platform would function in a neutral stance to make a good coordination apart from the existing departmental lines. It will be effective to put its roles and power in the statutory form with issuing a government order (GO). The Tamil Nadu Forest Project would be a good reference in this respect.



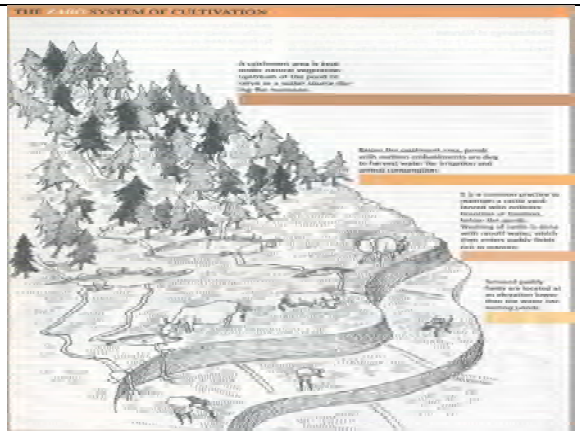
Source: JICA Survey Team

Figure 6.4.1 Platform for Integrated Agriculture Development

(2) Topo-sequential Integrated Farming System

The major activities involved in the topo-sequential integrated farming system (the proposed project) will include (i) selection of target micro watersheds, (ii) recovery of water holding capacity of forest, (iii) development of check dams and ponds, (iv) development of irrigation facilities, (v) technical guidance on farming agriculture, horticulture, livestock and fish, and (vi) establishment of market linkage for agriculture produces and their processed goods. Project images are given in Figure 6.4.2 and some technical details are presented in Attachment-6.4.1.

Integrated Farming System (ICAR model)



Traditional Integrated Farming System (Zabo model)

Wet Terracing

Topo-sequent Land Use

Source: Shifting Agriculture and Conservation Farming System in the North East Hill Region – Issues and Strategies (Dr. K.K. Satapathy)

Figure 6.4.2 Images of Topo-Sequential Integrated Farming System

6.4.2 Vertical Integration from Production to Market

The vertical integration from production to market is to make a linkage between agriculture produces and markets. Looking into the demand-supply balance of agriculture produces, the three target states exceed imports over exports in almost all agriculture produces except for a few crops due to low productivity attributable to difficult terrain and traditional shifting cultivation. As an initial step, it needs to increase the productivities of major agriculture produces to the national average level. It is also important to specify some agriculture produces that have comparative advantage in the market. As a pre-requisite, the target agriculture produces shall be selected in consideration of the market demand through market research.

(1) Focus Areas for the Development of Agriculture Sector

As described in Chapter 3, 4 and 5, the focus areas in Table 6.4.1 are recommended for the development of agriculture sector in Meghalaya, Nagaland and Tripura. Almost all recommendations are common in the three states, some characteristic measures are recommended for Tripura due to its simple land holding system and sub-tropical agro climatic conditions. In Tripura, majority of lands are held by the state government as forest area. Therefore, the implementation of the project for livelihood enhancement in patta land which is officially allow cultivation under Forest Right Act is easier than other two states. The situations of agriculture in the three states are described in Chapter

3 for Meghalaya, Chapter 4 for Nagaland and Chapter 5 for Tripura. For the project formation for future JICA's support, the following focus area should be taken into account. Problems and Countermeasures in Marketing and Processing in NER is described in Attachment-6.4.2.

Table 6.4.1 Major Focus Areas for Agriculture Development in the North Eastern States

State	Sub-sector	Focus Area for Agriculture Development
The Three States	Agriculture Production (Food Grain Production)	・ Increase in cropping intensity by introduction of short duration high yielding varieties by replacing the existing long duration local varieties followed by cultivation of other crops like oilseed, pulses, wheat. ・ Proper nutrient management practices along with crop protection measures to be under taken to increase production and productivity of crops. ・ Maximum utilization of available water sources for irrigation purpose and creation of extensive rain water harvest structures to reduce the runoff loss and soil erosion. ・ Farm mechanisation, wherever possible, in order to meet the agricultural labour demand and to reduce the time required for agricultural operations. ・ Manual preparation and extension of know-how in previous projects to mitigate and modify jhum and existing good practice.
	Horticulture (Cash Crop Production)	・ Natural advantages such as topography, climatic conditions are to be best utilized by cultivating wide range of horticultural crops like fruits, flowers, spices, medicinal and aromatic plants. Exotic crops like strawberry having very high demand in local, domestic and international markets can accelerate the enhancement of farmers' income. ・ Promotion and commercialisation of horticulture by means of value addition through Common Interest Groups (CIGs) or SHGs. ・ The protection of existing forest areas through awareness programmes and planting of fast growing species of fruit trees in Jhum areas. To release the pressure on existing forests, cultivation should be encouraged in waste land and other marginal lands. ・ Development of high value and specialised tissue culture laboratories to enhance food production capacity and benefit farmers by supplying the required quality seedlings for horticultural crops. ・ Capacity development for the government staff
	Animal Husbandry and Dairy Farming	・ Development of piggery and poultry including small ruminants for meat production and dairy cattle for milk by encouraging revived and improved backyard farming. ・ Encouragement to each household in the rural area for rearing three nos. of pig, 50 nos. of poultry birds, and one dairy cow in every 10 household. ・ Implementation of programmes such as, induction of quality dairy cattle, community cattle rearing, rural dairy farming, and artificial insemination. ・ Establishment of Dairy co-operatives/CIGs/SHGs for easy marketing ・ Establishment of small scale milk product processing industries for value addition ・ Improvement of technical dissemination network from Departmental farm to individual farms ・ Consolidating the existing livestock and poultry breeding farms, so as to evolve suitable crossbred in sufficient numbers from departmental farms for breeding and propagation ・ Establishment of piggery clusters composed of core breeding farm and satellite fattening pig farms ・ Intensification of fodder development. Fodder stock and grass land reserve in all districts such as hay and silage making units to meet the requirement of fodder in lean period are to be set up. ・ Consolidating entire animal health care programme.
	Fishery	・ In order to increase fish production in the State low lying area to be brought under aquaculture ・ Paddy cum fish culture to be encouraged in low lying paddy fields

State	Sub-sector	Focus Area for Agriculture Development
		・ Emphasis to be given for demand driven timely supply of quality fish fingerlings ・ Specialized transport vehicles for transportation of fish to the distant markets ・ Production of quality nutrition rich fish feeds to cater to the needs of fish farmers
	Processing & Marketing (Value Adding)	・ Promotion of aggregation and shipping system among producers. ・ Fostering producers who have basic business skill and manage their farming based on market needs. ・ Extension of production technology to meet market needs. ・ Strengthening extension system of market information ・ Extension of road network and strengthening maintenance of roads. ・ Strengthening management ability SAMB. ・ Promotion of direct sales markets and contracted farming. ・ Improvement market facilities ・ Improvement of export circumstance ・ Extension of quality control technology needed for export. ・ Establishment of inspection and certification institute in NER ・ Extension of post-harvest processing technology to meet market demand. ・ Support to improved post-harvest processing activities attaching to collective shipping activity. ・ Improvement and strengthening entrepreneurship training program. ・ Provision of adequate loan program. ・ Provision of match making service between processors and producers ・ Improvement of lows, regulations and traditional practices ・ Provide stable utility condition.
Tripura (specific item)	Agriculture Production	・ Promoting of bamboo production for supplemental income of farmers utilising its good productivity in Tripura ・ Capacity development for entrepreneurship for income diversification ・ Livelihood enhancement in patta land which is officially permitted to farming in forest area under Forest Right Act with sustainable agro-forestry ・ Capacity development for the government staff
	Horticulture	・ Cluster forming for value adding utilising Tripura's sub-tropical agro climatic condition and high productivity in crops

Source: JICA Survey Team

(2) Potential Agricultural Products in the Three States and North Eastern Region

Based on the field survey and interview to government officials in Meghalaya, Nagaland, Tripura and Assam, potential agricultural products for enhancement of farmers' income are listed in the following tables.

Table 6.4.2 Prospective Agricultural Products for Import Substitution in the Three States and North Eastern Region

Category	Meghalaya	Nagaland	Tripura	North Eastern Region	Source of Information
Cereals	Almost all	Almost all	Almost all	Almost all	(1)
Vegetables	Almost all vegetables in winter season Onion, Garlic	Almost all vegetables Potato, Onion, Garlic	Almost all vegetables Potato, Onion, Garlic	Potato, Onion, Garlic	(1)
Fruits	Apple, grape, etc.	Apple, grape, etc.	Apple, grape, etc.	Apple, grape, etc.	(1)
Animal Husbandry	Beef, Pork, Broiler Chicken egg	Beef, Pork, Broiler Chicken egg	Beef, Pork, Broiler Chicken egg	Beef, Pork, Broiler Chicken egg	(1)
Fishery	Fresh and dry fishes	Fresh and dry fishes	Fresh and dry fishes	Fresh and dry fishes	(1)

Source (1): From interviewing to officers, traders, farmers, etc. during field study / (2): NERAMAC / (3): "Value Chain Analysis of Selected Crops in NER", SFAC, 2012 / (4): "Export Potential of Horticultural Products from NE States", APEDA

Table 6.4.3 Prospective Agricultural Products for Export in the Three States and North Eastern Region

Category	Meghalaya	Nagaland	Tripura	North Eastern Region	Source of Information
Vegetables	Turmeric (high curcumin content), Bird eye chili	Naga-King-Chili, Soybean, Large cardamom	-	Chili, Ginger, Turmeric, Large cardamom, Flower	(1)
	Potato, Ginger, Turmeric, Black pepper, Areca nut	Ginger, Turmeric, Cardamom	-	-	(2)
	Ginger, Turmeric, *Vegetables*	Naga-chili	-	-	(3)
Fruits / Flower	Pineapple, Orange, Tea	Pineapple, Orange, Flower	Pineapple (queen variety), Flower,	Coffee,	(1)
	Pineapple, Citrus fruits, Banana	Pineapple, Citrus fruits, Passion fruits	Pineapple, Cashew nut	-	(2)
	Pineapple, Citrus fruits,	Pineapple, Passion fruits	Pineapple	-	(3)
Forestry product	Bay leaves, areca nut,	Honey	Broom	Bamboo,	(1)
Exportable	Betel nut/leaves, Broom, Fruits, Vegetables	Pineapple, Naga-chili	Pineapple, Ginger, Bamboo, Broom, Dry fish	-	(1)
	Orange, Pineapple, Ginger, Potato	-	Orange, Pineapple, Jackfruit,	Large cardamom, Bay leaves, Black pepper, Cabbage, Cauliflower, Sweet potato, Squash, Kiwifruit, Walnut, Passion fruits, Flower	(4)

Source: (1): From interviewing to officers, traders, farmers, etc. during field study.
(2): NERAMAC
(3): "Value Chain Analysis of Selected Crops in NER", SFAC, 2012
(4): "Export Potential of Horticultural Products from NE States", APEDA

Table 6.4.4 Prospective Agricultural Products for Processing in the Three States and North Eastern Region

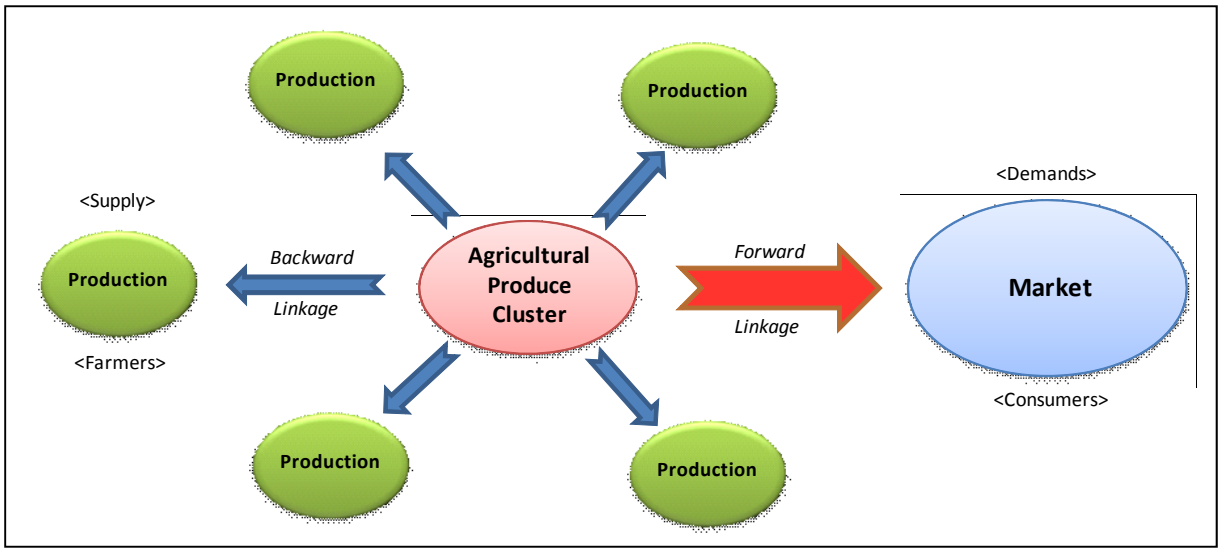
Category	Meghalaya	Nagaland	Tripura	North Eastern Region	Source of Information
Vegetables	-	*Pickles* (chili/tomato/beef/etc.)	Ginger	Ginger, Turmeric	(1)
Fruits / Flower	Pineapple, Strawberry, Star fruit,	Pineapple, Orange	Pineapple	Cashew nut	(1)
Forestry product	-	Sandalwood (oil)	Broom, Bamboo, Agar tree (oil), Sandalwood (oil),	Bamboo	(1)
Exportable	Pineapple	Aromatic/spicy oil, Sandalwood (oil),	Pineapple, Broom, Bamboo, Sandalwood (oil)	-	(1)
	Orange, Pineapple, Ginger, Turmeric,	-	Orange Pineapple, Jackfruit, Turmeric	-	(4)

Source: (1): From interviewing to officers, traders, farmers, etc. during field study.
(2): NERAMAC
(3): "Value Chain Analysis of Selected Crops in NER", SFAC, 2012
(4): "Export Potential of Horticultural Products from NE States", APEDA

(3) Application of Agriculture Cluster Approach

For producers, (i) accessibility to market, (ii) high price, (iii) selling out of all products are desirable factors in farming. On the other hand, for middleman/trader, (i) accessibility to market, (ii) availability of required amount, quality, price and timing are desirable factors in trading. To establish a win-win situation between producers and middleman/trader, it is said that creation of cluster approach is effective. As first step, production cluster will be created connecting the several project target villages. Then, marketing network development, installation of post-harvest and

market facilities should be done after farmers actually require those facilities considering site, type, size, specifications with financial support and capacity development of core farmers. An image of cluster approach for agriculture produce is shown in the following figure.



Source: JICA Survey Team

Figure 6.4.3 Image of Agriculture Cluster Approach

For the achievement of livelihood promotion of farmers through sales of farm products, it is indispensable (i) to develop their selling power with the marketable quantity of products, and (ii) to form their favourable position in the agricultural value chain.

For the item (i), the cluster approach is effective to form production centres for joint shipping of farm products where farmers are scattered over hilly terrain. It is generally said to be difficult to do cooperative activities in the north eastern region. However, it has been changing from subsistence farming to commercial farming first in the areas having a good access to city markets. It will be the barometer of a mind of farmers shifting from traditional to modern agriculture. Moreover, some local females have begun collecting farm products from neighbouring farmers and bringing those to the nearest city markets for sales. Yet it is too small for them to get bargaining power in the markets. Accordingly grouping of the females will be a possible option for expansion of their business. Furthermore, it is a successful case that middlemen come to a pineapple production centre in Nagaland.

As for the item (ii), the cluster approach is just a general model in this report in order to establish assembly markets in and around production centres. Actually it needs to formulate a best suitable marketing system through assessment of site location of the cluster, condition of transportation, activities of market players, connectivity to city markets, etc. It may be good ideas to attract middlemen to the assembly markets, and to bring farm products to nearby city markets for direct sales where possible. It is also a good idea to set up a consumers/farmers market (direct sales by farmers to consumers) in the existing city market under the model Agricultural Produce Market Committee (APMC) Act. It is quite possible in Nagaland to expand the business in collaboration with the existing consumers/farmers market. As conclusion of market survey in the north eastern states, it is a greatest challenge that there are only few capable persons who have good management skills. From this viewpoint, outcome of the Enterprise Facilitation Centre (EFC) of IBDLP in Meghalaya is noteworthy. Hence, it needs to include a capacity building component for enhancing

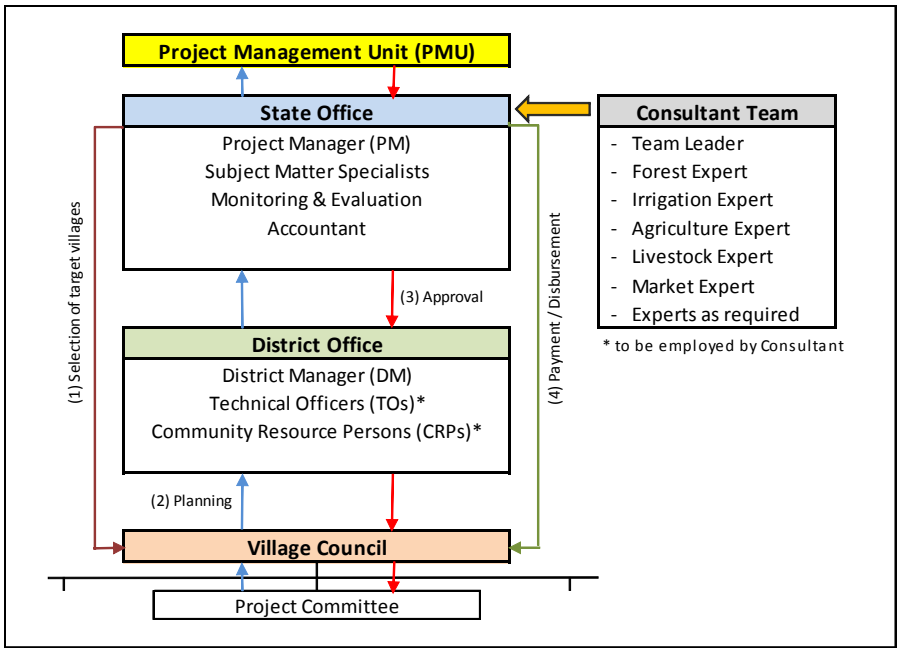
management skills of farmer's leaders and local entrepreneurs into the project. It is a key for the successful project whether such capable persons could be brought up through the project.

6.4.3 Institutional Development and Capacity Building

The institutional development and capacity building are fundamental factors for smooth implementation of projects. In order to achieve that, it should prioritise the following initiatives: (i) to develop institutions such as project implementation organisation, monitoring and evaluation system in order to ensure transparency of fund flow, setting, monitoring, and evaluation system of the project targets and (ii) to build-up the capacity of the stakeholders through social mobilisation and awareness system, participatory planning, design and construction, technical guidance in terms of cultivation, farm management, process and distribution of agriculture produces.

The state governments shall institute an autonomous body in compliance with the Society Registration Act of 1860 or entrust the works to an able society that will act as the PMU. Since several government departments will be involved in the implementation of the project, the PMU shall be headed by a commissioner who is in charge of the agriculture and rural development and supported by the directors of directorates/departments relevant to the project. The PMU will coordinate and guide the line departments in the annual planning, approval of financial statements, confirmation of work performance, and achievement of the project targets.

Just for reference, the tentative organizational structure is shown in Figure 6.4.4. The project implementation will be as follows: (i) selection of target villages based on the criteria, (ii) preparation of village development plans in a participatory manner by the project committees under the respective village councils, (iii) appraisal and approval of the village development plans, and (iv) payment to the village project committee as per the work progress. Sample of the fund flow is given in Figure 3.2.2. In any case, the project organizational structure and fund flow shall be finalized along with the type of JICA's assistance (e.g., ODA Loan, Grant Aid, Technical Cooperation Projects, etc.) in the next JICA's study.



Source: Prepared by JICA Survey Team

Figure 6.4.4 Tentative Organisational Structure for Project Implementation

It is recommended to employ the consultants in order to assist the PMU for purposes of institutional development and capacity development of the major stakeholders of the project in addition to the project management. The employment system may differ from the types of JICA assistance.

Attachments

Attachment-1.5.1

FARM HOUSEHOLD SURVEY
UNDER
JICA DATA COLLECTION SURVEY ON AGRICULTURE SECTOR
IN NORTHEAST INDIA

This work (hereinafter referred to as "the Work") was conducted as a part of the Data Collection Survey on Agriculture Sector in Northeast India (herein referred to as "the JICA Survey"). The Contract was entered upon 22nd December 2014 by and between the JICA Survey Team and NABARD Consultancy Services. Meanwhile, the Contract was amended on 1st February 2015 for time extension and price adjustment.

1. Objective of the Work

The objective of the Work is to collect information and data regarding current conditions and characteristics of farm economy and other agriculture related items in the three states of Meghalaya, Nagaland and Tripura for the JICA Survey.

2. Outline of the Work

(1) Survey Area and Number of Sample Household

Target State	Target District (District Capital)	Sample Number of Household	
		within 15 km*1	over 30 km*1
Meghalaya	East Khasi Hills (Shillong)	25 (5 villages x 5 FHHs*2)	25 (5 villages x 5 FHHs)
	West Garo Hills (Tura)	25 (5 villages x 5 FHHs)	25 (5 villages x 5 FHHs)
Nagaland	Kohima (Kohima)	25 (5 villages x 5 FHHs	25 (5 villages x 5 FHHs)
	Tuensang (Tuensang)	25 (5 villages x 5 FHHs)	25 (5 villages x 5 FHHs)
Tripura	West Tripura (Agartala)	25 (5 villages x 5 FHHs)	25 (5 villages x 5 FHHs)
	North Tripura (Kailashahar)	25 (5 villages x 5 FHHs)	25 (5 villages x 5 FHHs)
Total		150	150

Notes: *1) distance from the district capital, *2) farm households,

Basically target villages would be selected in a balanced manner in due consideration of farming systems, tribal groups, level of agriculture production and income, etc. However, the target districts might be changed due to security condition if any in the course of the Work.

(2) Contract Period

The Contract period of the Work was originally set for forty-five (45) calendar days from 22nd December 2014 to 4th February 2015. The expiry date of the Contract was changed to 14th day of February 2015 with a grant of 10 days time extension taking into account the law and order issues in Tuensang district of Nagaland state under the Amendment-1 to the Contract.

(3) Methodology

Step-1: Finalisation of the draft questionnaire shown hereunder so as to meet the local condition;

Step-2: Selection of respondents in consultation with the local authority;

Step-3: Execution of farm interview survey using the final questionnaire; and

Step-4: Data compilation and analysis, and report reparation

(4) Outputs

The Contractor shall prepare in English and submit outputs of the Work to the JICA Survey Team in the following manner.

Output	Form & No.	Due Date
(1) Compiled data sheets in English	CD-R or DVD x 3	By the end of the Contract
(2) Survey Report in English	Printed Document x 3 CD-R or DVD x 3	By the end of the Contract

It would be noted that draft compiled data sheets and survey report shall be submitted in the form of MS Word and/or Excel to the JICA Survey Team at least 5 days before the due date for his review and comments. Besides, the filled-out forms should be submitted to the JICA Survey Team together with the draft compiled data sheets.

(5) Contract Price

The Contract price was originally Rs. 671,305 inclusive of service tax. It was revised under the Amendment-1 to be Rs. 827,749 inclusive of service tax and withhold tax on ground of tax convention between India and Japan.

(6) Payment

The payment would be made in two installments as follows.

i) First installment : 40% of the Contract Price at the signing of the Contract

ii) Final installment : 60% of the Contract Price at the acceptance of Final Outputs

(end)

FARM HOUSEHOLD SURVEY

Date of Interview: _____

Name of Interviewer:_____

I. GENERAL INFORMATION

Location:	District: _____	Block: _____	Village: _____	
Name of respondent:		Sex:	❑ Male	❑ Female
Socio-economic status:	❑ APL	❑ BPL	❑ AAY	
Religion:	❑ Christian ❑ Hindu	❑ Muslim	❑ Buddhist	❑ Other:(specify)_____
Social category:	❑ GC ❑ SC	❑ ST	❑ OBC	
Number of household member:	person(s)	Mobile No. :		

II. HOUSEHOLD INCOME AND EXPENDITURE

1. Household income and expenditure of last one year **(Jan. 2014 - Dec. 2014)**.

INCOME	
Item	Annual Income (Rs./year)
a. Crop Production	
b. Livestock/Dairy	
c. Fishing/Aquaculture	
d. Forest Produces	
e. Sericulture	
f. Cottage industry/Processing	
g. Business/Trading	
h. Wage Labourer (casual work)	
i. Agricultural Labourer	
j. Loan	
k. Others (specify): _____	
l. Others (specify): _____	
Total Annual Income	

EXPENTITURE	
Item	Annual Expenditure (Rs. /year)
1. Foods	
2. Fuel	
3. Water	
4. Electricity	
5. Transportation	
6. Communication	
7. Agriculture Inputs (seeds, fertilizers, pesticides, , etc)	
8. Education	
9. Health (medicine)	
10. Clothing	
11. Social Functions	
12. Loan repayment	
13. Saving	
14 Others (specify): _____	
Total Annual Expenditure	

III. AGRICULTURE PRODUCTION

1. Please give information on production and sales of the following crops for last one year **(Jan. 2014 - Dec. 2014).**

Crop Name	Production System **[Multiple answers allowed]**			Cultivating Season		Cultivated Area (acre)	Production quantity (kg/season)	Sale quantity (kg/season)
	Shifting Cultivation	Settled Rainfed Cultivation	Settled Irrigated Cultivation	From (Month)	To (Month)			
	❑	❑	❑					
	❑	❑	❑					
	❑	❑	❑					
	❑	❑	❑					
	❑	❑	❑					
	❑	❑	❑					
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	❑	❑	❑					
	❑	❑	❑					
	❑	❑	❑					

2. Please give information on inputs for production for last one year **(Jan. 2014 - Dec. 2014)**.

Farming System	Purpose of Production	Agriculture Input						
		Seeds purchased at Shop	Irrigation Water	Chemical Fertiliser	Organic Manure	Pesti-cide	Insecti-cide	Labour hired from outside
Shifting Cultivation	For Selling	❑	❑	❑	❑	❑	❑	❑
	For Self Consumption	❑	❑	❑	❑	❑	❑	❑
Settled Cultivation	For Selling	❑	❑	❑	❑	❑	❑	❑
	For Self Consumption	❑	❑	❑	❑	❑	❑	❑

3. What are major constraints in agriculture production? **[Please choose three most serious constrains]**

❑	01 = Lack of irrigation facilities.
❑	02 = Lack of irrigation water.
❑	03 = Erratic precipitation.
❑	04 = Lack of suitable land for cultivation.
❑	05 = Soil degradation.
❑	06 = Difficult to obtain appropriate seeds/seedlings (e.g. high-yielding, disease resistance, etc.).
❑	07 = Difficult to apply fertilizer appropriately.
❑	08 = Difficult to control insects and diseases.
❑	09 = Lack of labour forces.
❑	10 = Lack of agriculture machineries/equipments.
❑	11 = Lack of skills and knowledge on cultivation.
❑	12 = Transportation of farm inputs/outputs
❑	13 = Others (specify):_____
❑	14 = Others (specify):_____

IV. POST-HARVEST AND MARKETING

1. Please give information on regarding **post-harvest treatment** for last one year **(Jan. 2014 - Dec. 2014)**.

(A)	(B)	(C)	(D)	(E)
Crop Name	What post-harvest treatment is applied for? **[USE CODE]**	Storage way **[USE CODE]**	Storage place **[USE CODE]**	Storage period after harvest* (Days)

Codes for (B)	[multiple answers allowed] <Grain>: A1=no processing; A2= threshing; A3=cleaning; A4=drying; A5=processing; A6=Others (specify) <Vegetable>: B1=no processing; B2=washing; B3=grading; B4= removing useless part out; B5=Others (specify) <Fruits and industrial crop>:C1=no processing; C2=cleaning; C3=washing; C4=grading; C5 = processing; C6 = Others (specify)
Codes for (C)	01 = bulk; 02 = bag; 03 = wooden box ; 04 = bamboo basket; 05 = plastic container; 06 = metal bin; 07 = Others (specify)
Codes for (D)	01= storage shed; 02= on ground in house; 03= on floor in house; 04= Others (specify)

2. What are major constraints in post-harvesting treatment? **[Please choose the most serious constrains]**

❑	01 = Lack of labour.
❑	02 = Lack of skills and knowledge on post-harvest treatment.
❑	03 = Lack of storage facilities.
❑	04 = Lack of processing machines.
❑	05 = Others (specify):_____
❑	06 = Others (specify):_____

3. Please give information on regarding marketing for last one year **(Jan. 2014 - Dec. 2014).**

* Note: Produce includes both raw materials and processed ones.

(A)	(B)	(C)	(D)	(E)	(F)	(G)		
Crop Name	Where do you sell your produce*? **[USE CODE]**	When do you sell your produce*? **[USE CODE]**	To whom do you sell your produce*? **[USE CODE]**	How do you transport your produce*? **[USE CODE]**	Package of produce for transportation* **[USE CODE]**	Constraints on marketing. **[USE CODE]**		
						1st	2nd	3rd

Codes for (B)	01 = Farm gate; 02 = Village market; 03 = Roadside market ; 04 = Town/City market; 05 = Outside State; 06 = Others (specify)
Codes for (C)	01= Immediately after harvest or post-harvest process; 02=As and when cash is needed; 03=When price is high; 04=Others (specify)
Codes for (D)	01 = Consumer; 02 = Retailer; 03 = Collector/Broker/Agent/Wholesaler; 04 = Processing factory; 05 = Others (specify) For 03, please describe the town / city name of final destination market.
Codes for (E)	01 = On foot; 02 = Collected by collector/middleman; 03 = Cart; 04 = Truck; 05 =LMV; 06 = Three wheeler; ; 07 = Motorcycle; 08 = Bicycle; 09 = Others (specify)
Codes for (F)	01 = No arrangement; 02 = Bag; 03 = Bamboo basket; 04 = Wooden box; 05 = Others (specify)
Codes for (G)	Please choose <u>three</u> most serious constrains at maximum and rank them (1^{st}= most serious, 2^{nd}= secondary serious, 3^{rd}= third serious). 01 = Low price; 02 = Fluctuation of price; 03 = Lack of market information (price, demand, etc.); 04 = Limited buyer; 05 = Difficulty of market access; 06 = Lack of transportation facilities; 07 = Lack of knowledge on marketing way; 08 = Lack of labour forces; 09 = Others (specify)

4. Sales months and price

Please answer the sales condition of five major sales products during last one year.

Sales Products	Sales Quantity (kg/year)	Highest Sales Price		Lowest Sales Price	
		Rs./kg	Month	Rs./kg	Month

5. Additional Processing: Have you had any additional processing activities for last one year (Jan. 2014 - Dec. 2014)?

(A)	(B)	(C)		(D)		(E)	(F)	
Raw material (Crop)	Processed product (Specify)	Processing volume of raw materials (kg or No.)		Sales volume (kg or No.)		Do you use machines? 01= use machines 02= manual	Charge for processing for others (Rs./kg or Rs./No.)	
		Volume	Unit	Volume	Unit		Volume	Unit

6. Market price information

Do you collect market price information? (❑ Yes /❑ No)

If "Yes", how do you collect information? **[Multiple answers allowed]**

❑ Neighbours/Relatives	❑ Radio	❑ Shops in village
❑ Mobile Phone	❑ Newspaper	❑ Trader/ Retailers in market
❑ TV	❑ Trader coming to village	❑ Government officials/ Extension officer
❑Others (specify): _____	❑Others (specify): _____	❑Others (specify): _____

V. FORESTRY

Please give information on collection of forest products for last one year **(Jan. 2014 - Dec. 2014)**.

Type of Forest Produce	How much forest product do you obtain? (kg)	Sources of forest produce				Sale of forest products for last one year	
		Self-owned Forest	Community owned Forest for common use	Others (specify)	Uncertain	Quantity (kg)	Amount (Rs.)
1. Timber wood		❑	❑	❑ _____	❑		
2. Firewood		❑	❑	❑ _____	❑		
3. Bamboo		❑	❑	❑ _____	❑		
4. Cinnamon bark		❑	❑	❑ _____	❑		
5. Tree resins		❑	❑	❑ _____	❑		
6. Edible fungi		❑	❑	❑ _____	❑		
7. Honey		❑	❑	❑ _____	❑		
8. Edible insects		❑	❑	❑ _____	❑		
9. Bay leaf		❑	❑	❑ _____	❑		
10. Broom grass		❑	❑	❑ _____	❑		
11. Betel nuts		❑	❑	❑ _____	❑		
12. Wild vegetables		❑	❑	❑ _____	❑		
13. Others (specify): _____		❑	❑	❑ _____	❑		
14. Others (specify): _____		❑	❑	❑ _____	❑		

VI. IRRIGATION AND WATER USERS' ASSOCIATION [Applicable for those who practice irrigated cultivation]

1. Irrigation

(1) What are sources of irrigation on your farm? **[Multiple answers allowed]**

❑ Canal, ❑ Pond/tank/reservoir, ❑ River/stream, ❑ Spring, ❑ Groundwater by dug well, ❑ Groundwater by tube well,
❑ Other (specify): _____

(2) Please give name of Irrigation Scheme if available. Specify Name: _____

(3) Do you have sufficient water for irrigation during dry season?

❑ Yes, sufficient, ❑ Yes, to certain extent, ❑ Insufficient, ❑ Almost no water

(4) Irrigation problems

(i) Do you need any improvement in irrigation system? (❑ Yes ❑ No)

(ii) If Yes, what area do you need to be improved? **[Multiple answers allowed]**

Please choose <u>three</u> at maximum and rank them (1 for need mostly, 2 for need secondly, 3 for need thirdly).

❑ Improvement/repair of diversion weir/pump, ❑ Widening/extension of canal, ❑ Desilting of canal
❑ Improvement/repair of irrigation canal structure, ❑ Drainage canal improvement/construction
❑ On-farm development, ❑ Other (specify)

(5) Micro irrigation

(i) Do you use any micro irrigation kits? (❑ Yes ❑ No)

(ii) If Yes, what are they?

❑ Drip, ❑ Sprinkler, ❑ Other (specify):_____

(6) Other use of irrigation water

(i) Do you use irrigation for other purposes? (❑ Yes ❑ No)

(ii) If Yes, what are they? **[Multiple answers allowed]**

❑ Domestic, ❑ Fisheries, ❑ Animals, ❑ Other (specify):_____

2. Water Users' Association (WUA).

(1) Are you (or your family member) a member of WUA? (❑ Yes ❑ No)

(2) If No, what are reasons for not becoming a member of WUA?

Please choose three at maximum and rank them.

❑ WUA in the area has not been organized., ❑ No/little information about WUA.

❑ Membership fee and water charge are high., ❑ There are many obligations as a member of WUA.

❑ There are few benefits as a member of WUA., ❑ Others (specify):_____

VII. FARMERS' COOPERATIVE SOCIETIES AND GROUPS

1. Please give information about your participation in farmers' cooperative societies and groups. **[Multiple answers allowed]**

Category of Cooperative Societies and Groups	Participation 01=Male adult in the family 02=Female adult in the family 03=No one in the family 04=Others (Specify in the cell)	Membership fee or other charge for being member (Indicate the total amount if paid in Rs. Otherwise, record 0.)	What kinds of benefit you have received as a member of cooperative societies/groups? **[multiple answers allowed]** 01=cooperative shipping (sale) 02=cooperative purchase of inputs 03=obtain information 04=obtain credit 05=obtain cash grant 06=obtain grant in kind 07=obtain subsidy 08=receive technical guidance and training 09= no benefits 10= Others (specify)
❑ Agriculture/Farming			
❑ Horticulture			
❑ Livestock/Dairy			
❑ Sericulture			
❑ Fishery			
❑ Sales/Marketing			
❑ Saving/Credit			
❑ SHG			
❑ Others (specify)			

2. If no one in your family is a member of a farmers group, please tell us the reasons. **[Multiple answers allowed]**

❑ There is no group nearby. / ❑ No benefits / ❑ Membership fee is too high. / ❑ Do not want to attend the meetings. /

❑ Cannot trust the management of the group. / ❑ Others (Specify:_____)

VIII. ACCESS TO PUBLIC SERVICES AND ASSISTANCES

1. Credit

(1) Have you (or your family member) obtain loan for agriculture (agriculture, horticulture, fishery, livestock, sericulture, etc.) related activities for the past 3 years? (❑ Yes ❑ No)

(2) If Yes, please give information about those loans. **[Multiple answers allowed]**

Sources of Loans	Loan Amount (Rs.)	Interest Rate (%/Month)	Repayment Period (Months)	Amount Repaid (Rs.)
❑ Bank (Government)				
❑ Bank (Private)				
❑ Cooperatives				
❑ SHG				
❑ NGO/MFI				
❑ Money Lender/Trader				
❑ Relative/Friend				
❑ Others (specify)				

(3) What are the difficulties in obtaining loans? **[Up to 2 answers at maximum]**

❑ No difficulty.
❑ Distance to the financial institutions (Physical access) is too far away.
❑ Procedures for applying loans are complicated.
❑ Loan condition is severe.
❑ Not aware of the available loan schemes and the application procedure
❑ Do not have collateral
❑ Others (specify):_____

2. Assistances under government schemes

(1) Have you received benefits under any farm-related government schemes for the past 3 years? (❑ Yes ❑ No)

(2) If Yes, please give details of assistances received under those government scheme and extension service

Scheme	Kind of assistances				
	Grant	Loan	Subsidy	In-kind	Training
❑ MGNREGA	❑	❑	❑	❑	❑
❑ National Rural Livelihood Mission (NRLM)	❑	❑	❑	❑	❑
❑ Integrated Watershed Development Programme (IWDP)	❑	❑	❑	❑	❑
❑ Integrated Watershed Management Programme (IWMP)	❑	❑	❑	❑	❑
❑ Accelerated irrigation Benefit Programme (AIBP)	❑	❑	❑	❑	❑
❑ National Horticulture Mission (NHM)	❑	❑	❑	❑	❑
❑ Rashtriya Krishi Vikash Yojana (RKVY)	❑	❑	❑	❑	❑
❑ Extension Service by KVK	❑	❑	❑	❑	❑
❑ Extension Service by ATMA	❑	❑	❑	❑	❑
❑ Extension Service by Government Department Specify Department:_____	❑	❑	❑	❑	❑
❑ Extension Service by Government Department Specify Department:_____	❑	❑	❑	❑	❑
❑ Others (specify):_____	❑	❑	❑	❑	❑
❑ Others (specify):_____	❑	❑	❑	❑	❑

IX. SOCIAL ENVIRONMENT

1. **Division of Labour**: What is situation of Division of Labour in agricultural activities?

Activity	Both male and female	Male	Female	Children
1. Land Preparation	❑	❑	❑	❑
2. Sowing	❑	❑	❑	❑
3. Raising Seedlings	❑	❑	❑	❑
4. Transplanting	❑	❑	❑	❑
5. Weeding	❑	❑	❑	❑
6. Harvesting	❑	❑	❑	❑
7. Watering	❑	❑	❑	❑
8. Post-harvest (Threshering / Winnowing / Cleaning etc.)	❑	❑	❑	❑
9. Processing	❑	❑	❑	❑
10. Transportation	❑	❑	❑	❑
11. Marketing & Sales	❑	❑	❑	❑

2. **Seasonal Migration from the Village:** Do your family member seasonally migrate to outside village?

❑ Yes (to other city in the State), ❑ Yes (to outside State), ❑ Yes (to outside India), ❑ No

Major Migration Periods From _____ (month) / To_____ (month)

3. **Food Security**: Do your family experienced food shortage during Jan. 2014 - Dec. 2014? (❑ Yes ❑ No)

If Yes, how many months a year have you experienced food shortage? (_____months/year

X. HOUSEHOLD ASSET

1. **Land:** Please tell us land areas which you could use for last one year **(Jan. 2014 - Dec. 2014)** by type, size, and holding type.

[CODE] 01=Periodic Patta /02=Land Settlement Certificate (Permanent) / 03=Community land (not permanent) /
04=VC Pass (permanent) /05=Others (specify) / 06=Uncertain

Land Type	Land Area (acre)	Land Holding Type **[USE CODE]** (Multiple answers are acceptable.)
(1) Settled cultivation land		
(2) Shifting cultivation land		
Rotation Cycle_____ year		
(3) Residential land		
(4) Other land		
Total		

2. **Other Assets:** Please tell us available household assets.

Agriculture & Transportation Equipment	No.	**Communication and Other Equipment**	No.	**Livestock**	No.
1. Pump		1. TV		1. Cow	
2. Sprayer		2. Radio		2. Goat	
3. Drip Irrigation System		3. Cell phone		3. Pig	
4. Farming Machine (specify): _____		4. TV dish antenna		4. Buffalo	
5. Bicycle		5. Computer		5. Poultry	
6. Motorcycle		6. Refrigerator		6. Duck	
7. Three wheeler		7. Other(specify):_____		7. Other(specify):_____	
8. Cart		8. Other(specify):_____		8. Other(specify):_____	
9. Other(specify):_____		Other(specify):_____		9. Other(specify):_____	

XI. ELECTRICITY & WATER SUPPLY

1. What is the main source of light? **[Multiple answers allowed]**
❑ None / ❑ Electricity connected to grid / ❑ Generator / ❑ Battery / ❑ Kerosene Lamp / ❑ Solar /
❑ Others (specify):_____

2. What is the main source of drinking water? **[Multiple answers allowed]**
❑ Tap Water / ❑ Shallow Well / ❑ Tube Well / ❑ Spring / ❑ River or Canal / ❑ Tank, Pond, Lake / ❑ Rainwater collection /
❑ Bottled water / ❑ Others (specify):_____ / ❑ Others (specify):_____
Distance from House _____ m
Water sufficiency ❑ Sufficient ❑ Insufficient (Specify the months) from _____ to _____

XII. NATURAL DISASTERS AND LAND CONSERVATION

(1) Have you experienced damages by natural disaster on your agriculture production **for last 5 years**? (❑ Yes ❑ No)

(2) If Yes, please give details of those damages and measures to recover or mitigate damages. **[Multiple answers allowed]**
❑ Cold-weather damages, ❑ Drought, ❑ Landslides, ❑ Flooding, ❑ Storm, ❑ Rodents/animals/insects, ❑ Others (specify)

(3) Do you practice a land conservation technique? (❑ Yes ❑ No)

(4) If Yes, please give details of the conservation technique. **[Multiple answers allowed]**
❑ Contour bunds, ❑ Contour trenches, ❑ Bench terrace, ❑ Combining trees and crops, ❑ Others (specify)

PROCEEDINGS OF THE WORKSHOP ON SURVEY FINDINGS AND RECOMMENDATIONS IN AGRICULTURE AND ALLIED SECTOR IN NAGALAND

1. Place of the meeting: de Oriental Grand, Kohima
2. Date of the meeting: 27th Feb 2015
3. Participants: 29 nos. including the Survey Team (refer to the attendance sheet-1)
4. Key proceedings of the Workshop

4.1. Mr. K Shibuta, Team Leader of the JICA Survey Team began the workshop with warm welcome to the participants and explained the purpose and schedule of the workshop and he invited Mr. Imkonglemba, Agriculture Production Commissioner to formally start the proceedings of the workshop.

4.2. Mr. Imkonglemba, APC greeted all the participants from different Departments and also the Survey Team and he briefly mentioned about the work of Survey Team and thanked all the Officers of the Department both at the state as well as district levels for their assistance to the Survey Team. As he won't be staying for the entire day for his other engagements, he provided an overview of development needs of the state and requested the participants to contribute the proceedings of the workshop. He emphasized on the need for achieving sustainable livelihoods – what the majority in Nagaland needs is a square meal every day. All the projects/ schemes should adopt integrated approach to help the farmers building their own foundations so that even after withdrawal of the project they can live on their own and ensure their livelihood. Although there are lot of similarities in Nagaland, Meghalaya and Tripura each state's development requirements are different. He requested the field staff to emphasize on group work/ team building methodologies. All social capital and social assets are there but the state is poor in organising market and building linkages with opportunities.

4.3. The APC requested the Officers from different Departments to do a piloting based on the recommendations of the Survey Team for two years i.e. till March 2017 so that 13th Five Year Plan can scale up the models established/ results achieved during the piloting. He further added that the piloting sites should be identified close to the national highways so that it can be low cost, visible and connected to the mainstream market. Infrastructure development, which always takes the major share of cost in any project, should be avoided.

4.4. Regarding the Project Structure and Institutional Arrangement, APC was of the opinion that an upgraded model of NEPED may be thought of bringing in convergence and coordinated interventions by different Departments.

4.5 After the opening remark by Mr. Imkonglemba, APC, Mr. Shibuta requested the members of Survey Team to make the presentation and he himself presented the objectives and methodology of the survey and then Dr. KK Satpathy presented the findings on irrigation and soil and water conservation; Mr. Nakamura presented findings on agriculture production; Mr. Mori discussed the market for agriculture produce; Dr. Michiko presented the farm livelihood component of the survey and Mr. Shibuta presented the overall concept of agriculture sector development and next course of action for the State Government to access financial assistance from JICA.

4.6 After the presentation by the Survey Team the participants were requested to comment on the findings and recommendations. The following comments and suggestions were given by the participants.

4.6.1. Project Director, Soil and Water Conservation Department had a reservation on the recommendation of the survey team i.e. changing the mind-set of the people to adopt cash crops such as areca nut, rubber etc. in Jhum field. He mentioned Jhum needs to be understood properly then only one can recommend the cash crops to be adopted. Some of the crops suggested may not be suitable for the Jhum field. A bottom up planning approach shall help identifying suitable crops to be promoted in addition to the basic Jhum crops (food crops). Regarding the cluster development on different enterprises, he suggested that the Survey Team should include NTFP – wild fruits, vegetables, medicinal plants etc. as many NTFPs are yet to be valued added and explored to find a market.

4.6.2. Mr. Nakamura from the survey team accepted the suggestions and reiterated that crops shall be selected based on the field situation as well as demand in the market. Efforts shall be made to follow cluster approach in promotion of different cash crops (market led crop promotion).

4.6.3. The representative from the Forest Department wanted to know more about the procedure for submission of a project proposal to JICA – whether each Department shall directly submit project to JICA or it would be sent through the Office of APC.

4.6.4. Both Mr. Shibuta and Mr. Imkonglemba explained the standard operating procures for project submission. Dr. Michiko further added the current emphasis by JICA on convergence and inter-departmental coordination for implementation of any loan project.

4.6.5. The representative from the Industries Department highlighted the current situation of industrial growth in the state and issues faced by the Department. Lack of surplus production had led to poor industrial growth and at the same time processing facilities are not available at the village/ rural areas to help farmers to produce more. He gave an example of “one village and one product” project in Thailand, which was supported by JICA and suggested that similar efforts need to be made in North East. According to him, Naga villages are quite big and one village can even form a cluster to produce enough and he suggested that the project may promote processing facilities in the villages and enhance the infrastructure related to cold chain. The Department proposes to establish 10 processing units in each district. He gave an example to substantiate the need for cold chain facility. 5 years ago the state as well as the farmers suffered a huge loss in cultivation of ginger as the market was crashed and there was no cold chain facility to store the produce and the wastage was 300,000 tonnes.

4.6.6. Mr. Mori from the Survey Team responded that the infrastructure will eventually be established but one has to work on the production and enhancement of business management skills. It is not difficult to have cold storage but who is going to manage the facilities and how to ensure that the products shall be stored in the cold storages. According to him processing facility and cold chain can’t guarantee higher profit to the producers.

4.6.7 Mr. Jitesh from the Survey Team emphasized that the production is pre condition for processing – one village in Nagaland can be a cluster – better to have 2-3 villages to ensure volume and he further emphasized the need to promote youth as entrepreneur. Primary processing also needs volume, he added. Each cluster needs to have

specialisation of products and more emphasis should be given on the backward linkages for food processing.

4.6.8. Mr. Simon from the Veterinary and Animal Husbandry Department wanted to know more specifics about the Survey Team's recommendations on promotion of organic farming and market for organic produce. He raised the mismatch in the Team's finding on organic farming – as the organic produces don't fetch premium prices then how to encourage the farmers to adopt organic farming. The state does not have surplus produces so the emphasis is on to enhance the productivity and production.

4.6.9 The Survey Team responded that it is difficult now to give specific recommendations but the state and the farmers are in a better position to promote organic farming as most of the inputs are locally produced and most of operations are by default organic.

4.6.10. The representative from the Sericulture Department mentioned that Sericulture is an important economic activity of the rural people and it has both short term and long term economic gains. People are earning a good amount in 3-7 months' time from Eri and Mulberry cultivation. The Survey Team should include the Sericulture as an important livelihood intervention in the state.

4.6.11. Mr. Shibuta mentioned that the Team had a good discussion with the Officers of Sericulture Department and the Team was expecting some concept notes from the Dept., which could be not received by the Team.

4.6.12. Mr. Imkonglemba, APC requested the Survey Team to recommend specific interventions to address the issue of power generation and supply. The issue has been highlighted but he expects some suggestions from the Survey Team – whether it is hydrogers or small irrigation and power generation projects etc. He also mentioned that the Team has to clarify the recommendations on the enhancement of farming in Jhum plot. As in most of the Jhum fields farming continue for two years it is better to suggest that the efforts shall be made to extend the activities to three years and also tree planting shall be carried out so that eventually it would contribute to reduction of Jhum.

4.6.13. The representative from the Horticulture Department suggested that women in Naga Society are a key to agriculture development and any project for agriculture sector development should ensure women to be part of decision making system/ arrangement.

4.7 After the plenary session the participants had small group discussions (two groups) to make specific suggestions on a) what is the appropriate institutional set up to implement integrated approach? & b) how to develop market with the given limitations of roads and other necessary infrastructure. The recommendations of each group have been presented below:

4.7.1. What is the appropriate institutional set up to implement integrated approach?

4.7.1.1. Jhum needs to be improved through integration of traditional knowledge of Jhumias and the experiences of good practices available with different Programmes/ Projects/ Schemes/ Organisations.

4.7.1.2. Integration is possible if all the Departments and Stakeholders would work together. An inter-departmental institutional structure needs to be evolved to work on Jhum improvement. The group suggested that NEPED model can be upgraded to bring in inter-departmental coordination. The Government may notify the APC to be the Team Leader and technical experts shall be brought from all the concerned Departments to work as a team.

4.7.2. How to develop market with the given limitations of infrastructure?

4.7.2.1. Product Cluster should be identified based on a) market, b) agro-ecological conditions, and c) remoteness/ geographical isolation.

4.7.2.2. Farmers need to be collectivised/ grouped and efforts should be made to promote individual entrepreneurs to look into different activities.

4.7.2.3. Farmers' capacity needs to be built up for proper book keeping and input-output analysis.

4.7.2.4. There may be development of some basic infrastructure at the village/ cluster level such as agri link roads linking the farms as well as market, collection centres and when there is volume, pre-cooling and other processing facilities may be established.

4.7.2.5. There needs to be some flexibility in the schemes to promote clusters and individual entrepreneurs. If a farmer is producing more she/he may be supported to produce more.

4.7.2.6. Efforts should be made to promote the cluster in such a way that the market shall come to the farmers rather than farmers going to the market.

4.8 After presentations by the groups on their deliberations and findings, Mr. Shibuta, Team Leader of the Survey Team extended his vote of thanks to all the officers from different Departments and formally closed the workshop.

PROCEEDINGS OF THE WORKSHOP ON SURVEY FINDINGS AND RECOMMENDATIONS IN AGRICULTURE AND ALLIED SECTOR IN TRIPURA

1. Place of the meeting: Conference Hall No 2; Secretariat, Agartala
2. Date of the meeting: 2nd March 2015
3. Participants: 34 nos. including the Survey Team (refer to the attendance sheet-2)
4. Key Proceedings of the Workshop:

4.1. Mr. K Shibuta, Team Leader of the JICA Survey Team began the workshop with warm welcome to the participants and explained the purpose and schedule of the workshop and he invited Mr. Bahuguna, Principal Secretary to formally start the proceedings of the workshop. As suggested by Mr. Bahuguna survey team members introduce themselves including their area of specialization. After introduction by survey team, Mr. Bahuguna suggested going ahead with the presentation.

4.2 Mr. Shibuta requested the members of Survey Team to make the presentation and he himself presented the objectives and methodology of the survey and then Dr. KK Satpathy presented the findings on irrigation and soil and water conservation; Mr. Nakamura presented findings on agriculture production; Mr. Mori discussed the market for agriculture produce; Dr. Michiko presented the farm livelihood component of the survey and Mr. Shibuta presented the overall concept of agriculture sector development and next course of action for the State Government to access financial assistance from JICA.

4.3. After the presentation, Mr. Bahuguna emphasized the presence of more than 40,000 SHGs in the State, and thereby scope for involving them in different activities. He emphasized the need for integrated agriculture development in cluster approach. This would support concentration of limited manpower in some areas to be able to achieve results. He suggested different directorates to respond to the presentation and share their suggestions.

5.0. Agriculture

5.1. All the basic things have been reflected in the presentation. However, it is important to reflect the dissimilarities between the 3 survey States.

5.2. In Tripura, soil erosion is reported to be highest in North East India, considering the presence of loose soil. It is not possible to go for large-scale bench terracing like that of Nagaland. Activities for effective soil erosion may be suggested considering the soil structure.

5.3. Market could be organized by promotion of 2-3 continuous clusters. In each of the clusters, cooperatives and farmers associations can be organized. There is need for more clarity on how to go about promoting clusters and farmer organizations.

5.4. There is need to consider suitability of small and medium irrigation projects; and also what irrigation system may best suite in loose soil structure, and also for enhancing ground water table.

5.5. At present, only 9 % ground water in the State is exploited. What would be desirable level of exploitation of ground water, to make available water for increasing production?

5.6. At present, productivity level crops especially vegetables is relatively high. Considering the high population density, some of the produces comes to the State in lean season. There is already huge marketable surplus. It is important to explore best marketing option for different produces.

5.7. In the past, there has been decline in production of pineapple, as market was not available. As the production is coming up, it would be important to explore new markets.

5.8. As indicated by survey team, there is lack business plan, especially for farmers organization.

5.9. Common produces for North East India could be identified that can be popularized through NEAT brand.

6.0. Chief Engineer, Water Resources

6.1 The survey team needs to consider issue of ground water in their study.

6.2. Despite vegetation cover, ground water flow is restricted to 25 %. Hence there is need for more reservoirs to conserve and manage the water resources. Construction of large reservoirs is difficult in the state as this would submerge large tribal areas. Even in constructing small and medium reservoirs, the government has to acquire land. There may be storage in or near private land for which attractive compensation and rehabilitation package may be considered. There may need to acquire forest land for constructing reservoirs. This would support meeting irrigation demand and also climate change variations. There is possibility of constructing 400 such structures in the State to irrigate about 60,000 ha.

6.3. There is also need for creating appropriate model for creation of market. The State has surplus rice, which is difficult to get marketed, as being a land locked State.

7.0. Animal Husbandry

7.1. The survey team has given pragmatic and practical recommendations for development of livestock in State. The market for livestock already exists. The focus need to be on productivity enhancement and production. R & D in livestock production can be one of the aspects JICA can consider for assistance.

7.2. In Tripura, it is difficult to promote intensive method of rearing practices. It is important to emphasize low input low output method of rearing animals.

7.3. Livestock as key component in integrated farming system could be tried, which seems to be lacking in the State.

7.4. Most of the farmers need support in right seed material, input and credit to be able to take up livestock production.

7.5. In cooperative sector there are only dairy cooperatives. There is scope for improving such cooperatives.

7.6. There is scope for promoting three tier piggery system viz. breeding, multiplier through individual entrepreneurs and fattening by farmers could be promoted in Tripura. Semi-intensive piggery could be also promoted through market oriented approach.

7.7 In the past, promotion of goatery clusters have been attempted, which could be done in case of piggery.

8.0. Horticulture

8.1. Survey team may also focus on micro irrigation, soil fertility and heath management.

8.2. In past staggering method of cultivation like in pineapple has been attempted.

8.3. Market intelligence and emphasis on small scale processing could be included in the study.

9.0. Forestry

9.1. The survey team presented good SWOT analysis of agriculture sector in the State. There is scope for formulating project that includes NRM and livelihood components.

9.2. In the State, except for paddy most of the produces are easily marketable. There is scope for exports like in case of jackfruit.

10.0. After sharing of feedback and suggestions by different department, Mr. Bahuguna shared his views on the presentation:

10.1. In a limited timeframe of 15 days, the survey team has been able capture important findings. However, it would have been better to present findings of each of the States separately.

10.2. In Tripura there is presence of 40,000 SHGs, which has been possible through social mobilization by earlier JICA project, other projects and schemes. There is also presence of strong people oriented Panchayat which may be reflected in the findings and suggestions.

10.3. Government of Tripura has already sent project proposal related to Catchment Area Treatment Plan to Department of Economic Affairs, GoI. In the proposal, Rs. 100 crore has been kept as component for agriculture development.

10.4. It is important to consider strategy to produce more through promotion of Integrated Farming System; which would also require creation of irrigation potential; and also harnessing of ground water potential.

10.5. There is also need for promotion of integrated farming, beyond proposal for catchment area treatment. Catchment area treatment covers different aspects of soil conservation i.e. beyond just planting trees.

10.6. About 1.7 lakh hectares of land allotted under FRA is available for promotion of integrated farming model.

10.7. Value addition could be promoted through enterprise development involving farmer groups, marketing, and extension linkage of farmer HHs through use of IT. This would involve data collection for every HH. There is project proposal of about Rs.5 Crore which can component of main project.

10.8. There is need to give thrust on infrastructure development in agriculture including setting up of soil testing laboratories, other laboratories and promoting centre of excellence related to agriculture and horticulture like in primary crops like pineapple.

10.9. Animal husbandry needs modernization, more important considering incidence of swine flu. More number of poultry farms, mini dairies could be promoted. There can be focus on production of A2 milk.

10.10. There is requirement to set up modern agriculture offices and farms, focusing on modernization of agriculture. It is important to work on mechanization of agriculture in small holdings; as number of small farmers is increasing day by day and this should be done through cluster development approach.

10.11. Value addition through food processing involving SHG groups like Lizzat Papad model could be promoted in the State.

10.12. Overall, integrated farming development with water resource development as key component is required for growth of agriculture sector in the State. Such initiatives could be taken up in cluster mode. It may be also relevant to suggest activities and projects that contribute towards climate resilient agriculture in Tripura State.

10.13. Mr. Bahuguna suggested different Directorates and Departments to submit additional information to JICA survey team.

11.0. The workshop came to an end with concluding remark, and thanks expressed by Mr. Shibuta, Team Leader, Survey Team to Mr. Bahuguna and other participants.

PROCEEDINGS OF THE WORKSHOP ON SURVEY FINDINGS AND RECOMMENDATIONS IN AGRICULTURE AND ALLIED SECTOR IN MEGHALAYA

5. Venue: Conference Hall, Secretariat, Shillong
6. Date of the meeting: 4th March 2015
7. Participants: 13 nos. including the Survey Team and Representatives of JICA, New Delhi. (refer to the attendance sheet-3)

8. Key proceedings of the Workshop

8.1. Mr. K N Kumar, Principal Secretary of Agriculture, Community and Rural Development Department welcomed the Survey Team and JICA Representative. He invited Mr. K Shibuta, Team Leader to share the findings of the Survey.

8.2. Mr. K Shibuta, Team Leader introduced the Team and highlighted the objectives and processes of the Survey. Thereafter Dr. K K Satpathy presented the findings on irrigation and soil and water conservation; Mr. Nakamura presented findings on agriculture production; Mr. Jitesh discussed the market for agriculture produce and the cluster development approach; Dr. Michiko presented the findings and recommendations on farmers organisations and farm livelihood and Mr. Shibuta presented the overall concept of agriculture sector development and next course of action for the State Government to access financial assistance from JICA.

8.3. During the course of presentation Mr. K N Kumar, Principal Secretary and other participants raised some issues and wanted additional clarifications as mentioned below:

8.3.1. Mr. K N Kumar, Principal Secretary, Agriculture, CRD – regarding irrigation, soil and water conservation, the suggestions made by the Survey Team are already being implemented by the Soil and Water Conservation Department under different schemes including IWMP. He wanted to know the specific activities, which the Department must do to address issues in soil and water conservation. He further informed the house that the Government intends to develop multipurpose reservoirs in the state. A project on Development of Multipurpose Reservoirs for integrated water management and livelihood improvement in the state of Meghalaya is being prepared and the State Government has committed some funds to initiate the work. He requested JICA to consider supporting this project.

8.3.2. Mr Subroto Talukdar, Lead Development Specialist, JICA, New Delhi responded to the request of Mr. K N Kumar. He clarified that JICA follows a demand driven approach. It does not on its own prepare proposal and come to the State Government for support. Any project to be considered by JICA for support needs to be included in the rolling plan of the Government of India. The Government of Meghalaya needs to submit the project in the required format to Ministry of Finance through proper channel. JICA identifies projects from the rolling plan based on its policies and priorities. He further added that the Survey Team has been sent by JICA to stock-take what is happening in the state in agriculture and allied sector and identify the potential areas. The Team is more of supporting the State Government to identify the priorities.

8.3.3. Dr. K K Satpathy from the Survey Team explained that the project concept note on small multipurpose reservoirs focuses mostly on the conservation and management of water resources and what the Survey Team suggested is to include the integrated farming system approach in the development of small multipurpose reservoirs. This

would contribute to natural resource management and livelihood enhancement. Mr. K N Kumar accepted the suggestion.

8.3.4. Responding to the presentation by Mr. Nakamura on agriculture production, Mr. K N Kumar wanted to know the Survey Team's views on fish farming in the state. According to Mr. Kumar fishery should be an integral part of integrated farming system. Mr. Nakamura mentioned that fishery is definitely a part of integrated farming system and he would include some findings on fishery in Meghalaya.

8.3.5. After the presentation on market for agriculture produces by Mr. Jitesh, the Joint Director, Agriculture gave his views on the current situation in the state. He emphasized that market is the real issue. The Department can handle the technology extension and production parts but it is unable to address the issue of proper market linkage. A lot of farmers are growing off season vegetables but they sometimes delay the harvesting as prevailing market price is low. The situation is quite complex – one season there is huge surplus of vegetables and the next season can be a dry one. There are 140 clusters where the farmers are producing vegetables. Many of these clusters have been promoted under the scheme – vegetables initiatives urban cluster but they are facing the problem of marketing their produces. As rightly pointed out by the Survey Team, farmers as well as farmers organisations/ producers groups don't have the capacity to prepare a proper business plan – what has to be produced, when, how much and how to sell the produce etc.

8.3.6. Responding to the comments, Mr. Jitesh explained the need for market led cluster formation and promotion of young traders and entrepreneurs who can buy the produce from the farmers and/ farmers organisations and take it to different markets in North East and if required, to other markets in the mainland. Cluster formation and aggregation of produce are important to ensure volume, which would help bringing in traders to the villagers/ clusters. Capacity building of farmers' organisations and entrepreneurs on business development/ management skills is very important. Small storage facilities created in the weekly market were found to be helpful the farmers as well as the entrepreneurs to aggregate the produce and take it to different markets. The focus should be on promotion of vegetables, potato, orange, ginger etc. in different clusters. For some products there can be overlapping clusters. Mr. K N Kumar agreed that opportunities exist in development of vegetable clusters.

8.3.7. Mr. Talukdar from JICA wanted to know the capacity of the Enterprise Facilitation Centres to prepare business plans and build capacity of farmers' organisations and entrepreneurs in business development/ management skills. Mr. Jitesh reiterated that the EFCs are in right directions to promote enterprises. It would be more efficient and productive if each EFC is anchored by a resource agency.

8.3.8. After the presentations Mr. Talukdar from JICA raised some pertinent questions – why JICA has to provide funds for different activities recommended by the Survey Team? Are there any critical gaps to be filled in by JICA? Whether JICA should support overall development of the state or support for some specific potential areas? Whether it would support all three states or states, who are taking much interest in accessing financial assistance? Whether JICA would follow an integrated approach or support for knowledge sharing and capacity building? After deliberations on some of these questions Mr. Talukdar requested that the Government of Meghalaya should decide

the nodal/ anchor department to submit proposal; what kind of project to be formulated; what is the capacity of the department to plan and implement the project; then prepare and send the proposal in JICA format to DEA. The Government should identify the coordination unit/ coordinator for communication with JICA (single window for coordination).

8.3.9. Mr. K N Kumar informed the house that the Planning Department is the key department to initiate the process of project formulation, finalise the project document and send the proposal to DEA. The concept note on multipurpose reservoirs is going to be finalised soon. The multipurpose reservoir shall be the hub for integrated farming – agriculture, horticulture, fishery, animal husbandry etc. Agriculture development and livelihood enhancement shall be centred on the reservoir. The state does not intend to adopt high input intensive agriculture to enhance agriculture productivity and production. It has withdrawn subsidy on chemical fertilizers and pesticides and has a clear mandate for organic agriculture and conservation of nature. Meghalaya is a water surplus state and all efforts need to be made for impounding of water, otherwise it drains to Bangladesh and Assam causing floods. If supports are available from JICA the Government can create 10-20 thousand structures to conserve water in next 10 years.

8.3.10. Mr. Talukdar gave the example of off season vegetable farming in Himachal Pradesh and promotion of organic farming and Mr. Kumar mentioned that the experiences of HP can also be brought to Meghalaya but one has to also consider the topography of both the states and suggest suitability of crops and approaches. Mr. Kumar further added that high value agriculture, horticulture and floriculture need to be promoted with the objective of enhancing export. He gave the example of strawberry and floriculture, which are successful initiatives in Meghalaya. He also emphasized fishery development as reservoirs would be created. Emphasis should be given on the production of fish seed and fish feed. He referred to the forestry proposal prepared by the Forest Department for JICA support and he is not sure of its success on the ground but according to him the multipurpose reservoir project would definitely produce significant results in natural resource management, agriculture development and livelihood enhancement.

8.4. The workshop was concluded with a vote of thanks by Mr. Shibuta, Team Leader of the Survey Team.

Attachment-2.2.1

Table A.2.2.1(1) Draft Scheme of Financing for the Annual Plan 2013-14, Meghalaya

SI. No.	Items	2011-12	2012-13		2013-14	
		(Actual)	(Actual)	(LE)	(State Est.)	(FR Est.)
1	2	3	4	5	6	7
A.	**State Government**					
1	**State Government's Own Funds (a to e)**	**1,025.58**	**294.55**	**229.91**	**174.55**	**397.80**
a	Balance from Current Revenues (BCR)	-326.23	109.19	94.55	40.10	143.35
b	Miscellaneous Capital Receipts (MCR) (excluding deductions for repayment of loans)	1,264.55	16.44	16.44	18.03	18.03
c	Plan Grants from GoI (13th FC)	87.26	118.92	118.92	116.42	116.42
d	Additional Resource Mobilization (ARM)	0.00	50.00	0.00	0.00	0.00
e	Adjustment of Opening Balance	0.00	0.00	0.00	0.00	70.00
2	**State Government's Budgetary Borrowings (i-ii)**	**367.29**	**546.00**	**546.64**	**593.00**	**593.00**
(i)	**Gross Borrowings (a to e)**	**646.33**	**794.31**	**794.95**	**848.26**	**848.26**
a	Gross Accretion to State Provident Fund	181.49	222.45	222.45	268.26	268.26
b	Gross Small Savings	60.00	77.00	77.00	77.00	77.00
c	Gross Market Borrowings	326.38	416.36	417.00	420.00	420.00
d	Gross Negotiated Loans	78.46	78.50	78.50	83.00	83.00
	(i) of which NABARD	78.46	78.50	78.50	83.00	83.00
e	Bonds/ Debentures	-	-	-	-	-
(ii)	**Repayments (a to e)**	**279.04**	**248.31**	**248.31**	**255.26**	**255.26**
a	Repayment/ Withdrawal of Provident Fund	76.41	80.06	80.06	107.46	107.46
b	Repayment to Small Savings	12.86	16.90	16.90	15.00	15.00
c	Repayment to Market Borrowings	101.45	87.00	87.00	54.00	54.00
d	Repayment of Negotiated Loans	43.04	43.34	43.34	58.43	58.43
e	Repayments- Others	45.28	21.01	21.01	20.37	20.37
3	**Central Assistance - Grants**	**1,702.64**	**2,698.45**	**1,900.60**	**2,809.20**	**2,809.20**
Total A. State Government Resources (1+2+3)		**3,095.51**	**3,539.00**	**2,677.15**	**3,576.75**	**3,753.83**
A1	Plan Resources Transferred to PSEs	0.00	0.00	0.00	0.00	0.00
A2	Plan Resources Transferred to Local Bodies	0.00	0.00	0.00	0.00	0.00
B.	**State Govt. Resources Net of Plan Transfer to PSE's and Local Bodies (A-A1-A2)**	**3,095.51**	**3,539.00**	**2,677.15**	**3,576.75**	**3,753.83**
C.	**Resources of Public Sector Enterprises (PSEs)**	**0.00**	**400.00**	**400.00**	**400.00**	**400.00**
1	Internal Resources	0.00	0.00	0.00	0.00	0.00
2	External Resources	0.00	400.00	400.00	400.00	400.00
3	Budgetary Support	0.00	0.00	0.00	0.00	0.00
D.	**Resources of Local Bodies**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
E.	**Aggregate State Plan Resources (B+C+D)**	**3,095.51**	**3,939.00**	**3,077.15**	**3,976.75**	**4,150.00**

Note: Central Assistance for 2012-13 does not include allocation under NEC & NLCPR

Source: FR Brief for Annual Plan 2013-14: Meghalaya

Attachment-2.2.1

Table A.2.2.1 (2) Draft Scheme of Financing for the Annual Plan 2013-14, Tripura

SI. No.	Items	2011-12	2012-13		2013-14	
		(Actual)	(Actual)	(LE)	(State Est.)	(FR Est.)
1	2	3	4	5	6	7
A.	**State Government**					
1	**State Government's Own Funds (a to e)**	**-546.18**	**-1,278.06**	**-957.01**	**-1,366.50**	**-1,295.91**
a	Balance from Current Revenues (BCR)	-278.44	-1,277.94	-950.36	-1,342.50	-1,295.79
b	Miscellaneous Capital Receipts (MCR) (excluding deductions for repayment of loans)	-351.66	-155.28	-136.39	-155.28	-155.28
c	Plan Grants from GoI (13th FC)	83.92	155.16	130.28	131.28	155.16
d	Additional Resource Mobilization (ARM)	0.00	0.00	0.00	0.00	0.00
e	Adjustment of Opening Balance	0.00	0.00	0.00	0.00	0.00
2	**State Government's Budgetary Borrowings (i-ii)**	**179.55**	**609.00**	**493.56**	**699.00**	**699.00**
(i)	**Gross Borrowings (a to e)**	**885.44**	**885.53**	**1,274.30**	**1,537.15**	**1,537.15**
a	Gross Accretion to State Provident Fund	467.55	30.00	514.30	565.70	565.70
b	Gross Small Savings	12.52	30.00	10.00	15.00	15.00
c	Gross Market Borrowings	300.00	675.53	600.00	803.45	803.45
d	Gross Negotiated Loans	99.30	150.00	150.00	150.00	150.00
	(i) of which NABARD	99.30	150.00	150.00	150.00	150.00
e	Bonds/ Debentures	6.07	0.00	0.00	3.00	3.00
(ii)	**Repayments (a to g)**	**705.89**	**276.53**	**780.74**	**838.15**	**838.15**
a	Repayment/ Withdrawal of Provident Fund	488.37	0.00	504.30	545.70	545.70
b	Repayment to Small Savings	48.59	61.22	61.22	77.14	77.14
c	Repayment to Market Borrowings	73.57	0.00	0.00	121.45	121.45
d	Repayment of Negotiated Loans	42.03	55.24	55.24	55.24	55.24
e	Repayments- Others	53.33	160.07	159.98	38.62	38.62
f	Repayment for GoI Loans	161.26	161.26	161.26	161.26	161.26
g	Repayments- Others	82.01	127.80	127.80	127.80	127.80
3	**Central Assistance - Grants**	**1,865.04**	**2,919.06**	**2,609.67**	**3,021.91**	**3,021.91**
Total A. State Government Resources (1+2+3)		**1,498.41**	**2,250.00**	**2,146.22**	**2,354.41**	**2,425.00**
B.	**Resources of Public Sector Enterprises (PSEs)**	**0.00**	**0.00**	**-**	**-**	**0.00**
C.	**Resources of Local Bodies**	**0.00**	**0.00**	**-**	**-**	**0.00**
D.	**Aggregate State Plan Resources (A+B+C)**	**1,498.41**	**2,250.00**	**2,189.00**	**-**	**2,425.00**

Note: Central Assistance for 2012-13 does not include allocation under NEC & NLCPR

Source: FR Brief for Annual Plan 2013-14: Tripura

Attachment-2.2.1

Table A.2.2.1 (3) Draft Scheme of Financing for the Annual Plan 2013-14, Nagaland

Sl. No.	Items	2011-12	2012-13		2013-14	
		(Actual)	(Actual)	(LE)	(State Est.)	(FR Est.)
1	2	3	4	5	6	7
A.	**State Government**					
1	**State Government's Own Funds (a to e)**	**-1,135.41**	**-848.00**	**-1,026.73**	**-1,348.43**	**-1,163.70**
a	Balance from Current Revenues (BCR)	-1,208.44	-939.98	-1,118.71	-1,440.08	-1,256.35
b	Miscellaneous Capital Receipts (MCR) (excluding deductions for repayment of loans)	-6.79	-6.96	-6.96	-7.29	-7.29
c	Plan Grants from GoI (13th FC)	79.82	98.94	98.94	98.94	99.94
d	Additional Resource Mobilization (ARM)	0.00	0.00	0.00	0.00	0.00
e	Adjustment of Opening Balance	0.00	0.00	0.00	0.00	0.00
2	**State Government's Budgetary Borrowings (i-ii)**	**337.07**	**459.00**	**468.20**	**430.00**	**429.00**
(i)	**Gross Borrowings (a to e)**	**657.73**	**839.42**	**777.46**	**688.93**	**687.93**
a	Gross Accretion to State Provident Fund	4.00	25.00	9.25	10.00	10.00
b	Gross Small Savings	10.00	10.00	10.00	10.00	10.00
c	Gross Market Borrowings	505.00	695.22	641.01	558.93	557.93
d	Gross Negotiated Loans	138.73	100.00	108.00	100.00	100.00
e	Bonds/ Debentures	0.00	9.20	9.20	10.00	10.00
(ii)	**Repayments (a to d)**	**320.66**	**380.42**	**309.26**	**258.93**	**258.93**
a	Repayment of GoI Loans	38.47	19.20	22.61	20.00	20.00
b	Repayment to NSSF	4.98	4.14	4.14	4.55	4.55
c	Repayment of Negotiated Loans	97.72	113.44	96.52	110.59	110.59
d	Repayments- Others	179.49	243.64	185.99	123.79	123.79
	i. Open Market Borrowing	171.60	235.75	178.10	115.90	115.90
	ii. Power Bonds	7.89	7.89	7.89	7.89	7.89
3	**Central Assistance - Grants**	**2,084.16**	**2,689.00**	**2,139.69**	**2,834.70**	**2,834.70**
Total A. State Government Resources (1+2+3)		**1,285.82**	**2,300.00**	**1,581.15**	**1,916.27**	**2,100.00**
B	**Resources of Public Sector Enterprises (PSEs)**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
C.	**Resources of Local Bodies**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
D.	**Aggregate State Plan Resources (B+C+D)**	**1,285.82**	**2,300.00**	**1,581.15**	**1,916.27**	**2,100.00**

Notes: 1. 2012-13 Revised Estimates: Rs. 1,726.85 crores as per State Governemnt

2. Central Assistance excludes NLCPR & NEC 2012-13

Source: FR Brief for Annual Plan 2013-14: Nagaland

Attachment-2.4.1

Land Custom Stations in NER

Arunachal Pradesh

Sl. No.	LCS in India	LCS in neighbouring country	Neighbouring country	Status
1	Nampong (Pangsau Pass)	Pangsu	Myanmar	Notified but non-functional

Assam

Sl. No.	LCS in India	LCS in neighbouring country	Neighbouring country	Status
2	Sutarkhandi	Sheola	Bangladesh	Functional Identified to be developed as Integrated Check Post in Phase-II by D/o Border Management
3	Karimganj Steamer Ghat	Zakiganj	Bangladesh	Functional
4	Mankachar		Bangladesh	Functional
5	Golakganj	Bhurungamari	Bangladesh	Not Functional
6	Karimganj Ferry Station	Zakiganj	Bangladesh	Functional
7	Mahisasan Railway Station	Sahabajpur	Bangladesh	Not Functional
8	Silchar R.M.S. office		Bangladesh	Not Functional
9	Dhubri Steamerghat	Rowmati	Bangladesh	Functional
10	Gauhati Steamerghat		Bangladesh	Functional
11	Silghat		Bangladesh	Functional
12	Darranga		Bhutan	-
13	Hatisar		Bhutan	-
14	Ultapani		Bhutan	-

Meghalaya

Sl. No.	LCS in India	LCS in neighbouring country	Neighbouring country	Status
15	Borsora	Borosora	Bangladesh	Functional
16	Dawki	Tamabil	Bangladesh	Functional Being developed as Integrated Check Post by D/o Border Management in Phase-I
17	Ghasuapara	Karoitoli	Bangladesh	Non-functional
18	Shellabazar	Sonamganj	Bangladesh	Functional
19	Bholaganj	Chattak	Bangladesh	Non-functional
20	Dalu	Nakugaon	Bangladesh	Functional
21	Mahendraganj	Dhanua Kamalpur	Bangladesh	Functional
22	Baghmara	Bijoypur	Bangladesh	Functional
23	Ryngku	Kalibari, Sonamganj	Bangladesh	Not functional
24	Balat	Lauwaghar	Bangladesh	Not functional
25	Kalaichar	Baliamari	Bangladesh	

Tripura

Sl. No.	LCS in India	LCS in neighbouring country	Neighbouring country	Status
26	Agartala	Akhaura	Bangladesh	Functional Being developed as Integrated Check Post in Phase-I by D/o Border Management
27	Srimantapur	Bibir Bazaar	Bangladesh	Functional
28	Old Raghnabazar	Betuli (Fultali)	Bangladesh	Functional
29	Manu	Chatlapur	Bangladesh	Functional
30	Sabroom	Ramgarh	Bangladesh	Non-functional
31	Belonia (Muhurighat)	Belonia	Bangladesh	Non-functional
32	Dhalaighat	Khurma	Bangladesh	Functional
33	Khowaighat	Balla	Bangladesh	Functional

Mizoram

Sl. No.	LCS in India	LCS in neighbouring country	Neighbouring country	Status
34	Kawrapuchciah	Thegamukh	Bangladesh	Functional Not yet notified. Being developed as Integrated Check Post in Phase-II by D/o Border Management
35	Demagiri	Rangamati	Bangladesh	Functional
36	Zokhawthar	Rih*	Myanmar	Functional

Manipur

Sl. No.	LCS in India	LCS in neighbouring country	Neighbouring country	Status
37	Moreh	Tamu	Myanmar	Functional Being developed as Integrated Check Post in Phase-I by D/o Border Management

Sikkim

Sl. No.	LCS in India	LCS in neighbouring country	Neighbouring country	Status
38	Sherathang (Nathu La)	Renginggang	China	Functional

Nagaland

Sl. No.	LCS in India	LCS in neighbouring country	Neighbouring country	Status
39	Avangkhu	Somara	Myanmar	Bi-laterally agreed to open new Land Custom Station in the Indo-Myanmar Joint Trade Committee meeting in October, 2008. Not yet notified by Govt. of India under Section 7 of the Customs Act, 1962 (52 of 1962) (letter of Joint Commissioner, Central Excise & Custom, Shillong Zone, North Eastern Region No.VIII(29)1/CUS/CCO/SH/2010 dated 15.11.2010)

Source: CBEC, D/o Revenue, M/o Finance As in April 2012

ATTACHMENT-2.5.1 NATURAL CONDITIONS IN THE NORTH EASTERN REGION

2.5 Natural Conditions

2.5.1 Physiography

The north eastern region is connected with the rest of India via the Siliguri Corridor, a 27-km narrow strip so-called the "Chicken's Neck". The north eastern region, which comprise eight states, namely, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura, has an international border with China in the north, Nepal and Bhutan in the northwest, Bangladesh in the southwest, and Myanmar in the east. The physiographic features of the north eastern states are summarised in Table 2.5.1.

Table 2.5.1 Physiography

State	Physiographic Conditions
Arunachal Pradesh	The state can be broadly divided into four distinct physiographic regions: the Greater Himalayan Range with snow-capped mountains with altitudes rising to 5,500 m above mean sea level (msl), the Lower Himalayan ranges up to an altitude of 3,500 m above msl; the Sub-Himalayan belt including the Siwalik Hills with altitude up to 1,500 m above msl and the plains of the eastern continuity of Assam. The Greater Himalayas with snow-capped mountains cover the districts of Lohit, Dibang Valley, East Siang and West Siang, Lower and Upper Subansiri, East Kameng and West Kameng. The Lower and Central Himalayas include Siwalik or Sub-Himalayan Range with moderately steep to steep hills. Sub-Himalayan belt includes the southern part of the hill ranges along Kameng, Subansiri, and West Siang. The plains are continuity of Assam Plains, including plains of the Lohit, Tirap, Dibang, and the Siang rivers.
Assam	The state has been divided into four physiographic regions: the Brahmaputra Plain, the Barak Plain, the Karbi Plateau, and the North Cachar Hills. The Brahmaputra Valley is the continuity of the great Indo-Gangetic plain which separates sub-Himalayan foothills of Shillong Plateau and Patkai Naga Hills. It comprises 'bils', oxbow lakes, and marshy lands. Char, a unique land type, is very prominent in the Brahmaputra Valley, and Majuli is the biggest river island of the world. The Barak Valley surrounding the Karimganj area is level alluvial flat land. The Central Assam Range comprises the hills of Karbi Anglong and the North Cachar Hills, an extension of the Shillong Plateau.
Manipur	Manipur has a hilly terrain with its distinct geographic entity. The hilly terrain surrounds a central valley, elongating and tapering towards south, dotted by isolated hillocks. The hill ranges are aligned in a series of north-south parallel ridges. The eastern aspects of the hilly terrain are at the relatively higher elevation than those of the western aspects. The western range has elevation of 800–1,100 m above msl, and the eastern aspect has elevation of 1,800–2,500 m above msl. The central valley is elongated in shape and tapers towards the south; and the valleys are interrupted by isolated hillocks. Physiographically, the state comes under the Purvanchal Hill region.
Meghalaya	The state can be broadly divided into three zones: the central plateau region, sub-montane region, and a border region stretching southward abruptly; from the central plateau to the plains in the Bangladesh. The central plateau region has elevation of 900–2,000 m above msl. The sub-montane region in continuation with the central plateau is below 900 m. The state represents part of an ancient plateau of Precambrian Indian peninsular shield, lifted to the present height of 600–1,800 m above msl. The plateau region stands as watershed between the Surma Valley of Bangladesh in the south and Brahmaputra Valley in the north.
Mizoram	The terrain of the state is young and immature. It shows prominent relief features with steep slopes, and is still undergoing denudation due to various exogenic and endogenic processes. Most dominant process in the evolution of these forms is the fluvial activity that is operating from the upper tertiary onwards, till today. In the western part of the state, the valleys are wider with low relief. And in the western half, settlements cling to the valley flats while in the eastern half, they follow the crests. As such, physiographically, the Mizo Hills can be divided into the Mizo Hills west and the Mizo Hills east. Both east and west parts can be divided into three sub-zones depending on the intensity of the slopes, i.e., steep hill slopes, moderate hills slopes, and gently sloping uplands. Mizo Hills elevation is confined between

State	Physiographic Conditions
	150 m and 900 m, though peaks of over 1,500 m elevation also occur. The most typical and undisturbed pattern of parallel drainage can be noticed on the Mizo Hills. Rivers have cut hill ranges at suitable points, almost at the right angles, resulting into barbed patterns.
Nagaland	This state is represented by a hilly terrain comprising closely spaced elevated ridges with alternate "V" shaped intermountain valleys. Topographically, the landscape can be grouped into foothills with undulating to rolling topography of less than 100 m altitude, facing the Assam Plains on the northern side, lower ranges and mid-ranges, with varying degree of slopes with an elevation of 1,000 m and above, and high hills and mountainous regions. The state has many narrow strips of hilly ridges running north-east to southeast. The Borail Range enters the state at the south-west corner and runs in a north-easterly direction, almost up to Kohima. Near Kohima, the Borail Range merges with the mountain ranges, which extend to Manipur and the main range assumes a much more northerly trend. This range is considerably higher than the Borail, with peaks like Saramati (3,826 m) and Mataungse Kien (3,420 m) at its extreme east. Between Mon and Kohima, there are several very high peaks, including Japro in the north of Kohima. The main ridge declines in height at the far north in Mokochung District, and the Japukong Range attains an average elevation of 750 m.
Sikkim	The area of Sikkim can be divided into nine unequal geomorphic entities, namely: 1) summits and ridges, 2) escarpments, 3) very steep slopes, 4) steep slopes, 5) moderately steep slopes, 6) narrow valleys, 7) cliffs and precipitous slopes, 8) zones of glacial drifts/ moraines/boulders, and 9) perpetual snow. The elevation of the state ranges between 300 m at the southern foothills and 5,500 m above msl on its north and northwest sides. The general run of the main ridges is north-south with subsidiary interlacing spurs from each ridge in a roughly east-west direction. Singalela and Chola Ranges arising from the Great Himalayas determine its boundary in the east and west. Another north-south chain runs through its central portion, separating Rangit from Tista Valley. All these ridges are lofty indeed with an average elevation exceeding 800 m above msl.
Tripura	The state has been divided into ten physiographic units: 1) steeply sloping and slightly dissected high relief, structural hills and ridges; 2) moderately sloping with moderately dissected, medium relief parallel ridges; 3) moderately sloping and highly dissected, low relief structural hills and ridges; 4) moderate to gently sloping and moderately dissected, flat-topped denuded hills; 5) low-lying residual hills with valleys; 6) gently sloping, undulating plains with low mounds and narrow valleys; 7) moderately to gently sloping, Interhill valleys with uplands; 8) moderately to gently sloping, interhill valleys with upland alluvial plains; 9) flood plains; and 10) rolling uplands.

Source: Degraded and Wastelands of India; Status and Spatial Distribution, Indian Council of Agricultural Research and National Academy of Agricultural Sciences, June 2010

2.5.2 Geology

The geological features of the north eastern states are summarised in Table 2.5.2.

Table 2.5.2 Geological Features

State	Geological Conditions
Arunachal Pradesh	It is characterised by sedimentary and metamorphic rocks. Some important rock groups are Sela, Tenga, and Bichom. Sela consists of schist, magnetite, quartzite, and amphiboles. Tenga formations are of low-grade metamorphic rocks like schist, amphiboles, phyllite, sericite, and quartzite, and Bichom are sedimentary rocks, quartzite, phyllite, shale, sandstone. Dolomites are also found in the state. Different types of metamorphic rocks and volcanic extrusions of much older age predominate the northern part. The rock formations of Lohit and Dibang Valley districts on the south-western part comprise a narrow stretch of sedimentary rocks of Tertiary period that consist of sandstone, shale, clay, and pebble beds.
Assam	The geological history of the area has revealed that Archaean, the late Cretaceous, Tertiary, and Quaternary formations are the predominant types in Assam. State geology is very complex, and is the product of an ancient landmass caught up in collision zones of three other landmasses, which were originally its neighbours, but drifted apart with the breakup of the Gondwana land. Later these collided again resulting to the present geological and continental framework. The Brahmaputra and Barak valleys are built up by the deposition of alluvium of several hundred metres depth. The Karbi Plateau is dominated by Precambrian rocks. The Barail Range and Naga Hills are dominated by Tertiary sandstones and related rocks.
Manipur	Rock formations in the state are of the Cretaceous limestone, the Disang with serpentinites (Lower and Middle Eocene–upper Cretaceous), the Barails (Upper Eocene and Oligocene), and the Surmas and the Tipams (Miocene) groups. The eastern part of the state abounds in narrow belts of fossiliferous Cretaceous limestone and the formation of the Disang group intruded by serpentinites. Disang

State	Geological Conditions
	formations comprise grey-sandstone-grit, conglomerate limestone sequences intruded by serpentinites; containing minor amounts of enstatite, chromite, amphibole and magnetites. Barail group, which is mainly arenaceous, occupies the western and central part of Manipur, is distinguished from the younger Surma group by abundance of carbonaceous materials. The Surma and Tipam groups occur in the western margin of the state and are represented by argillaceous and arenaceous sequences, respectively, and are separated by a major anticline form of the Cretaceous limestone in between synclinoria. The synclines form ridges and the anticlines form valleys (GSI, 1974).
Meghalaya	The state is occupied by Archaean gneisses complex with acidic and basic intrusions, Shillong group of rocks, Lower Gondwana rocks, Sylhet traps and Cretaceous Tertiary sediments.
Mizoram	Geologically, Mizoram forms a part of Tripura. Mizoram geosynclinals' depositional basin extends north into the Surma Valley. Hill regions forming anticlineal crests expose relatively compact and resistant older rock types while valleys are composed of younger, softer formations in synclinal troughs. Geomorphologically, the region may be considered immature. Mizo Hills constitute a part of eugosynclinal mobile belt of the Asom-Arakan geosynclines, comprising geosynclinal molasse-type sediments of Neogene age. The sediments consist dominantly of a repetitive succession of fine-grained arenaceous and argillaceous clastics. The sedimentary succession at Mizoram is of the repetitive sequence proportions of alterating shale, silt stone, mudstone, and fine-grained sandstone.
Nagaland	The state is located in the northern extension of the Arkan Yoma Ranges, which are of Tertiary Cretaceous age and belong to a fairly young mobile belt of the earth. The rock sequence is of the geosynclinal fecies, represented by the Disang group (Lower and Middle Eocene, Upper Cretaceous), the Borail group (Upper Eocene and Oligocene), the Surma group and the Tipam group (Miocene), the Namsang beds (Mio-Pliocene) and the Dibing group (Pliocene-Pleistocene). The Disang group consists of monotonous sequence of dark grey splintery shales with thin beds of sandstone. In parts of the Naga Hills, the Disang shales are splintery and sometimes slaty with numerous thin ramifying quartz veins. The Borail Range enters the state at the south-west corner and runs in the north-eastern direction almost up to Kohima, and thereon merges with the mountain range. The Surma group, which is essentially an alternation of shales and sandstone with more thin conglomerate, overlies the Borails. The Tipam group consists of ferrugineous sandstone of huge thickness of clay layers in the Naga Hills. The Dibing group represented by pebble beds, thin clays, and sand rests over the Namsang beds.
Sikkim	Sikkim is the part of the lesser Himalayan terrain of eastern sector. Tectonostratigraphically, it has been classified under four tectonic belts: foothill belt, inner belt, axial belt, and transaxial belt. The state is predominantly covered by unfossiliferous metamorphic and crystalline rocks grouped in the inner and axial tectonic belts.
Tripura	The state is represented by sedimentary rocks, which range in age from Miocene to loosely consolidated sediments of the recent age. The rocks are sandstone, silt stone, and shale grading into clay. These rock types are repeated as layers one above the other. Depending on their characteristics and presence of fossils, these sedimentary rock sequences are divided into the Surma group (the oldest), the Tipam group, and the Dupitila group (the youngest). From the nature of the grains and the texture imprinted on these rocks, it is inferred that originally sediments were deposited in the sea and later they converted into rocks. Quite a larger part of the South Tripura District is occupied by the recent fluvial deposits. The sedimentary rocks are deformed and folded.

Source: Degraded and Wastelands of India; Status and Spatial Distribution, Indian Council of Agricultural Research and National Academy of Agricultural Sciences, June 2010

2.5.3 Climate

The climatic features of the north eastern states are summarised in Table 2.5.3.

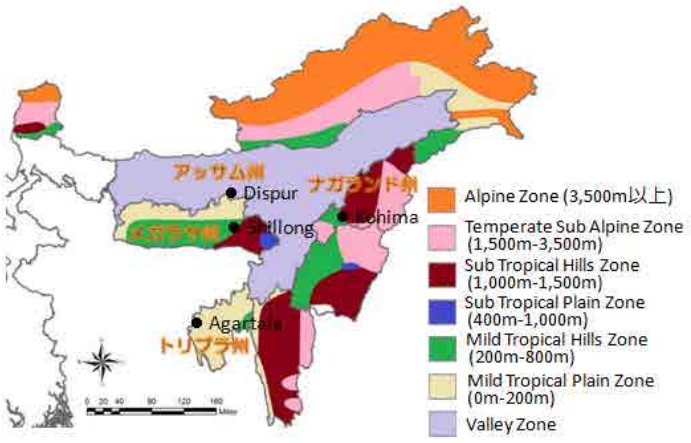
Table 2.5.3 Climatic Features

State	Climatic Conditions
Arunachal Pradesh	Its climate is humid to per-humid subtropical, characterised by high rainfall and high humidity at the sub-Himalayan belt. Average annual rainfall varies from 1,380 to 5,000 mm, and the minimum temperature is around 0 °C in winter months in Bomdila and Twang areas and rises to 35 °C during summer months in Namsai and Tezu areas of Lohit District. In plains, mean annual air temperature is 23.8 °C and in hilly regions, it is 16.2 °C.
Assam	Its climate is neither too cold in the winter nor too hot in the summer. In general, it is of subtropical type, influenced by the monsoon. The state receives high precipitation during June to August; and a small amount of rainfall is received during pre-monsoon (April and May) and post-monsoon (September and October). Rainfall is scanty in the winter months from November to February. Lakhimpur and Cachar districts receive the highest amount of rainfall, while Nagaon and Karbi Anglong, the least. Average

State	Climatic Conditions
	annual rainfall is 1,700 mm, and average annual temperature is about 24 °C.
Manipur	The hilly terrain of the state is characterised by heavy precipitation, almost throughout the year, excepting seasonal distribution of rains in the central plains. Temperature variations are conspicuous in the hilly terrain. The eastern aspect of the hill ranges including central plain is relatively cooler than its western counterpart. The region experiences humid climate with seasonal water deficiency. The climate of the eastern aspect is characterised by warm summers and cold winters with mean annual temperature of about 20 °C. The summer temperature is around 29 °C that drops to 0–12 °C in the winter season. Mean annual precipitation varies from 1,200 to 1,350 mm, effectively meeting bulk of potential evapo-transpiration demand. However, seasonal water deficit occurs in January and February. While the western part experiences hot summers and cold winters. The mean annual temperature exceeds 22 °C, and summer temperature ranges from 35 °C to 40 °C. The mean annual precipitation varies from 2,000 to 2,650 mm.
Meghalaya	It is per-humid with small seasonal water deficiency. The average rainfall ranges between 2,000 mm and 4,000 mm. The mean summer temperature rises as high as 26 °C and mean winter temperature falls down to 9 °C. At times it drops below freezing point. The mean annual soil temperature at higher elevations is less than 22 °C but it is higher than 15 °C; at lower elevations, it exceeds 22 °C.
Mizoram	The state has a pleasant climate, humid tropical with mean annual humidity of 86.45%; generally cool in the summer and not very cold in the winter. There is no snowfall, but frost is experienced in the eastern parts. The mean winter temperature varies between 21°C and 27 °C. The mean annual temperature is 20 °C, and the difference between mean summer and mean winter temperature exceeds 5 °C. The area lies under the direct influence of monsoon and average rainfall in the area is 2,170 mm per annum.
Nagaland	The climate of the state is controlled to a large extent by its terrain features. It is hot to warm sub-tropical in areas with elevations of 1,000–1,200 m above msl. It is warm sub-temperate in areas with elevations of 1,200 m and above. Rainfall is heavy, with an average annual rainfall of 1,940 mm in Kohima. And the rainy season is generally from April to September/October. Temperature varies from 0 °C in winter to 40 °C in summer and average annual air temperature ranges from 18 °C to 20 °C and 23 ° C to 25 °C, based on the elevation.
Sikkim	Its climate generally varies from sub-tropical to alpine depending upon the elevation of the place. Mean annual rainfall varies from 2,000 mm to 5,000 mm with intensity ranging from drizzle to torrential rains. Rainfall is heavy and well-distributed from May to September; July is the wettest month in most of the places. Rainfall is moderate from April to October. It is generally low during November to February. Rainfall pattern is essentially monsoonal. Average annual temperature is 27 °C. The temperature is very cool in the north as compared with the south, and reaches to 0 °C in the winter.
Tripura	It varies from sub-tropical to alpine depending upon the elevation of the place. Mean annual rainfall varies from 2,000 mm to 5,000 mm with intensity ranging from a drizzle to torrential rains. The area experiences winter and summer showers to a limited extent. Humidity ranges from 100% to 42%. The monsoon generally starts by the end of May. The average mean annual temperature varies from 20.1 °C to 24.6 °C and the mean winter temperature is 16 °C and summer temperature is 28.2 °C.

Source: Degraded and Wastelands of India; Status and Spatial Distribution, Indian Council of Agricultural Research and National Academy of Agricultural Sciences, June 2010

Farming system is generally dominated by agro-climatic zones. The agro-climatic zone of the north eastern region is classified roughly into the Eastern Himalayan Region, which further divided into ten sub-zones depending on the altitude. Typical agro-climatic sub-zone map of the region is illustrated in Figure 2.5.1.



Source: Farming System of North East India, Research and Development

Figure 2.5.1 Agro-climatic Zone in the North Eastern Region

2.5.4 Vegetation

Natural vegetation of the north eastern states is summarised in Table 2.5.4.

Table 2.5.4 Natural Vegetation

State	Vegetation Conditions
Arunachal Pradesh	This is of open scrub (grassland) to alpine forests types in the Greater Himalayas. Sub-alpine and alpine forest species in the Greater Himalayan region are represented by blue pine (*Pinus wallichiana*), and chir pine (*P. roxburghii*). Temperate and subtropical forests in the Lower Himalayan region are of deodar (*Cedrus deodara*) and East Himalayan fir (*Abies densa*). And most common species of tropical rain forests and semi-evergreen forests are hingori (*Bhesa robusta*), sal (*Shorea robusta*), teak (*Tectona grandis*), and sissoo (*Dalbergia sissoo*). Besides trees, many of the shrubs, canes, palms, climbers, and grasses are also found.
Assam	Flora of the state is broadly divided into evergreen forests, mixed deciduous forests, riverine forests, and Savannah. Amongst the evergreens, the most common trees are: hollong (*Dipterocarpus macrocarpus*), nahar (*Mesua ferrea*), gamari (*Gmelina arborea*), kadam (*Anthocephalus cadamba*), garidsarai (*Cinnamomum cecidodaphne*), dhuna (*Canarium bengalense*), konkon (*Duabanga sonneratioides*), sepa (*Michelia champaca*), silikha (*Terminalia chebula*), bhomora (*Terminalia belerica*), agaru (*Aquilaria malaccensis*), and bonsom (*Phoebe attenuata*). Deciduous forest species are of sal (*Shorea robusta*), digsa (*Pinus keisya*), sam (*Artocarpus chaplasha*).
Manipur	It consists of a large variety of plants, ranging from short and tall grasses, bamboos and trees of various species. The hilly terrain is occupied by medium to thick tropical deciduous forests, and ground is covered with thick undergrowth of bushes, shrubs, tall grasses, and other types of mixed vegetation. Bamboo forests are common in the state with luxuriant growth in the lower and gentle hill slopes. The flora in this region includes a variety of orchids, pines, oaks, teak, cane, etc. Amongst the trees the most common species are: amlokhi (*Phyllanthus emblica*), bokul (*Mimosops elengi*), chingsu (*Tectona grandis*), kadam (*Anthocephalus cadamba*), silver oak (*Grevillea robusta*), mango (*Mangifera indica*), neem (*Azadrachta indica*), champre (*Citrus medica*), chandan (*Santalum album*), chu (*Saccharum officinarum*), komola (*Citrus aurantium*), and lagihidak (*Datura fastuosa*).
Meghalaya	The state is rich in flora from open scrub (grass) to pine forest in the central plateau region; the remaining area is covered mostly by tropical moist deciduous to evergreen forests. The most important species are *Bambusa polymorpha, Bambusa tulda, Dendrocalamus* spp., *Musa* spp. The deciduous forest species are sal (*Shorea robusta*) and teak (*Tectona grandis*).
Mizoram	Mizoram has a great natural beauty with endless variety of trees, plants, grasses, and bushes; and bamboos grow abundantly everywhere. Amongst the most common species on the lower elevations, mentioned can be made of naga bhe (*Schima wallichii*) which, though seen in plains, is common on the hills, where it grows to a larger size. Photiki and photkola (different species of *Melastoma*) grow in deep ravines and assume form of small trees (3 to 4 m high). Bamboo jungle is extensive everywhere, but it exhibits a better growth in low-lying tracts and ravines. Apart from these, *Mesua ferrea*, *Careya arborea*, and *Ficus elastica*, are found commonly under the tropical evergreen group. Trees growing on hill slopes above 1,800 m are oak, chestnut, magnolia, cherry, maple, laurel, fig, and moly; and comprise temperate evergreen type of forest. The forest above 2,100 m is cool temperate, and is covered by *Pyrus*, *Sorbus*, *Acer,* and *Magnolia cambellii*.
Nagaland	The state is rich in flora and ground is covered with thick undergrowth of bushes, shrubs, and tall grasses. The forest comprises sub-tropical to evergreen species and varies from open scrub to thick forest. And bamboo forests are common on lower and middle slopes of the hills. The dominant species are: amlokhi (*Phyllanthus emblica*), bamboo (*Bambusa polymorpha*), bola (*Morus laevigata*), chingsu (*Tectona grandis*), huagoni (*Castanopsis* spp.), hillock (*Terminalia myriocarpa*), silver oak (*Grevillea robusta*), siloni (*Schima wallichii*), tejpat (*Cinnamomum tamala*), komola (*Citrus aurantium*), pineapple (*Ananas comosus*), banana (*Musa parodisiaca*), etc.
Sikkim	Its natural vegetation consists of evergreen trees, grasses, and bushes, which extends to 4,000 m above msl, and above 5,000 m msl hardly any vegetation is found. Distribution pattern of natural vegetation in the state may be divided into five mixed forest zones. Lower hill forests (<900 m) consist of sal forests and are generally confined to the Tista and Rangit valleys. Pakasaj, lampatey, simul, chilawne, and lali (*Dysoxylum gobarum*) are some of the important associate species. Middle hill forests (900–1,800 m) are dominated by trees like murse katus and dalne katus besides walnut. Upper hill forests (1,800–2,450 m) consist of mawa, rani, and champa (*Michelia champaca*). Rhododendron and oak forests are found at elevations ranging from 2,450 to 3,350 m. The main trees are *Quercus lamellosa*, *Q. pacheyphylla*, mostly mixed with *Acer campbellii*, *Rhododendron*. Conifer forests (2,450–3,350 m) are found in the low rainfall zone of the north district. Alpine pastures comprise dwarf junifers and *Rhododendron* and exclusive grassy meadow with *Deschampsia caespitosa* and *Salix* sp.
Tripura	Forests cover mostly elevated flat lands, hillocks and high hills and are practically absent in the

State	Vegetation Conditions
	lowlands (lungas). The state is mainly occupied by sal (*Shorea robusta*). The principal deciduous trees like teak (*Tectona grandis*), karai (*Albizia procera*), hargaja gamair (*Gmelina arborea*), and wild neem (*Azadirachta indica*) are quite common. Ban tulsi (*Stereospermum sp*.) is found in abundance with san and kas grasses. Bamboo species found are rupai (*Dendrocalamus longispathus*), parwa (*Bambusa teres*), pocha (*Dendrocalamus hamiltonii*), and dolu (*Teinostachyum dullooa*). Sub-dominant natural vegetation is chamal (*Artocarpus chaplasha*), khemta (*Chukrasia tabularis*), awal (*Vitex peduncularis*), semul (*Bombax malabaricum*), and sangrass (*Imperata cylindrica*). Muli (*Melocana bambusoides*) and mitinga (*Bambusa tulda*) bamboos are grown in the *jhumed* areas. In the alluvial tract, kul, palm, datepalm are quite common. Mango, litchi, jackfruit, and black berries also occupy a sizeable area. Besides, wild banana (*Musa* spp.) is also found in the hilly tracts of the region.

Source: Degraded and Wastelands of India; Status and Spatial Distribution, Indian Council of Agricultural Research and National Academy of Agricultural Sciences, June 2010

2.5.5 Soil

The soil conditions in the north eastern states are summarised in Table 2.5.5.

Table 2.5.5 Soil

State	Soil Conditions
Arunachal Pradesh	In Arunachal Pradesh, 79 soil families have been identified. These have been mapped into 45 soil units. Arunachal Pradesh soils belong to 4 orders, 10 suborders, 16 great groups, and 31 subgroups. Inceptisols are the dominant soils, followed by Entisols, Alfisols, Ultisols and miscellaneous land types (including rock outcrops and snow-covered mountains), occupying 37.3%, 35.6%, 0.3%, 14.2%, and 12.6% of the total geographical area (Nayak et al., 1996), respectively.
Assam	Its soils belong to 4 orders, 9 suborders, 15 great groups, 26 subgroups, and 83 soil family associations. Inceptisols are the dominant soils, followed by Entisols, Alfisols, and Ultisols, which occupy 41.4%, 33.6%, 11.3%,and 5.6% of the total geographical area of the state and miscellaneous land types are marshy and riverine, which total to 8.1% (Sen et al., 1999).
Manipur	They belong to 4 orders, 8 suborders, 13 great groups, 22 subgroups, and 29 families. Inceptisols dominate, covering 38.4% of the area, followed by Ultisols (36.4%), Entisols (23.1%), and Alfisols (0.2%). Marshy land and lake constitute about 2% of the area (Sen et al., 1997). Soil subgroups are Typic Hapludalfs, Typic Udorthents, Typic Haplaquepts, Typic Dystrochrepts, and Typic Haplohumults.
Meghalaya	Soils of the state belong to 4 orders, 8 subgroups, 14 great groups, and 25 subgroups. Inceptisols occupy 46%, Ultisols 40%, Entisols 11%, and Alfisols 4% of the total geographical area of the state. Soils classified at the subgroup level are Ustic Hapludalfs, Typic Udifluvents, Aquic Udifluvent, Typic Humaquepts, Cumilic Humaquepts, Typic Haplaquepts, Aeric Haplaquepts, and Humic Haplaquepts (Singh et al., 1999).
Mizoram	In Mizoram, though soils have been developed on shales and sandstones, but ecosystem significantly influences process of soil formation. Due to high precipitation and favourable condition of temperature and vegetation, weathering is intense. Soils of Mizoram mainly belong to 4 orders, 7 suborders, 11 great groups and 13 subgroups. Inceptisols are the dominant soils, followed by Ultisols, Entisols, and Alfisols (Maji et al., 2001).
Nagaland	Soils of the state belong to 4 orders, 7 suborders, 10 great groups, and 14 subgroups. Alfisols cover 2.9%, Entisols 7.3%, Inceptisols 66%, and Ultisols cover 24% of the TGA of the state (Maji et al., 2000). Seventy-two soil families have been identified and mapped into 36 soil units.
Sikkim	Soils of the state belong to Inceptisols (43% of TGA); Entisols (42%), and Mollisols (15%), and 7 suborders, 12 great groups, and 26 subgroups. Haplumbrepts with 31% of TGA is the most predominant great group, followed by Udorthents (30%), Cryorthents (12%) and Hapludolls (12%). Amongst subgroups, most prominent ones are Typic Haplumbrepts (20%) and Cumulic Haplumbrepts (5%); Lithic Udorthents (19%) and Typic Udorthents (10%); Typic Hapludolls (5%) and Cumulic Hapludolls (2%) (Das et al., 1996).
Tripura	The soils of Tripura belong to 5 orders, 7 suborders, 9 great groups, and 19 subgroups. The five orders are Inceptisols, Entisols, Ultisols, Alfisols, and Histosols, occupying 80.6%, 8.1%, 6.6%, 4.5%, and 0.2% of TGA, respectively. Generally, Inceptisols, Ultisols, and Alfisols are observed in patches on hills and tilla lands. Entisols are observed in patches on the hills as well as on interhill basins. Paddy soils by and large are grouped into Inceptisols with aquic moisture regime and are taxonomically known as Aquepts (Bhattacharyya et al., 1996).

Source: Degraded and Wastelands of India; Status and Spatial Distribution, Indian Council of Agricultural Research and National Academy of Agricultural Sciences, June 2010

2.5.6 Land Use

Land use in the north eastern states is summarised in Table 2.5.6

Table 2.5.6 Land Use

State	Land Use Condition
Arunachal Pradesh	About 62% of the total area of the state is under forests, and cultivated land accounted for less than 2%. Land not available for cultivation accounts for 0.4%, fallow land covers 2% and other uncultivated lands, excluding fallow land, account for 2%. Shifting cultivation known as '*Jhuming*' is still practised extensively on the hill slopes of most of the districts, and about 0.25 million ha is under *jhum* cultivation. Principal crops grown in the hilly region are paddy, maize, beans, and potato. Different temperate fruits such as apple, peach, kiwi-fruit, plum, are also grown, and the state also has tea and coffee plantations. In the sub-Himalayan belt and on the foot hills, paddy is the main crop, followed by maize, beans, and spices along with the horticultural crops, orange, banana, and pineapple. In the plains, paddy is extensively cultivated in kharif and mustard, potato, wheat and all kinds of winter vegetables are grown in rabi season. Major cropping patterns are paddy mustard, maize-pea, millets-potato, maize-barley, maize-vegetables, paddy beans, maize-buckwheat, and millets-mustard.
Assam	The principal crops in the upper Assam are tea and paddy, jute and paddy are in the middle Assam, and paddy is in the lower Assam. In some parts of the state, vegetables are cultivated. Nagaon and Marigaon are prominent vegetable growing districts. Agro-based tea industry is most significant in the state. Jorhat, Sibsagar, and Golaghat districts are famous for tea gardens, which produce about 52% of the country's total tea, and contribute towards about 10% of state's income. Arecanut is very prominent backyard crop. Sericulture is also practised in the state. The famous eri and muga silks are produced in this state. Kamrup, Goalpara, and Barpeta districts grow jute plants.
Manipur	Nearly 70% of the total geographical area of the state is under forests. Agriculture is the mainstay of the state's economy, and more than 75% of the people are engaged in agriculture. Agriculture is primarily of primitive nature in major part of the state. The area under cultivation is little more than 9% of the TGA of the state. '*Jhum'* cultivation is fairly common and is practised on slopes in the vicinity of the habitation. The gently sloping valley lands are bunded and terraced for intensive and permanent cultivations. The hilly regions are predominantly under horticultural crops like banana, pineapple, orange, guava, pear, and plum. Paddy and maize are the most important cereal crops grown in the valley and non-cereals crops include pulses, chillies, cabbage, other vegetables, sweet-potato, and ginger. On the hills, horticulture, tea and rubber plantations and agroforestry (silvi-horticulture, silvi-pastoral, and agro-silvipastoral) are practised. Improved varieties of paddy and other cereals in the valley, and oilseeds and vegetables in the narrow inter-hill valleys are being cultivated by the farmers.
Meghalaya	About 85% of the population of the state is dependent on agriculture. And about 9% of the total geographical area is under cultivation, out of which only 26% is irrigated. The principal crops grown are: paddy, wheat, maize, jute, mesta, cotton, tapioca, sweet-potato, mustard, chillies, turmeric, soybean, castor, chickpea, and pigeon pea. Main horticultural crops are: citrus fruits (predominantly orange), pineapple (both of queen and kew varieties), banana, litchi, guava, mango, jackfruit, pear, cashew nut, plum, and peach. Tea and coffee plantations are also found in the government farms.
Mizoram	Of the total geographical area, forest covers 18,775 km^2, and total cropped area including horticulture is 98 thousand ha. Agriculture is the main occupation of the people, and about 5% of the total area is under cultivation. *Jhuming* is the usual practice, 80% of the total population is practising *jhum* cultivation. Various crops are grown in mixed cropping. Paddy and maize are principal crops, and horticultural crops and spices like ginger are grown abundantly.
Nagaland	Of the total geographical area of the state, about 11% is under cultivation, and irrigated area comprises 3% of the cultivated area. People of the state have still adopted primitive practise of shifting (*jhuming*) cultivation extensively on the hill slopes; in 99 thousand ha. In the *jhum* land and on the terraced slopes, mixed cropping is practised with paddy, maize, millets, chillies, sweet potato, tapioca, mustard, and wheat. In wetlands, crop rotations, like paddy-paddy and paddy-wheat are practised.
Sikkim	Sikkim has a total area of about 7,096 km^2; of which 11% is under agriculture. Forest and barren land covers 35% and 24% of the TGA. Agriculture in Sikkim is well established compared with other hill states in the north-eastern Himalayan Hill region. Agricultural land is at elevation from 300 to 3,000 m, but most of the cultivated land is below 1,800 m. Agriculture on 30–50% slope is common but at altitudes above 1,500 m, land with >50% slope has also been brought under cultivation. Paddy is the common cereal. Maize, wheat, and vegetables are also grown in the state. Sikkim is rich in orchids, and spices like cardamom is grown in the vast area of the state.
Tripura	Out of the total geographical area of 1,049 thousand ha of the state, 58% is occupied by forests, followed by 26% as net sown area. The area sown more than once is 65%. The valley land locally known as 'lungas' is well suited for common agricultural crops, while highlands locally called 'tillas' are fit for plantation crops but are often used for shifting cultivation called *jhum*. Paddy alone occupies 58% of the

State	Land Use Condition
	total cropped area. The two important commercial crops grown are rubber (21,000 ha) and tea (5,780 ha). On the tillas and lungas cultivation of sugarcane, potato, groundnut, ginger, and turmeric is gradually getting popular. Double cropping is practised in irrigated areas. A number of tropical and subtropical fruits, pineapple, jackfruit, orange, litchi, and banana have been successfully grown on the tillas. Introduction of cashew nut has been found promising.

Source: Degraded and Wastelands of India; Status and Spatial Distribution, Indian Council of Agricultural Research and National Academy of Agricultural Sciences, June 2010

2.5.7 Degraded and Waste Lands

Degraded and wastelands in the north eastern states are briefly described in Table 2.5.7.

Table 2.5.7 Degraded and Wastelands

State	Degraded and Wastelands Conditions
Arunachal Pradesh	The datasets of the state indicate that 165 thousand ha (1.9% of TGA) is exclusively affected by water erosion. Water erosion in the open forest area (<40% canopy cover) is 215 thousand ha (2.5% of TGA). Acid soils (having pH <5.5) cover about 300 thousand ha (3.5% of TGA). Acidic soils with problems of water erosion account for 501 thousand ha (5.9% of TGA). Total acid soils (all categories) amount to 1,769 thousand ha, which are about 21% of TGA. Mining waste lands and waterlogged areas are minimal. Water erosion (exclusive and in open forest areas) has affected Bomdila, Along, Ziro, Daporijo, and Tezu districts. Along District has larger area under acid soils, followed by Tezu and Anini. Total degraded and wastelands cover largest area in Along, followed by Anini, Tezu, Bomdila and Ziro. Tezu has waterlogged area of 2.6 thousand ha and Khonsa has 1.4 thousand ha. Districts having highest amount of degraded and wastelands are Along (400 thousand ha), Ziro (397 thousand ha), followed by Anini (226 thousand ha), Tezu (214 thousand ha), and Bombila (197 thousand ha).
Assam	Water erosion, soil acidity, and waterlogging are the major land degradation problems in the state. Total degraded wastelands accounted for 4,571 thousand ha, which is about 58% of the TGA. Water erosion affects 1,929 thousand ha (about 24% of TGA) of agricultural land and 437 thousand ha (about 5.5% of TGA) of open-forest area; thus affecting 29.5% of the total area of the state. Soil acidity (affecting 25% of TGA) accounts for 1,995 thousand ha. Out of which, 1,319 thousand ha are also affected by water erosion. Karbi Anglong District has highest area (363 thousand ha) under acid soils, followed by Tinsukia (231 thousand ha) and Sibsagar (205 thousand ha). Waterlogged area covers about 210 thousand ha (about 2.6% of the TGA). Karbi Anglong District has highest total degraded area (611 thousand ha), followed by Tinsukia (287 thousand ha), Kamrup (278 thousand ha), North Cachar (277 thousand ha), Cachar (256 thousand ha), Dibrugarh (250 thousand ha), and Sonitpur (252 thousand ha).
Manipur	Manipur has 1,768 thousand ha degraded and wastelands, which is very high, around 79% of TGA of the state. Soil acidity and soil loss due to water erosion remain the major degradation problems. About 72% of the state is affected by soil acidity (1,597 thousand ha) and 6.7% is affected by water erosion, accounting for 150 thousand ha. Amongst the districts, Churachandpur has highest area under water erosion (33 thousand ha), followed by Ukhrul (29 thousand ha), Senapati (28 thousand ha), and Tamenglong (24 thousand ha). Total degraded and wastelands area also follow the same order of districts.
Meghalaya	In Meghalaya, degraded and wastelands accounted for 1,732 thousand ha, mostly contributed by soil acidity (1,023 thousand ha) and water erosion (706 thousand ha), amounting to 46% and 31% of TGA of the state. East Khasi Hills has about 348 thousand ha under acid soils, followed by Jaintia Hills (306 thousand ha) and West Khasi Hills (261 thousand ha). Waterlogged and marshy lands account for 3 thousand ha.
Mizoram	Soil acidity remains the major degradation problem, affecting 1,163 thousand ha (55% of TGA). Amongst the districts, Aizwal is worst affected by degradation, followed by Saiha and Lunglei. In the state, degraded and wastelands with particular reference to water erosion have been calculated on the basis of extrapolation. It is expected to be much higher owing to climatic and terrain conditions.
Nagaland	These lands occupy 1,550 thousand ha, accounting for 93% of TGA of the state. Like Arunachal Pradesh and Mizoram, Nagaland is predominantly affected by soil acidity. Acidity affects 1,516 thousand ha (91% of TGA) under different associated degraded lands. Water erosion affects 31 thousand ha (1.8% of TGA). Tuensang has remained highly degraded (421 thousand ha), followed by Kohima (267 thousand ha), Phek (202 thousand ha), and Mokochung (163 thousand ha). Soil erosion is highest in Kohima, followed by Dimapur, Mokochung, Mon, and Wokha.
Sikkim	Total degraded area in Sikkim is 60 thousand ha (9% of TGA); of which West Sikkim is highly degraded, followed by South Sikkim and North Sikkim. Erosional hazard has affected about 2 thousand

State	Degraded and Wastelands Conditions
	ha (0.28% of TGA of the state). South Sikkim is worst affected district, followed by West Sikkim and North Sikkim. Sikkim being a hilly state practising terraced agriculture on an extensive scale could successfully control soil erosion. Soil acidity, a major problem of Sikkim, accounts for 58 thousand ha (about 8% of the area of the state); West Sikkim has highest area (32 thousand ha), followed by South Sikkim (11 thousand ha), North Sikkim (10 thousand ha), and East Sikkim (5 thousand ha).
Tripura	Total degraded and wastelands are estimated to be 785 thousand ha (74% of TGA). Agartala (224 thousand ha) is worst affected, followed by Kailashahar (199 thousand ha), Ambasa (194 thousand ha), and Radha-kishorepur (168 thousand ha). Water erosion (in 7% of TGA) has been observed in 74 thousand ha; of which open forest area accounts for 48 thousand ha. Kailashahar (25 thousand ha) is worst affected, followed by Ambasa (21 thousand ha), Agartala (19 thousand ha), and Radha-kishorepur (9 thousand ha). Acid soils cover 709 thousand ha (about 67% of TGA). Soil acidity is highly prevalent in Agartala (205 thousand ha), followed by Kailashahar (174 thousand ha), Ambasa (172 thousand ha), and Radha-kishorepur (158 thousand ha). Over 2 thousand ha is either marshy or waterlogged for most part of the year.

Source: Degraded and Wastelands of India; Status and Spatial Distribution, Indian Council of Agricultural Research and National Academy of Agricultural Sciences, June 2010

ATTACHMENT-2.6.1 SOCIO-ECONOMIC CONDITIONS IN THE NORTH EASTERN REGION

2.6.1 State Government Administration

The north eastern region of India comprise eight states, as shown in Table 2.6.1. The number of districts, sub-districts, and villages in Table 2.6.1 was confirmed at the time of the Census of India 2011. Thereafter, it has increased to 11 districts in Meghalaya and 8 districts in Tripura.

Table 2.6.1 Status of Administrative Units in the North Eastern States

State	Capital	Area (km^2)	No. of Districts	No. of Sub-districts	No. of Villages	No. of ADC*1
Arunachal Pradesh	Itanagar	83,743	16	188	5,589	-
Assam	Dispur	78,438	27	153	26,395	3
Manipur	Imphal	22,327	9	38	2,582	-
Meghalaya	Shillong	22,429	7	39	6,839	3
Mizoram	Aizawl	21,081	8	26	830	3
Nagaland	Kohima	16,579	11	114	1,428	-
Sikkim	Gangtok	7,096	4	9	451	-
Tripura	Agartala	10,486	4	40	875	1
All-India	New Delhi	3,287,240	640	5,924	640,930	-

*Note: *1= Autonomous District Council constituted under the Six Schedule*
Source: Census of India 2011, Register Central of India

Amongst the eight states in northeast India, an autonomous administration system is constituted for the tribal areas in the states of Assam, Meghalaya, Tripura, and Mizoram under the Sixth Schedule of the Constitute. The State of Nagaland is provided with peculiar constitutional provisions of Article 371 A of the Constitute.

2.6.2 Population and Employment

According to the Census of India 2011, eight states in the northeast India occupy 7.98% of the total geographical area and 3.76% of the total population. Table 2.6.2 shows the state-wise characteristics that (i) population of Assam shares 68.6% of the regional population, (ii) urban population is fairly high in Nagaland and Manipur, (iii) female population is relatively high in the urban areas of Manipur and Meghalaya, and (iv) growth population rate is fairly high in Meghalaya and Arunachal Pradesh but seen a downward trend in Nagaland particularly in the rural area.

Table 2.6.2 Demographic Data of Census 2011 (1/2)

State	Population			Sex Ratio			% Decadal Growth Population		
	Total	%Rural	%Urban	Total	Rural	Urban	Total	Rural	Urban
Arunachal Pradesh	1,383,727	77.06	22.94	938	953	890	26.0	22.6	39.3
Assam	31,205,576	87.10	12.90	958	960	946	17.1	15.5	27.9
Manipur	2,570,390	57.57	42.43	992	976	1,026	18.6	9.1	44.8
Meghalaya	2,966,889	74.89	25.11	989	986	1,001	27.9	27.2	31.1
Mizoram	1,097,206	80.42	19.58	976	952	998	23.5	17.4	29.7
Nagaland	1,978,502	50.37	49.63	931	940	908	-0.6	-14.6	66.6
Sikkim	610,577	88.93	11.07	890	882	913	12.9	-5.0	156.5
Tripura	3,673,917	82.94	17.06	960	955	973	14.8	2.2	76.2

State	Population			Sex Ratio			% Decadal Growth Population		
	Total	%Rural	%Urban	Total	Rural	Urban	Total	Rural	Urban
All-India	1,210,569,573	72.19	27.81	943	949	929	17.7	12.3	31.8

Source: Census of India 2011

In addition, Table 2.5.3 demonstrates that (i) population density is relatively high in Assam and Tripura, (ii) child population (0-6 years) is prominent in Meghalaya, (iii) natural increase of population is fairly high in Meghalaya and Assam, and contrarily, (iv) infant mortality rate in Meghalaya and Assam exceeds the national average.

Table 2.6.3 Demographic Data of Census 2011 (2/2)

State	Population Density	%Child Population (0-6 Years)			CBR	CDR	Natural Increase (CBR-CDR)	IMR
		Total	Rural	Urban				
Arunachal Pradesh	17	15.33	16.16	12.57	19.8	5.8	14.0	32
Assam	398	14.86	15.62	10.25	22.8	8.0	14.8	55
Manipur	115	13.16	13.64	12.16	14.4	4.1	10.3	11
Meghalaya	132	19.16	20.69	13.09	24.1	7.8	16.3	52
Mizoram	52	15.36	17.77	13.14	16.6	4.4	12.2	34
Nagaland	119	14.71	15.45	12.89	16.1	3.3	12.8	21
Sikkim	86	10.50	10.77	9.70	17.6	5.6	12.0	26
Tripura	350	12.47	13.47	9.64	14.3	5.0	9.4	29
All-India	382	13.59	14.55	11.45	21.8	7.1	14.7	44

Abbreviation: CBR = Crude Birth Rate, CDR = Crude Death Rate, IMR = Infant Mortality Rate
Source: Census of India 2011

Over 70% of total population resides in rural areas, and the agriculture sector absorbs around 60% of the labour force as indicated in Table 2.6.4.

Table 2.6.4 Labour Force by Work Origin

State	Main Worker				
	Cultivator	Agriculture Labour	Household Industry	Other Worker	Total
Arunachal Pradesh	248,120	20,259	4,728	205,614	478,721
Assam	3,138,554	903,294	242,071	4,403,204	8,687,123
Manipur	466,768	45,609	45,924	415,862	974,163
Meghalaya	411,270	114,642	11,969	383,694	921,575
Mizoram	202,514	26,464	5,459	180,593	415,030
Nagaland	420,379	22,571	9,525	288,704	741,179
Sikkim	82,707	11,582	2,888	133,220	230,397
Tripura	246,707	201,863	19,296	609,153	1,077,019
All-India	95,942,413	86,168,706	12,332,802	168,000,000	363,000,000
State	Marginal Worker				
	Cultivator	Agriculture Labour	Household Industry	Other Worker	Total
Arunachal Pradesh	54,603	15,912	3,637	34,784	108,936
Assam	923,073	942,052	249,250	1,168,192	3,282,567
Manipur	107,263	69,309	45,432	108,443	330,447
Meghalaya	83,405	83,722	8,519	88,398	264,044
Mizoram	27,089	15,323	2,393	26,870	71,675
Nagaland	117,323	40,391	13,313	61,916	232,943
Sikkim	34,694	14,404	2,255	26,388	77,741
Tripura	49,240	151,755	22,200	169,307	392,502
All-India	22,866,367	58,164,984	6,005,366	32,286,580	119,000,000

Source: Census of India 2011

2.6.3 Economy

The changes in net state domestic product (NSDP) at constant prices 2004-05 are shown in Table 2.1.5, and similarly those in per capita NSDP are given in Table 2.6.6.

Assam recorded the largest NSDP for the last decade amongst the north eastern states followed by Tripura, Meghalaya, and Nagaland. Meanwhile, the five states of Sikkim, Mizoram, Tripura, Meghalaya, and Nagaland have achieved a higher NSDP growth rate than the average of all of India.

Table 2.6.5 Changes in NSDP at 2004-05 Constant Prices and Growth Rate

State	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Average 2005-2013
Arunachal Pradesh	3,281	3,458	3,873	4,191	4,530	4,725	4,942	5,146	5,549	4,411
	2.92%	5.39%	12.00%	8.21%	8.09%	4.30%	4.59%	4.13%	7.83%	6.38%
Assam	48,602	50,797	52,968	56,123	61,294	65,726	69,035	73,081	77,376	61,667
	3.01%	4.52%	4.27%	5.96%	9.21%	7.23%	5.03%	5.86%	5.88%	5.66%
Manipur	4,907	4,992	5,266	5,642	6,040	5,862	6,420	6,620	NA	5,719
	6.60%	1.73%	5.49%	7.14%	7.05%	-2.95%	9.52%	3.12%	NA	4.71%
Meghalaya	6,303	6,778	6,991	7,889	8,396	9,226	10,299	10,490	11,838	8,660
	7.82%	7.54%	3.14%	12.85%	6.43%	9.89%	11.63%	1.85%	12.85%	8.22%
Mizoram	2,577	2,639	2,988	3,437	3,832	4,539	4,405	4,688	NA	3,638
	7.38%	4.50%	10.95%	15.03%	11.49%	18.45%	-2.95%	6.42%	NA	8.91%
Nagaland	5,986	6,454	6,978	7,422	7,842	8,587	9,291	9,887	10,522	8.108
	10.42%	7.82%	8.12%	6.36%	5.66%	9.50%	8.20%	6.41%	6.42%	7.66%
Sikkim	1,662	1,760	1,862	2,106	3,659	4,028	4,548	4,886	5,271	3,309
	9.99%	5.90%	5.80%	13.10%	73.74%	10.08%	12.91%	7.43%	7.88%	16.31%
Tripura	8,708	9,458	10,082	11,146	12,287	13,215	14,339	15,585	NA	11,853
	6.59%	8.61%	6.60%	10.55%	10.24%	7.55%	8.51%	8.69%	NA	8.42%
All-India	2,902,180	3,178,664	3,469,008	3,689,772	3,994,165	4,348,232	4,619,695	4,794,228	4,988,116	3,998,229
	9.45%	9.53%	9.13%	6.36%	8.25%	8.86%	6.24%	3.78%	4.04%	7.29%

Notes: Upper: NSDP in Rs crores, Lower: Growth rate in % YoY
Source: Directorate of Economics & Statistics of Respective State Government and CSO, 1 August 2014

As for per capita NSDP, Sikkim has achieved a signal growth since 2009-10. Nagaland recorded larger per capita NSDP than the average of all of India, followed by Tripura and Mizoram.

Table 2.6.6 Changes in Per Capita NSDP at 2004-05 Constant and Growth Rate

State	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Average 2005-2013
Arunachal Pradesh	26,870	27,675	30,287	32,028	33,825	34,470	35,231	35,845	37,767	32,666
	0.56%	3.00%	9.44%	5.75%	5.61%	1.91%	2.21%	1.74%	5.36%	3.95%
Assam	17,050	17,579	18,089	18,922	20,406	21,611	22,420	23,448	24,533	20,451
	1.60%	3.10%	2.90%	4.61%	7.84%	5.91%	3.74%	4.59%	4.63%	4.32%
Manipur	19,478	19,430	20,104	21,131	22,197	21,147	22,739	22,395	NA	21,078
	4.50%	-0.25%	3.47%	5.11%	5.04%	-4.73%	7.53%	-1.51%	NA	2.40%
Meghalaya	25,642	27,242	27,764	30,963	32,569	35,363	34,217	34,004	37,439	31,689
	6.46%	6.24%	1.92%	11.52%	5.19%	8.58%	-3.24%	-0.62%	10.10%	5.13%
Mizoram	25,826	26,308	28,467	31,921	34,699	40.072	40,387	40,930	NA	33,572
	4.72%	1.87%	8.21%	12.13%	8.70%	15.48%	-5.37%	3.76%	NA	6.19%
Nagaland	33,072	35,074	37,317	39,041	40,590	43,992	46,340	48,111	49,963	41,500
	8.65%	6.05%	6.40%	4.62%	3.97%	8.38%	5.34%	3.82%	3.85%	5.68%
Sikkim	29,008	30,293	31,722	35,394	60,774	66,136	73,704	78,427	83,527	54,332
	8.68%	4.43%	4.72%	11.57%	71.71%	8.82%	11.44%	6.41%	6.50%	14.92%
Tripura	25,688	27,558	29,022	31,711	34,544	36,718	39,382	42,315	NA	33,367
	5.30%	7.28%	5.31%	9.26%	8.93%	6.29%	7.25%	7.45%	NA	7.13%

State	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Average 2005-2013
All-India	26,015	28,067	30,332	31,754	33,901	36,202	38,048	38,856	39,904	33,675
	7.75%	7.89%	8.07%	4.69%	6.76%	6.79%	5.10%	2.12%	2.70%	5.76%

Notes: Upper: Per Capita NSDP in Rs., Lower: Growth rate in % YoY
Source: Directorate of Economics & Statistics of respective State Government and CSO, 1 August 2014

The gross domestic product (GDP) share of the agriculture and allied sector (Sector (1) in Table 2.6.7 below) in India as well as the states generally showed a decreasing trend, though the percentage differs state by state. Of which, Tripura maintained the share of the agriculture and allied sector at 24% to 26% in the last decade, meanwhile Sikkim drastically decreased to about 8% in 2009-10 and thereafter.

Table 2.6.7 GSDP Share in Percentage by Industry of Origin at 2004-05 Constant Prices

State	Sector	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14 (P)
Arunachal Pradesh	(1)	33.31	34.76	34.80	29.79	26.91	29.43	28.72	28.38	27.76
	(2)	32.46	29.96	31.23	35.26	30.07	32.45	32.87	33.35	33.03
	(3)	34.24	35.29	33.96	34.94	43.02	38.12	38.41	38.28	39.21
Assam	(1)	25.37	24.70	24.23	23.36	22.91	21.95	21.88	21.53	21.27
	(2)	25.69	24.54	23.57	23.84	23.80	22.54	22.16	21.59	21.27
	(3)	48.94	50.76	52.20	52.80	53.29	55.50	55.96	56.88	57.47
Manipur	(1)	23.20	22.76	26.63	24.26	25.78	21.21	19.67	18.60	NA
	(2)	37.01	37.14	36.10	34.70	34.66	29.68	28.85	27.84	NA
	(3)	39.79	40.09	40.26	41.04	39.55	49.10	51.49	53.56	NA
Meghalaya	(1)	22.60	21.26	20.15	18.58	17.83	16.73	16.24	16.42	16.08
	(2)	26.37	27.63	28.89	30.10	29.97	29.45	29.47	29.30	28.27
	(3)	51.03	51.11	50.96	51.31	52.20	53.82	54.30	54.28	55.65
Mizoram	(1)	22.33	21.37	21.96	21.74	21.12	20.98	19.34	17.72	NA
	(2)	19.94	19.24	19.58	20.18	18.55	16.44	16.46	16.49	NA
	(3)	57.75	59.39	58.46	58.09	60.33	62.58	64.20	65.80	NA
Nagaland	(1)	32.33	30.28	28.40	28.71	27.64	27.40	27.06	26.27	NA
	(2)	13.67	14.57	14.93	16.23	16.32	12.69	12.79	12.71	NA
	(3)	53.99	55.14	56.67	55.06	56.04	59.91	60.15	61.02	NA
Sikkim	(1)	17.63	16.65	16.07	14.40	8.65	8.34	8.10	8.07	NA
	(2)	29.37	29.65	30.29	35.09	55.13	59.23	59.06	58.90	NA
	(3)	53.03	53.70	53.65	50.51	36.22	32.44	32.85	33.03	NA
Tripura	(1)	24.45	24.41	26.55	25.64	24.37	25.12	25.16	24.33	NA
	(2)	25.32	26.17	24.54	24.59	25.03	23.19	21.47	20.29	NA
	(3)	50.24	49.42	48.91	49.77	50.60	51.68	53.37	55.37	NA
All-India	(1)	18.27	17.37	16.81	15.77	14.64	14.59	14.37	13.95	13.94
	(2)	27.99	28.65	28.74	28.13	28.27	27.92	28.22	27.27	26.13
	(3)	53.74	53.98	54.45	56.11	57.09	57.48	57.42	58.79	60.05

Notes: (1)= Primary (Agriculture & Allied Sector), (2)= Secondary (Industry Sector), (3) Tertiary (Services Sector)
(P)= Provisional
Source: Central Statistical Organisation (CSO), Ministry of Agriculture, Govt. of India (as of 31 May 2014)

The GDP share of the agriculture and allied sector in India shows a downward trend; which was roughly 50% in the 1950s, 18% in 2005-06, and 14% in 2013-14. However, the agriculture and allied sector in the north eastern states, especially Tripura, has achieved equal or even higher growth rates than the average of all of India.

Table 2.6.8 Growth Rate of the Agriculture and Allied Sector in GSDP at 2004-05 Constant Prices

State	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Average 2005-2013
Arunachal Pradesh	1,194	1,311	1,471	1,369	1,351	1,533	1,605	1,668	1,713	1,468
	-2.50%	9.83%	12.20%	-6.93%	-1.34%	13.50%	4.67%	3.93%	2.71%	4.01%
Assam	14,006	14,274	14,676	14,961	15,992	16,435	17,255	18,002	18,829	16,048
	2.56%	1.91%	2.82%	1.94%	6.89%	2.77%	4.99%	4.33%	4.59%	3.64%
Manipur	1,266	1,267	1,394	1,525	1,733	1,417	1,422	1,468	NA	1,437
	-0.30%	0.08%	10.01%	9.40%	13.59%	-18.20%	0.34%	3.21%	NA	2.27%
Meghalaya	1,600	1,621	1,606	1,673	1,711	1,742	1,825	1,963	2,126	1,763
	4.90%	1.33%	-0.92%	4.15%	2.26%	1.87%	4.76%	7.54%	8.27%	3.80%
Mizoram	641	642	733	822	897	1,045	998	951	NA	841
	1.63%	0.27%	14.06%	12.20%	9.17%	16.42%	-4.50%	-4.65%	NA	5.58%
Nagaland	2,081	2,101	2,114	2,273	2,339	2,535	2,647	2,756	NA	2,356
	2.55%	0.97%	0.61%	7.53%	2.89%	8.41%	4.41%	4.12%	NA	3.94%
Sikkim	337	337	350	365	381	399	416	443	NA	379
	4.13%	0.09%	3.91%	4.29%	4.23%	4.83%	4.13%	6.65%	NA	4.03%
Tripura	2,303	2,490	2,918	3,083	3,243	3,614	3,934	4,136	NA	3,215
	3.21%	8.10%	17.18%	5.66%	5.20%	11.45%	8.84%	5.14%	NA	8.10%
All-India	594,487	619,190	655,080	655,689	660,987	717,814	753,832	764,510	800,548	691,349
	5.14%	4.16%	5.80%	0.09%	0.81%	8.60%	5.02%	1.42%	4.71%	3.97%

Notes: Upper: GSDP in Rs crores, Lower: Growth Rate in % YoY
Source: Central Statistical Organisation (CSO), Ministry of Agriculture, Govt. of India (as of 31 May 2014)

2.6.4 Poverty

Whereas, the poverty line in terms of monthly income per capita exceeds the national average in the north eastern states except Tripura, the below poverty line (BPL) rate goes beyond the national average for Manipur ranking in the third highest in India, Arunachal Pradesh in the fifth highest, and Assam in the eighth highest. Particularly, there is a tendency that BPL rate is higher in rural area.

Table 2.6.9 Poverty Status in 2011-12

State	Poverty Line *1 (Rs., Monthly per Capita)		No. of BPL (lakh)*2			Rate of BPL (%)*2		
	Rural	Urban	Rural	Urban	Total	Rural	Urban	Total
Arunachal Pradesh	930	1,060	4.25	0.66	4.91	38.93	20.33	34.67
Assam	828	1,008	92.06	9.21	101.27	33.89	20.49	31.98
Manipur	1,118	1,170	7.45	2.78	10.22	38.80	32.59	36.89
Meghalaya	888	1,154	3.04	0.57	3.61	12.53	9.26	11.87
Mizoram	1,066	1,155	1.91	0.37	2.27	35.43	6.36	20.40
Nagaland	1,270	1,302	2.76	1.00	3.76	19.93	16.48	18.88
Sikkim	930	1,226	0.45	0.06	0.51	9.85	3.66	8.19
Tripura	798	920	4.49	0.75	5.24	16.53	7.42	14.05
All-India	**816**	**1,000**	**2166.58**	**531.25**	**2697.83**	**25.7**	**13.7**	**21.92**

*Notes: *1= State Specific Poverty Lines (Tendulkar Methodology), Monthly per Capita Expenditure in Rs.*
**2= Below Poverty Line by States (Tendulkar Methodology) in %.*
Source: Press Note on Poverty Estimates, 2011-12, Government of India Planning Commission, July 2013

2.6.5 Religion

According to the Census of India 2001, religion is classified into seven, i.e., Hindus, Muslims, Christians, Sikhs, Buddhists, Jains, and others. As shown in Table 2.6.9, the population of Christians is remarkably high in the north eastern states, particularly in Nagaland, Mizoram, and Meghalaya. On the

other hand, majority of the population of Tripura, Assam, Sikkim, and Manipur are Hindu. Buddhists occupies 28.11% in Sikkim and 13.03% in Arunachal Pradesh which are respectively included in the "others" category.

Table 2.6.10 Religious Demography at Census 2001

State	Hindus	Muslims	Christians	Others
Arunachal Pradesh	34.60	1.88	18.72	44.80
Assam	64.89	30.92	3.70	0.49
Manipur	46.01	8.81	34.04	11.14
Meghalaya	13.27	4.28	70.25	12.20
Mizoram	3.55	1.14	86.97	8.34
Nagaland	7.70	1.76	89.97	0.57
Sikkim	60.93	1.42	6.68	30.97
Tripura	85.62	7.95	3.20	3.23
All-India	80.46	13.43	2.34	3.77

Source: Census of India 2001, Sate-wise Religious Demography

2.6.6 Language

English is the main official language in the north eastern states in combination with some local languages, such as Assamese, Bengali, and Manipuri, depending on the state. Besides, each tribe has its own language/dialect. For instance in Nagaland, 16 major tribes speak about 60 dialects.

Table 2.6.11 Languages

State	Official Language	Other Languages/Dialects
Arunachal Pradesh	English	The number and diversity of languages/dialects spoken in Arunachal Pradesh are not conclusively known. Thirty, possibly 50, distinct languages/dialects in addition to innumerable dialects and sub-dialects coinciding with tribal areas are in use. Some of them are Nyishi, Dafla, Miji, Adi, Gallong, Wancho, Tagin, Hill Miri, Mishui, Mohpa, Nocte, Aka, Tangsa, and Khamti. Vast majority of them belong to the Tibeto - Burman language family. Hindi is making constant inroads. Nagamese is fairly widely used as a link language in some areas.
Assam	Assamese, Bengali, Bodo and English	Other languages/dialects and dialects are Bengali, Dimasa, Mishing, Karbi, Rambha, Tinua, and sub-groups likeTai - Phake, Tai - Aiton, Tai - Khamti.
Manipur	Meiteilon (Manipuri)	About 29 different dialects are also in wide usage. Five of them (in addition to Meiteilon, which is taught up to post graduate level) are recognised as medium of instruction in schools up to V. These are: 1. Tangkhul, 2. Hmar, 3. Paite, 4. Lushai, and 5. Thadou/Kuki
Meghalaya	Khasi, Puar, and Garo with English	Garo has close affinity with the Koch-Boda language. It has many dialects e.g., Abeng or Aurbengh, Along, Akarve (or Alve) Matchi, Dual, Uibok, Chisak Megam or Lyngugam, Ruga, Gao-Ganching. Puan is spoken by Tribal group e.g. Khyniram, Bhoi, Puai, and War.
Mizoram	Mizo, English	The main dialects of Mizoram are: Aso, Chho, Halam, Hinar, Lai, Lusei, Mara, Miu - Khumi, Paite, and Thado - Kuki.
Nagaland	English	Each tribe in Nagaland has its own dialect. There are about 60 different spoken dialects which belong to the Tibeto - Burman family of languages/dialects. These dialects have no script of their own. Tribes speak to each other in 'Nagamese' a language which is an amalgamation of Assamese, Bengali, and local dialects. It is the language of the market.
Sikkim	English	Sikkim has 11 languages/dialects (in proportion to the population mix of the State) Nepali, Bhutia, Lepcha, Limbu, Newari, Rai, Gurung, Mangai, Sherpa, Tamang, and Sunwar.
Tripura	English and Bengali	'Bengali' is the language used by majority of the people in Tripura. Another

State	Official Language	Other Languages/Dialects
		important language is 'Kak - Barak' or 'Tripuri', which belongs to the Tibeto - Burman group. The 'Tripuri' language uses the Bengali script. The dialect is Halam and the sub-dialects are Rankhal and Chakma.

Source: Ministry of Development of North Eastern Region (http: //mdoner.gov.in/content/)

2.6.7 Scheduled Castes and Scheduled Tribes

The scheduled caste (SC) rate in the north eastern states is far below the national average of 16.6%; particularly, it is less than 1.0% in Arunachal Pradesh and Nagaland. Meanwhile, the scheduled tribe (ST) rate largely surpasses the national average of 8.6%; especially it is over 80% in Mizoram, Nagaland, and also Meghalaya. Moreover, the ST rate exceeds 90% in remote areas of these three states.

Table 2.6.12 Scheduled Castes and Scheduled Tribes

State	Scheduled Caste (SC)			Scheduled Tribe (ST)		
	% Total	% Rural	% Urban	% Total	% Rural	% Urban
Arunachal Pradesh	0.000	0.000	0.000	68.787	74.069	51.037
Assam	7.150	6.811	9.220	12.448	13.673	4.978
Manipur	3.775	2.739	5.932	35.121	45.566	13.381
Meghalaya	0.585	0.488	0.971	86.146	90.109	70.362
Mizoram	0.111	0.057	0.161	94.432	96.580	92.458
Nagaland	0.000	0.000	0.000	86.478	92.846	70.781
Sikkim	4.631	4.450	5.170	33.798	36.575	25.534
Tripura	17.826	16.147	22.562	31.759	41.201	5.122
All-India	16.635	18.459	12.603	8.614	11.257	2.774

Source: Rural Urban Distribution of Population, Census of India, 2011

2.6.8 Literacy Rate and Educational Level

The literacy rate in the north eastern states goes beyond the national average except in Arunachal Pradesh. Especially, Mizoram and Tripura rank third and fifth highest in terms of literacy rate in India.

Table 2.6.13 Literacy Rate

State	Urban		Rural		Total
	Male	Female	Male	Female	
Arunachal Pradesh	88.449	76.663	67.439	52.036	65.385
Assam	91.811	84.937	75.395	63.033	72.186
Manipur	91.676	79.310	83.393	68.893	79.215
Meghalaya	92.458	89.139	71.457	68.373	74.426
Mizoram	97.984	97.272	88.159	79.815	91.332
Nagaland	91.622	87.403	78.961	71.507	79.555
Sikkim	92.354	84.702	84.619	72.449	81.424
Tripura	95.512	91.376	90.067	79.491	87.216
All-India	88.763	79.112	77.155	57.930	72.986

Source: Rural Urban Distribution of Population, Census of India, 2011

Educational level in the north eastern states is generally proportional to the literacy rate. As shown in Table 2.6.14, the labour forces in Nagaland and Manipur have finished higher education, which resulted in a higher mean years of schooling (MYS) in these states.

Table 2.6.14 Education Level and Mean Years of Schooling (MYS) of Labour Force per 1,000 for Persons of Age 15+ according to Usual Status (PS+SS): 2007-08 (Rural + Urban)

State	Not Literate	Literacy up to Primary	Middle	Secondary	Hr. Secondary	Diploma/ Cert	Deg + PG	MYS of Labour Force
Arunachal Pradesh	410	238	139	72	70	10	62	4.919
Assam	135	392	237	111	65	5	56	6.642
Manipur	169	173	249	187	77	17	128	7.783
Meghalaya	95	577	188	55	37	6	42	6.090
Mizoram	25	376	364	115	40	15	66	7.603
Nagaland	99	214	284	148	98	28	129	8.293
Sikkim	179	480	137	60	63	2	80	6.071
Tripura	209	384	210	85	42	7	64	5.994
All-India	345	247	167	101	52	19	68	5.482

Notes 1. Distribution of labour force across educational levels done using intrapolated population between Census 2001&2011 for 2007-08 (June-July) and mean years of schooling derived for labour force.
2. Labour force with educational qualification of degree/PG derived by subtraction.
3. Degree/PG has common 15 years of schooling only as separate details of labour force with PG not available
Source: NSS Report No. 531: Employment and Unemployment Situation in India, July 2007 – June 2008, Statement No. 10.1 Chapter 3.

2.6.9 Basic Amenities and Household Assets

Comparing some basic amenities of daily life, the rate of safe drinking water is below the national average, meanwhile, the rate of latrine facility available within premises is notably high in the north eastern states. Moreover, electricity is the main source of lighting except in Assam, and firewood is the main fuel used for cooking in the region except in Mizoram.

Table 2.6.15 Basic Amenities

State	Number of Households*1	Safe Drinking Water*2 (%)	Latrine Facility Available within Premises (%)	Source of Lighting		Fuel Used for Cooking	
				Electricity (%)	Kerosene (%)	Firewood (%)	LPG (%)
Arunachal Pradesh	261,614	78.6	62.0	65.7	18.5	68.7	29.2
Assam	6,367,295	69.9	64.9	37.1	61.8	72.1	19.0
Manipur	507,152	45.4	89.3	68.4	25.1	65.7	29.7
Meghalaya	538,299	44.7	62.9	60.9	37.0	79.0	11.9
Mizoram	221,077	60.4	91.9	84.2	13.5	44.5	52.6
Nagaland	399,965	53.8	76.5	81.6	15.6	77.9	20.2
Sikkim	128,131	85.3	87.2	92.5	6.6	52.5	41.3
Tripura	842,781	67.5	86.0	68.4	29.1	80.5	17.6
All-India	246,692,667	85.5	46.9	67.3	31.4	49.0	28.6

Notes 1. Excluding institutional households
2. Access to tap water, hand-pump, and tubewell
Source: Databook for DCH, 3 June 2014

As for household assets in the north eastern states, Table 2.6.16 indicates that (i) Tripura is below the national average for all listed items, and (ii) ownership of radios, televisions, and four-wheel vehicles is relatively high. On the other hand, ownership of computers with internet, mobile phones, and two-wheel vehicles is generally below the national average.

Table 2.6.16 Household Having Assets in Percent

State	Radio	Television	Computer with Internet	Mobile Phone	Bicycle	Scooter, Motorcycle, Moped	Car, Jeep, Van
Arunachal Pradesh	22.0	41.1	2.0	39.8	19.5	14.0	7.9
Assam	22.1	27.5	1.6	43.5	55.0	10.2	3.8
Manipur	54.4	47.4	2.2	52.3	44.6	19.8	6.0
Meghalaya	25.2	33.7	1.5	39.1	13.3	5.4	5.4
Mizoram	33.5	55.1	2.5	63.9	4.3	13.8	7.3
Nagaland	25.0	37.9	1.7	48.6	7.9	6.3	7.8
Sikkim	23.0	54.7	3.3	67.7	0.9	2.8	8.3
Tripura	12.8	44.9	1.0	42.7	39.3	8.2	2.2
All-India	19.9	47.2	3.1	53.2	44.8	21.0	4.7

Source: Databook for DCH, 3 June 2014

Attachment-3.7.1 Details of the Cooperative Societies in Meghalaya as of 31st March 2014

Sl. No.	Type of Societies	East Khasi Hills Dist.		West Khasi Hills Dist.		Jaintia Hills Dist.		Ri-Bhoi Dist.		East Garo Hills Dist.		West Garo Hills Dist.		South Garo Hills Dist.		South West Khasi Hills Dist		Amlarem Sub-Divn.		Sohra Sub-Divn.		T OTAL		GRAND TOTA
		F	NF	F	NF	F	NF	F	NF	F	NF	F	NF	F	NF	F	NF	F	NF	F	NF	F	NF	(F+NF
1	M.C.A.B. Ltd.	1																				1		1
2	M.E.C.O.F.E.D. Ltd.	1																				1		1
3	M.S.H.F.C.S. Ltd.	1																				1		1
4	M.E.G.H.A.L.O.O.M. Ltd.	1																				1		1
5	M.S.C.U. Ltd.	1																				1		1
6	M.V.D.P.T.C.S. Ltd.	1																				1		1
7	COOPERATIVE URBAN	1				1						1										3	0	3
8	WHOLESALE COOP.					1						1										2	0	2
9	P.A.C.S.	27		25		17	1	18		19		40	3	11	3	8		3		4		172	7	179
10	HOUSING	2	2	1	2				3				1				1			1		4	9	13
11	CONSUMER	15	4	3	2	1	2	3		3		4	1		2	4		2		5		40	11	51
12	MARKETING	9		1		2	1	2		2		4	1	1		2		2				25	2	27
13	MULTIPURPOSE	101	18	23	6	38	16	89	35	16	2	11	7	2	7	35	2	26	4	19	1	360	98	458
14	THRIFT	30	1			3		2	1	2		13	3	4	1					1		55	6	61
15	INDUSTRIAL	10	6	15	9	4	6	1	2		2	5	7	1		16	11	2	2	3		57	45	102
16	DISTRICT MILK COOP.	1				1		1														3	0	3
17	DAIRY	13		6	8	14	8	5	2		1	17	5		2	4	2	3	1			62	29	91
18	FISHERIES	5		3		1	3			6	5	6	3	2	6	8	7	6		2		39	24	63
19	HANDLOOM WEAVERS			2	5	5	3	12	4	8	1	17	5	3	1	3						50	19	69
20	HANDICRAFT	1	1					1				3	1							2		7	2	9
21	TRANSPORT	12	5	1	2	12	8	1	1	1		2	3		1	5	6	1	3	5		40	29	69
22	INTEGRATED VILLAGE	8		6		2		3						3				1		2		25	0	25
23	JOINT/COLLECTIVE	2	1	1	5	2	1		3							1	6			5		11	16	27
24	PIGGERY/POULTRY	3	1	3	1	7	9	3				1	3			7	1	1				25	15	40
25	LIVESTOCK				1	4	3	10			1		1			1	2	14	1	4		33	9	42
26	HORTICULTURE	3		2	1			3		1	4	2	1		5	2				2		15	11	26
27	PROCESSING			1		1	2	1	1	1		1						4		2		11	3	14
28	LABOUR CONTRACT	2	1		3		1															2	5	7
29	SERICULTURE				1					1		1	2									2	3	5
30	TOURISM			1		1										2			1	2		6	1	7
31	OTHER TYPES	1	1			1		5	2	1												8	3	11
	GRAND TOTAL	252	41	94	46	118	64	160	54	61	16	129	47	27	28	98	38	65	12	59	1	1,063	347	1,410

Attachment-3.7.1

Source: Cooperation Department. (http://megcooperation.gov.in/coop/list%20of%20Coop%20as%20on%2031-03-2014.pdf)

(Accessed in March 2015)

Attachment-3.7.2

Case Studies of Cooperative Societies based on the Field Interviews Conducted by JICA Survey Team

1. Urlong Tea Cooperative, Mawlyngot, East Khasi Hills District

The Urlong Tea Cooperative Society was registered in 2011 and there are 21 members. Tea cultivation started in the area in 2003. The members have their own tea gardens and the total area is approximately 50 ha. All the gardens have been certified as organic. The Horticulture Department has helped the society for organic certification. The members have to maintain their own tea garden and they sell the plucked tea leaves to the Cooperative Society at the rate of Rs. 60 per kg of the unprocessed tea leaves.

A tea processing factory was set up in 2008 with the support of World Vision, Border Area Development Programme and Department of Agriculture, Government of Meghalaya. Some finance has been procured from Meghalaya Cooperative Apex Bank. Border Area Development Programme (BADP) has provided support for construction of building (first floor) in 2011. Most of the investments in the tea gardens and factory have come from World Vision, BADP and Department of Agriculture as grant.

The tea factory operates from the end of March to November. Every day about 5-6 persons are engaged in the running the factory. The Chairman and the Secretary of the Cooperative Society manage the factory. The Cooperative Society produces three varieties of tea – white tea (sale price – Rs. 250 per 50 grams), green tea (sale price – Rs. 120 per 100 grams) and black tea (Rs. 100 per 200 grams). The green tea is available in 200 grams pack too and similarly the black tea is also available in 500 grams pack.

The Cooperative Society supplies the tea to different sales outlets/stores in Shillong. So far they have not faced problems in selling the tea. There was inadequate data to analyse the profitability of the unit as well as return to the farmers. One lady member of the cooperative has 2 ha of tea garden and spends about Rs. 3-4 thousand every year on the maintenance of the garden in addition to the labourers for plucking the leaves (Rs. 150 per day per labour). She gets about 60 kg leaves every month.

Most of the investments for the tea gardens, factory and stores have come as grant and the cooperative needs to generate adequate profit to run the set up. The production capacity of the factory is yet to be fully utilized. The cooperative may promote tea cultivation by the members as well as other farmers in the village and neighbouring areas, which would help the factory to run efficiently and generate more profit.

2. Wahkdait Pashum Cooperative, East Khasi Hills

The Wahkdait Pashum Cooperative was formed in 1997 and registered in 1999 with members from two villages of Wahkdait and Pashum. The cooperative was formed to transport fruits and vegetables

using rope way and process some of the local fruits, and also to promote livestock rearing. The Government supported the cooperative to install the rope way, fruit processing unit, store houses, construction of fish ponds, creation of orchard of areca nut, pineapple, star fruits and etc.

The cooperative has 50 ha orchard with areca nut, star fruit and pineapples, and three fish ponds. The cooperative engages 20 -25 persons during the peak season to maintain the farm in addition to the five (5) regular workers who are engaged every day. The cooperative produces juices of star fruit and pineapple, which are mostly sold in the local market. Occasionally some traders from Shillong and Balat (border haat/ market) place orders for juice. Whatever produced is sold out and the cooperative does not face problems in marketing. The processing unit does not operate regularly and its potentiality is not fully utilized.

The rope way is being used for transportation of fruits, vegetables and other essential commodities from the village to the road side and vice versa. The members manage the rope way on rotation i.e. each member is responsible for one month to manage the rope way. The member has to pay Rs. 2,000 to the cooperative for the month and has to take care of the fuel and other maintenance charges separately. Rs. 40 per trip is charged to transport the material one side. In each trip about 100 kg of produce can be transported. The cooperative is making good profit and the members and other villagers are immensely benefited by the rope way. One has to spend about 4-5 hours to transport 100 kg of produce from the village to the road side (wage labour would charge Rs. 300 to transport the material), which can be done within 5 to 10 minutes with a cost of Rs. 40.

Attachment-3.7.3 Number of Farm Households Engaged in Various Livelihood Activities in Meghalaya between January and December 2014

Unit: Households

Sources of Income	East Khasi Hills (N=50)				West Garo Hills (N=50)				Total No of HH*	% to Total N =100
	<15km	>30km	Total	% of Total to N	<15km	>30km	Total	% of Total to N		
Crop Production	25	25	50	100.0%	18	25	43	86.0%	93	93.0%
Livestock/ Dairy	25	25	50	100.0%	7	18	25	50.0%	75	75.0%
Fishing/ Aquaculture	1	-	1	2.0%	2	-	2	4.0%	3	3.0%
Forest Produces	23	24	47	94.0%	23	20	43	86.0%	90	90.0%
Sericulture	-	-	-	-	-	-	-	-	-	-
Cottage Industry/ Processing	-	-	-	-	-	-	-	-	-	-
Business/ Trading	-	-	-	-	3	-	3	6.0%	3	3.0%
Wage Labourer (Casual Work)	25	25	50	100.0%	25	23	48	96.0%	98	98.0%
Agricultural Labourer	24	25	49	98.0%	3	15	18	36.0%	67	67.0%
Loan	1	-	1	2.0%	2	-	2	4.0%	3	3.0%

**HH: Households*
Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-3.7.4 Source Wise Average Income of Farm Households in Meghalaya between January and December 2014

Unit: Rs.

Source of Income	East Khasi Hills			West Garo Hills			Overall
	<15km	>30km	Total	<15km	>30km	Total	
Crop Production	60,000.0	56,120.0	58,060.0	24,017.2	19,423.3	21,346.3	41,084.9
Livestock/ Dairy	20,080.0	16,720.0	18,400.0	46,700.0	23,602.8	30,070.0	22,290.0
Fishing/ Aquaculture	20,000.0		20,000.0	30,750.0		30,750.0	27,166.7
Forest Produces	16,043.5	14,416.7	15,212.8	115,869.6	24,302.5	73,280.2	42,956.1
Business/ Trading	-	-	-	31,666.7	-	31,666.7	31,666.7
Wage Labourer (Casual Work)	65,680.0	52,280.0	58,980.0	13,251.2	10,047.4	11,716.1	35,830.3
Agricultural Labourer	62,083.3	58,980.0	60,500.0	6,666.7	3,080.0	3,677.8	45,234.3
Loan	70,000.0	-	70,000.0	76,000.0	-	76,000.0	74,000.0
Total Average	223,720.0	197,940.0	210,830.0	163,359.6	66,950.9	115,155.3	162,992.6

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-3.7.5 Item Wise Average Expenditure of Farm Households in Meghalaya between January and December 2014

Unit: Rs.

Expenditure Items	East Khasi Hills			West Garo Hills			Total
	<15km	>30km	Total	<15km	>30km	Total	
Foods	60,320.0	46,480.0	53,400.0	50,208.0	37,120.0	43,664.0	48,532.0
Fuel	18,000.0	12,200.0	15,100.0	-	-	-	15,100.0
Water	-	-	-	-	-	-	-
Electricity	4,472.0	7,568.0	6,020.0	1,595.7	1,019.6	1,295.6	3,706.0
Transportation	21,960.0	19,400.0	20,680.0	4,680.0	2,304.0	3,492.0	12,086.0
Communication	8,504.0	6,448.0	7,476.0	2,953.6	2,086.0	2,519.8	4,997.9
Agriculture Inputs	74,080.0	65,120.0	69,600.0	-	-	-	69,600.0
Education	8,440.0	8,780.0	8,610.0	16,041.7	6,525.0	11,283.3	9,919.4
Health	10,920.0	12,160.0	11,540.0	6,800.0	1,476.8	4,138.4	7,839.2
Clothing	8,020.0	7,460.0	7,740.0	13,581.6	6,200.0	9,890.8	8,815.4
Social Functions	4,960.0	2,940.0	3,950.0	6,087.5	4,100.0	5,073.5	4,506.1
Loan repayment	20,000.0	-	20,000.0	-	-	-	20,000.0
Savings	50,000.0	-	50,000.0	28,415.8	5,236.3	17,062.6	17,721.4
Total Average	222,476.0	188,556.0	205,516.0	129,351.0	65,597.3	97,474.2	151,495.1

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-3.7.6 Number of Households Took Loan for Agriculture Purposes between 2012 and 2014 in Meghalaya

Unit: Responses

Responses	East Khasi Hills (N=50)				West Garo Hills (N=50)				Total
	<15km	>30km	Total	% of Total to N	<15km	>30km	Total	% of Total to N	
Took Loan	14	1	15	30.0%	8	5	13	26.0%	28
Not Taken Loan	10	24	34	68.0%	11	7	18	36.0%	52
Total	24	25	49	98.0%	19	12	31	62.0%	80
No Reponses	1	0	1		6	13	19		20

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-3.7.7 Number of Households Owning Livestock and the Average Number of Livestock Owned by Farm Households in Meghalaya

1) East Khasi Hills district

Livestock	<15km		>30km		Total	
	No of Households	Average No of Livestock	No of Households	Average No of Livestock	No of Households	Average No of Livestock
Cow	23	2.9	15	2.3	38	2.7
Goat	14	2.6	9	3.6	23	3.0
Pig	25	2.8	25	3.1	50	2.9
Buffalo	-	-	-	-	-	-
Poultry	25	43.2	25	52.4	50	47.8
Duck	-	-	-	-	-	-
Other	-	-	-	-	-	-

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

2) West Garo Hills district

Livestock	<15km		>30km		Total	
	No of Households	Average No of Livestock	No of Households	Average No of Livestock	No o Households	Average
Cow	21	3.6	20	2.5	41	3.0
Goat	-	-	2	3.0	2	3.0
Pig	16	1.7	20	1.6	36	1.6
Buffalo	-	-	-	-	-	-
Poultry	17	13.3	25	7.9	42	10.1
Duck	-	-	-	-	-	-
Other	1	2.0	-	-	1	2.0

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

3) Overall

Livestock	Total	
	No of Households	Average
Cow	79	2.9
Goat	25	3.0
Pig	86	2.4
Buffalo	-	-
Poultry	92	30.6
Duck	-	-
Other	1	2.0

Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-4.7.1 Status of Cooperatives in Nagaland as on February 2014

Sl.	Type of Cooperatives	No of Cooperatives	% to Total No of Cooperatives
1	Agriculture and Allied Activities	1,061	15.2%
2	Animal husbandry - Dairy, Poultry, Goatry, Piggery etc.	621	8.9%
3	Fishery	382	5.5%
4	Weaving, Handloom and Handicraft	496	7.1%
5	Marketing and trading cooperatives	83	1.2%
6	Service cooperatives	68	1.0%
7	LAMPS, Mini LAMPS, MPCS	3,844	54.9%
8	Consumer Cooperative Society	165	2.4%
9	Thrift and Credit Cooperative Society	39	0.6%
10	Village Development Board Cooperative Society	98	1.4%
11	Forest Cooperative Society	8	0.1%
12	Others - housing, pharmaceutical, transport, industrial, carpentry, bakery, printing and stationery etc.	125	1.8%
13	State Level Societies - State Cooperative Bank, Cooperative Union, Apex Weaver Federation, State Piggery Federation, State Dairy Federation, Thrift and Credit Federation etc.	7	0.1%
14	District Milk Union	3	0.0%
	Total	**7,000**	**100.0%**

Source: Annual Administrative Report 2013-14, Dept. of Cooperation, Kohima

Attachment-4.7.2 Number of Farm Households Engaged in Various Livelihood Activities in Nagaland between January and December 2014

Unit: Households

Sources of Income	Kohima (N=50)				Tuengsang (N=50)				Total (N=100)	
	<15km	>30km	Total	% to N	<15km	>30km	Total	% to N	No of HH*	% to N
Crop Production	22	25	47	94.0%	25	24	49	98.0%	96	96.0%
Livestock/ Dairy	12	19	31	62.0%	24	24	48	96.0%	79	79.0%
Fishing/ Aquaculture	3	5	8	16.0%	2	5	7	14.0%	15	15.0%
Forest Produces	12	6	18	36.0%	21	16	37	74.0%	55	55.0%
Sericulture	1	1	2	4.0%	2	4	6	12.0%	8	8.0%
Cottage Industry/ Processing	-	1	1	2.0%	-	2	2	4.0%	3	3.0%
Business/ Trading	16	12	28	56.0%	9	20	29	58.0%	57	57.0%
Wage Labourer (Casual Work)	17	9	26	52.0%	16	23	39	78.0%	65	65.0%
Agricultural Labourer	7	7	14	28.0%	5	21	26	52.0%	40	40.0%
Loan	4	3	7	14.0%	7	-	7	14.0%	14	14.0%
Others	3	15	18	36.0%	6	1	7	14.0%	25	25.0%

**HH: Households*

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.

Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-4.7.3 Source Wise Average Income of Farm Households in Nagaland between January and December 2014

Unit: Rs.

Sources of Income	Kohima			Tuengsang			Total
	<15km	>30km	Total	<15km	>30km	Total	
Crop Production	16,489.5	31,668.0	24,563.2	36,172.7	21,387.5	28,931.0	26,792.6
Livestock/ Dairy	22,958.3	17,315.8	19,500.0	15,979.2	19,416.7	17,697.9	18,405.1
Fishing/ Aquaculture	3,166.7	1,300.0	2,000.0	2,150.0	6,500.0	5,257.1	3,520.0
Forest Produces	18,833.3	36,833.3	24,833.3	13,339.0	6,562.5	10,408.6	15,129.5
Sericulture	5,000.0	5,000.0	5,000.0	5,000.0	5,375.0	5,250.0	5,187.5
Cottage Industry/ Processing	-	1,000.0	1,000.0	-	1,500.0	1,500.0	1,333.3
Business/ Trading	20,812.5	26,333.3	23,178.6	20,576.7	10,600.0	13,696.2	18,354.2
Wage Labourer (Casual Work)	32,658.8	16,111.1	26,930.8	9,131.3	6,769.6	7,738.5	15,415.4
Agricultural Labourer	20,428.6	10,285.7	15,357.1	3,460.0	5,795.2	5,346.2	8,850.0
Loan	105,000.0	40,000.0	77,142.9	22,428.6	-	22,428.6	49,785.7
Others	234,000.0	134,661.5	147,906.7	17,750.0	7,000.0	16,214.3	106,004.5
Total Average	111,918.8	150,312.0	131,115.4	87,773.1	65,508.0	76,640.5	103,878.0

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-4.7.4 Item Wise Average Expenditure of Farm Households in Nagaland between January and December 2014

Unit: Rs.

Expenditure Items	Kohima			Tuengsang			Total
	<15 km	>30km	Total	<15 km	>30km	Total	
Foods	33,560.0	29,720.0	31,640.0	40,461.1	29,344.0	34,789.1	33,198.7
Fuel	15,580.0	27,900.0	21,740.0	8,707.4	-	8,707.4	15,390.8
Water	8,000.0	-	8,000.0	170.0	1,000.0	511.8	927.8
Electricity	2,519.6	2,616.5	2,567.0	1,200.0	1,359.2	1,279.6	1,903.4
Transportation	6,000.9	8,890.0	7,376.7	2,356.5	7,043.5	4,700.0	5,977.5
Communication	6,351.8	4,131.3	5,416.8	1,667.3	3,059.1	2,363.2	3,778.3
Agriculture Inputs	200.0	3,350.0	2,300.0	1,551.5	4,500.0	2,370.6	2,352.9
Education	38,075.0	35,638.9	36,921.1	54,015.2	14,173.9	34,094.6	35,373.2
Health	18,061.9	2,409.1	10,053.5	6,010.9	3,875.0	5,017.4	7,535.5
Clothing	12,934.8	11,200.0	12,031.3	4,793.5	8,125.0	6,494.7	9,292.1
Social Functions	7,413.6	6,625.0	7,002.2	2,068.8	4,321.1	3,064.0	5,099.4
Loan repayment	50,200.0	31,540.0	40,870.0	5,757.1	-	5,757.1	26,411.8
Savings	11,450.0	26,250.0	18,850.0	25,300.0	-	25,300.0	22,433.3
Others	-			10,000.0	-	-	10,000.0
Total Average	130,260.4	105,496.0	117,878.2	121,062.3	68,279.2	94,670.7	106,274.5

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-4.7.5 Group Membership among Farm Households in Nagaland

Unit: Responses

Type of Groups/ Organisations	Kohima N=50				Tuengsang N=50			
	<15km	>30km	Total	% to N	<15km	>30km	Total	% to N
Agriculture/ Farming	8	1	9	18.0%	1	0	1	2.0%
Horticulture	1	1	2	4.0%	0	0	0	0.0%
Livestock/ Dairy	0	0	0	0.0%	0	1	1	2.0%
Sericulture	1	0	1	2.0%	0	0	0	0.0%
SHG	1	7	8	16.0%	16	24	40	80.0%
Total No of Responses	11	9	20	40.0%	17	25	42	84.0%

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-4.7.6 Accessibility to Loan for Agriculture Purposes in Nagaland

1) Sources of Loan in Nagaland

Unit: Responses

Sources of Loan	Kohima			Tuengsang			
	<15km	>30km	Total	<15km	>30km	Total	Overall
Bank (Government)	-	1	1	-	-	-	1
Bank (Private)	-	-	-	-	-	-	
Cooperatives	2	3	5	-	-	-	5
SHG	-	1	1	12	3	15	16
NGO/ MFI	-	-	-	-	-	-	-
Money Lender/ Trader	-	-	-	-	1	1	1
Relative/ Friend	1	-	1	-	-	-	1
Others	-	-	-	1	1	2	2
Total	3	5	8	13	5	18	26

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

2) Average Amount of Loan Taken from Various Sources

Unit: Rs.

Sources	Kohima			Tuengsang			
	<15km	>30km	Average	<15km	>30km	Average	Average
Bank (Government)	-	45,000.0	45,000.0	-	-	-	45,000.0
Bank (Private)	-	-	-	-	-	-	-
Cooperatives	73,333.3	43,333.3	58,333.3	-	-	-	58,333.3
SHG	-	30,000.0	30,000.0	18,333.3	3,333.3	15,333.3	16,250.0
NGO/ MFI	-	-	-	-	-	-	-
Money Lender/ Trader	-	-	-	-	-	-	-
Relative/ Friend	2,000.0	-	2,000.0	-	-	-	2,000.0
Others	-	-	-	5,500.0	-	5,500.0	5,500.0

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

3) Reasons for Not Taking Loan

Unit: Responses

Responses	Kohima			Tuengsang			
	<15km	>30km	Total	<15km	>30km	Total	Total
Distance to the financial institutions (physical access) is too far away	-	4	4	3	1	4	8
Procedures for applying loans are complicated	3	12	15	9	17	26	41
Loan condition is severe.	4	10	14	5	18	23	37
Not aware of the available loan schemes and the application procedure	6	5	11	5	10	15	26
Do not have collateral	1	-	1	1	-	1	2

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-4.7.7 Number of Households Owning Livestock and the Average Number of Livestock Owned by Farm Households in Nagaland

1) Kohima district

Livestock	<15km		>30km		Total	
	No of Households	Average No of Livestock	No of Households	Average No of Livestock	No of Households	Average No of Livestock
Cow	4	3.8	5	5.2	9	4.6
Goat	2	2.0	1	10.0	3	4.7
Pig	23	1.9	20	2.1	43	2.0
Buffalo	1	2.0			1	2.0
Poultry	10	6.8	20	15.2	30	12.4
Duck	6	3.2	3	5.3	9	3.9
Other	8	2.4	2	1.5	10	2.2

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

2) Tuengsang district

Livestock	<15km		>30km		Total	
	No of Households	Average No of Livestock	No of Households	Average No of Livestock	No of Households	Average No of Livestock
Cow	4	3.8	5	5.2	9	4.6
Goat	2	2.0	1	10.0	3	4.7
Pig	23	1.9	20	2.1	43	2.0
Buffalo	1	2.0			1	2.0
Poultry	10	6.8	20	15.2	30	12.4
Duck	6	3.2	3	5.3	9	3.9
Other*	8	2.4	2	1.5	10	2.2

**Other livestock includes the indigenous semi-wild livestock, Mithun. Its meat is eaten at ceremonial occasions in Nagaland.*
Source: Farm Household Survey, JICA Survey Team (2015)

3) Overall

Livestock	Total	
	No of Households	Average No of Livestock
Cow	21	3.0
Goat	16	2.2
Pig	90	1.8
Buffalo	4	1.8
Poultry	71	11.5
Duck	11	3.4
Other	16	1.9

Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-4.8.1 Project Area and Target Groups of Nagaland Empowerment of People through Economic Development (NEPED)

Phases	Year	Districts	Villages covered	Project Management	Activities
1	1995 to 2000	8	854	Project Operation Unit (POU) at the state level and District Support Units (DSU) at the district level At the village level NEPED Committee under the Village Council	➢ Sustainable management of Jhum land through farmer led development and demonstration of agro-forestry systems. Major emphasis was given on tree plantations on the Jhum land – 1794 test plots in 854 villages covering 5,500 ha land. The total project cost was around Rs. 128.6 million. ➢ This project was supported by India-Canada Environment Facility.
2	2001 to 2005	9	105	POU and DSUs At the village level Village Development Boards, Village Councils and SHGs	➢ Introduction of micro credit system in 105 villages through Village Development Boards and SHGs. Rs. 82.6 million from the total project cost of Rs. 128.5 million was given as revolving fund to the target villages. Capacity building of VDBs was done to manage the revolving fund. Each VDB decided the modalities and rate of interest for disbursement of loans to the farmers and the rate of interest was between 6-8% per annum. According to NEPED almost 40 per cent of the target villages are currently managing the revolving fund without any external support. ➢ This project was supported by India-Canada Environment Facility.
3	2006 to 2013	11	63	POU and DSUs and village committees	➢ Increase of jhum cycle by providing alternative livelihood through horticulture, livestock and other small income generation activities. This project basically integrated the lessons learnt from NEPED I and II. ➢ This project was supported under Watershed Development Project in Shifting Cultivation Areas by the Ministry of Agriculture and Cooperation, Government of India. About 17,000 ha area was treated under the project. The Project cost was around Rs. 165 million including price escalation.
4	2012to 2014	1			➢ Piloting of piggery development as part of Tata-ILRI[1] project on Enhancing Livelihood through Livestock Knowledge system – improvement of breed, demonstration of proper shed, extension services etc.

Source: JICA Survey Team (2015)

[1] ILRI: International Livestock Research Institute. A member institute of CGIAR.

Attachment-4.8.2 List of Selected Civil Society Organisations and their Livelihood Initiatives in Nagaland

Sl.	Organisation/ Agency/ Project	Project Area and Target	Activities
1.	Nagaland Bee and Honey Mission (NBHM), Kohima, Nagaland – Project supported by Sir Ratan Tata Trust (SRTT)	Tizu Watershed Region of Tuengsang, Zunheboto and Kiphire districts – 1350 households in 30 villages	Promotion of modern beekeeping for sustainable livelihood through ➢ Awareness and motivational programme ➢ Establishment of modern apiaries of *Apis cerana* ➢ Setting up of nucleus stock multiplication centres ➢ Beekeepers training and skill building ➢ Participatory monitoring and harvesting of *Apis dorsata* hives.
2.	International Livestock Research Institute (ILRI), New Delhi – Project supported by Sir Ratan Tata Trust (SRTT)	Nagaland state	➢ Conducting a study to assess the hazards to human health associated with pig production in Nagaland and sharing the findings with the state government for mitigating the risks of disease.
3.	Entrepreneurs Associate (EA), Kohima, Nagaland - Project supported by Sir Ratan Tata Trust (SRTT)	Kohima – 200 families and 700 ha of Jhum area	➢ Community-led mithun rearing for livelihood and conserving forests – Project activities include ➢ Conservation and protection of forests though erecting weather-beaten permanent fencing ➢ Construction of ponds and sheds ➢ Credit packet to purchase mithuns ➢ Ensuring community participation and engagement through workshops meetings and capacity building.
4.	Eleutheros Christian Society (ECS), Tuengsang, Nagaland – Project supported by SRTT and NABARD	Tuengsang – 10 villages and 600 households	➢ Promoting sustainable livelihoods through wadi and establishing market linkages – promotion of orange and banana cultivation in the jhum areas, promotion of vegetables and establishing market linkages
5.	North East Initiative Development Agency (NEIDA) – promoted by Navajbai Ratan Tata Trust and Sir Ratan Tata Trust	Nagaland, Mizoram, Arunachal Pradesh, Assam	➢ North East Initiative by the Tata Trusts started in 2008 to address rural livelihood issues. In 2012 NEIDA was registered as a society and currently partners with Government and Civil Society Organisation to demonstrate innovative livelihood projects.

Source: JICA Survey Team (2015)

Attachment-5.7.1 Number of Farm Households Engaged in Various Livelihood Activities in Tripura between January and December 2014

Unit: Households

Source of Income	North Tripura (N=50)				West Tripura (N=50)				Total (N=100)	
	<15 km	>30 km	Total	% to N	<15 km	>30 km	Total	% to N	No of Households	% to N
Crop Production	18	4	22	44.0%	25	25	50	100.0%	72	72.0%
Livestock/ Dairy	6	4	10	20.0%	17	22	39	78.0%	49	49.0%
Fishing/ Aquaculture	8	2	10	20.0%	7	1	8	16.0%	18	18.0%
Forest Produces	12	11	23	46.0%	10	14	24	48.0%	47	47.0%
Sericulture	-	-	-	-	-	-	-	-	-	-
Cottage Industry/ Processing	-	-	-	-	-	-	-	-	-	-
Business/ Trading	12	8	20	40.0%	8	2	10	20.0%	30	30.0%
Wage Labourer (Casual Work)	15	20	35	70.0%	16	20	36	72.0%	71	71.0%
Agricultural Labourer	3	4	7	14.0%	-	-	-	-	7	7.0%
Loan	-	-	-	-	-	6	6	12.0%	6	6.0%
Others	-	-	-	-	-	-	-	-	-	-
Total Average	-	-	-	-	-	-	-	-	-	-

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-5.7.2 Source Wise Average Income of Farm Households in Tripura between January and December 2014

Unit: Rs.

Income Sources	North Tripura			West Tripura			Total
	<15 km	30 km <	Total	<15 km	30 km <	Total	
Crop Production	20,911.1	9,775.0	18,886.4	84,752.0	66,840.0	75,796.0	58,406.9
Livestock/ Dairy	10,550.0	8,150.0	9,590.0	7,647.1	8,363.6	8,051.3	8,365.3
Fishing/ Aquaculture	7,837.5	10,000.0	8,270.0	9,042.9	6,000.0	8,662.5	8,444.4
Forest Produces	7,650.0	5,000.0	6,382.6	3,300.0	2,000.0	2,541.7	4,421.3
Sericulture	-	-	-	-	-	-	-
Cottage Industry/ Processing	-	-	-	-	-	-	-
Business/ Trading	32,666.7	26,250.0	30,100.0	28,500.0	45,000.0	31,800.0	30,666.7
Wage Labourer (Casual Work)	39,666.7	33,750.0	36,285.7	24,000.0	23,300.0	23,611.1	29,859.2
Agricultural Labourer	24,000.0	16,625.0	19,785.7	-	-	-	19,785.7
Loan	-	-	-	-	10,000.0	10,000.0	10,000.0
Total Average	66,128.0	43,928.0	55,028.0	118,284.0	100,200.0	109,242.0	82,135.0

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-5.7.3 Item Wise Average Expenditure of Farm Households in Tripura between January and December 2014

Unit: Rs.

Expenditure Item	North Tripura			West Tripura			Total
	<15 km	30 km <	Total	<15 km	30 km <	Total	
Foods	35,120.0	24,916.0	30,018.0	47,984.0	46,240.0	47,112.0	38,565.0
Fuel	1,136.4	1,231.2	1,183.8	4,108.0	3,900.0	4,004.0	2,593.9
Water	360.0	-	360.0	-	-	-	360.0
Electricity	2,123.5	1,992.3	2,076.1	1,724.0	2,684.0	2,204.0	2,150.5
Transpiration	3,224.0	1,641.7	2,449.0	6,200.0	5,420.0	5,810.0	4,146.5
Communication	1,548.6	1,020.9	1,278.6	3,761.9	4,200.0	4,000.0	2,685.2
Agriculture Inputs	4,226.7	1,273.5	2,657.8	8,800.0	5,409.1	7,212.8	5,367.7
Education	5,753.8	2,578.6	4,107.4	3,461.5	4,300.0	3,694.4	3,942.2
Health	4,180.0	2,552.0	3,366.0	2,260.0	1,904.0	2,082.0	2,724.0
Clothing	4,324.0	2,724.0	3,524.0	5,440.0	4,800.0	5,120.0	4,322.0
Social Functions	3,176.0	1,824.0	2,500.0	9,196.0	4,480.0	6,838.0	4,669.0
Loan repayment	-	-	-	8,000.0	8,000.0	8,000.0	8,000.0
Savings	3,830.8	5,600.0	4,066.7	28,900.0	13,250.0	21,944.4	16,686.3
Others	2,436.8	2,806.7	2,600.0	-	-	-	2,600.0
Total Average	63,873.2	41,199.6	52,536.4	114,112.0	89,328.0	101,720.0	77,128.2

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-5.7.4 Household Assets Owned by Farm Households in Tripura

1) North Tripura district

Household Assets	<15km		>30km		Total	
	No of Households	Average No of Asset	No of Households	Average No of Asset	No of Households	Average No of Asset
TV	15	1.0	5	1.0	20	1.0
Mobile Phone	21	1.3	22	1.2	43	1.3
Pump	1	1.0			1	1.0
Sprayer	6	1.2	3	1.0	9	1.0
Bicycle	9	1.1	13	1.2	22	1.1

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

2) West Tripura district

Household Assets	<15km		>30km		Total	
	No of Households	Average No of Asset	No of Households	Average No of Asset	No of Households	Average No of Asset
TV	25	1.0	25	1.0	50	1.0
Mobile Phone	25	2.0	25	2.0	50	2.0
Pump	8	1.0	11	1.0	19	1.0
Sprayer	21	2.2	25	2.0	46	2.1
Bicycle	25	1.0	24	1.0	49	1.0

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

3) Overall

Household Assets	Overall	
	No of Households	Average No of Asset
TV	70	1.0
Mobile Phone	93	1.7
Pump	20	1.0
Sprayer	55	1.9
Bicycle	71	1.1

Source: Farm Household Survey, JICA Survey Team (2015)

Attachment-5.7.5 Number of Households Owning Livestock and the Average Number of Livestock Owned by Farm Households in Tripura

1) North Tripura district

Livestock	<15km		>30km		Total	
	No of Households	Average No of Livestock	No of Households	Average No of Livestock	No of Households	Average No of Livestock
Cow	22	3.0	19	2.8	41	2.9
Goat	7	2.4	10	1.9	17	2.1
Pig	-	-	-	-	-	-
Buffalo	3	1.3	-	-	3	1.3
Poultry	8	2.8	11	6.3	19	4.8
Duck	5	5.4	1	4.0	6	5.2

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

2) West Tripura district

Livestock	<15km		>30km		Total	
	No of Households	Average No of Livestock	No of Households	Average No of Livestock	No of Households	Average No of Livestock
Cow	25	2.9	24	2.4	49	2.7
Goat	19	5.2	21	4.5	40	4.8
Pig	15	1.0	14	1.5	29	1.2
Buffalo	-	-	-	-	-	-
Poultry	-	-	-	-	-	-
Duck	-	-	-	-	-	-

Remarks: <15km, >30km indicates the distance of the surveyed areas from the district centre.
Source: Farm Household Survey, JICA Survey Team (2015)

3) Overall

Livestock	Total	
	No of Households	Average No of Livestock
Cow	90	2.8
Goat	57	4.0
Pig	29	1.2
Buffalo	3	1.3
Poultry	19	4.8
Duck	6	5.2

Source: Farm Household Survey, JICA Survey Team (2015)

Development of Topo-sequential Integrated Farming System

(1) Topo-sequential Land Use Plan

The north eastern region (NER) of India is rich in natural resources; meanwhile there are several restraining factors like as difficult terrain and remoteness. Especially, the traditional shifting (*Jhum*) cultivation predominantly practiced in the NER is a pressing issue to be improved from the view points of forest conservation and management and enhancement of crop productivity. Taking into account such characteristics of the NER, the Indian Council of Agricultural Research (ICAR) has researched and developed the topo-sequential integrated farming system.

Table A.6.4.1(1) Topo-sequential Land Use Plan

Land Slope	Suitable Land Use	Farm Product
Very steep slope (Class-C) over 100%	Forest.	- Forest products
Steep slope (Class-B2) between 51%-100% Soil depth of more than 1.75 m	Pasture and fodder.	- Forage
Steep slope (Class-B1) between 51%-100% Soil depth of less than 1.75 m	Orchards, cash crops, plantation crops etc.	- Cash crops (Areca nut, bloom grass, etc.)
Moderate slope (Class-A2) between 6%-50%	Cultivation with special conservation measures	- Fruits (Orange, banana, guava, jack fruit, cashew nut, etc.) - Cash crops (Pineapple, turmeric, ginger, etc.) - Cereals (Rice, maize, millets, pulses, etc.) - Vegetables (Potato, taro, cabbage, cauliflower, beans, etc.) - Fishes (Carp, etc.) - Livestock (Cattle, pigs, goats, buffalos, hens, ducks, etc.) - Flowers (Orchid, marry gold, chrysanthemum, gladiolus, gerbera, etc.) - Honey, etc.
Gentle slope or flat (Class-A1) between 0%-5%	Cultivation without special soil conservation measures.	

Source: Prepared by JICA Survey Team based on Steps Towards Modernization of Agriculture in NEH Region, ICAR,

(2) Soil and Water Conservation Measures

The watershed based farming system should be coupled with mechanical soil conservation measure; contour trenches, contour bunds, bench terraces, half moon terraces, grass water way and so on to retain maximum rainwater within the slope, safely disposing the excess runoff to the foot hills with non-erosive velocity.

Table A.6.4.1 (2) Soil and Water Conservation Measures

Conservation Measure	Description
Check Dams	Harnessing springs or hill streams by constructing storage cambers or check dams on the bed of stream for diversion and conveyance of water through earthen channel or pipes to bench terraces..
Water Harvesting Ponds (cum silt retention ponds)	Small water harvesting ponds to be constructed at upper portion to collect rain water runoff from the catchment of protected hill tops of above 100% slopes and/or at foot hill to harvest rain water runoff from the micro watershed. The size of ponds depends on extent of farmlands and soil condition, for example, (L)10m x (W)5m x (D)1.5m for 0.4ha (or 1 Ac).

	The ponds also function as silt retention ponds.
Contour Trenches	These are trenches excavated along the contours to break the slope length for reducing the velocity of surface run-off, the water retained in the trenches help in conserving the moisture. The size of trenches depends upon the soil depth available and its cross section may vary from 100 cm2 to 2,500 cm2 and are designed according to the rainfall to be retained per unit area.
Contour Bunds	These are small embankments or bunds constructed across the slope to decrease the slope length, which reduces soil erosion and diverts the excess runoff to the designed outlet. The eroded soil is retained within the bund interspaces, which get leveled up in the course of 4 to 8 years to form bench terrace. These bunds on steep slopes are created by way of excavated parabolic channels (0.30m top and 0.2m deep) on contours and keeping the dugout soil in the form of a bund at the lower edge of channel. The vertical interval of these bunds may vary from 0.5m to 5m depending on the land use and soil depth.
Bench Terraces (wet terracing with water)	Bench terraces are series of flat beds constructed across the hill slope separated at regular intervals in a step like formation. Manual labour as well as bulldozer can be engaged to form bench terraces. Bench terraces with inward slopes are adopted in the high rainfall areas. The alignment of bench terraces on slope should be made to obtain convenient width making deviations wherever necessary for depressions; sharp turns field boundaries and so forth. However, the loss of surface area due to bench leveling under bunds, risers' outlets is by far the largest loss in terracing. Such measures are normally adopted where soil depth is more than 1.0m. Terracing of the entire hill slope is not necessary since trees and horticultural crops can be raised without terraces. Only the lower portion of the hills needs to be terraced for agricultural crops. The terrace risers, which constitute 30 %to 40%of total area, can be utilized for growing perennial fodder grasses and legumes, which not only help in conservation but also provides enough fodder.
Half Moon Terraces	Where complete terracing is not desired of feasible, productive multiple use of step slopes is possible by planting trees on half moon terraces. These are circular beds having 1m to 1.5m diameters, cut into half moon shape on the hill slope. These beds are used mainly for fruit trees like guava, citrus etc. in horticultural land uses.
Vegetative Bunds	Barrier hedges substantially reduce runoff and increases infiltration. Some of runoff may cross the barrier, whilst the entrained soil will be partly filtered out and deposited. Pineapple plantation has been successfully used as vegetative bunds in hills.
Grassed Waterway	There are trapezoidal or parabolic channels planted with suitable close growing grasses constructed along the slope preferably on natural drainage line to act as outlet for the terrace system. These channels along silting basins serve the purpose of energy dissipation of flowing runoff water.

Source: Prepared by JICA Survey Team based on Steps Towards Modernization of Agriculture in NEH Region, ICAR

(3) General Planning and Design of Small Ponds

Small ponds can be used in large scale for water storage in the northeastern region. Construction of these structures involves mainly manual labour input and use of locally available materials; earth and stones etc. Experience on water harvesting in dugout-cum-embankment type of pond clearly indicate the feasibility of harvesting runoff from hilly watersheds for beneficial use. The soil in the area has very low water holding capacity and the seepage losses are very high. Thus water storage may be seasonal or perennial depending on the site condition. Partial employing of the farm ponds is possible to irrigate crops during dry spells. Stored water however, have more scope for fish production. Limited water available for irrigating winter crops should be used at the earliest opportunity to reduce seepage and evaporation losses. Relatively expensive such structures, however, defy standardization and normally built in the area. Some of the general features are as follows:

Table A.6.4.1 (3) General Planning and Design of Small Ponds

SN.	Description
(1)	Adequate storage capacity with least amount of earth fill; availability of fill materials near the site; adequate scope for outlet for safe disposal of surplus water; relatively impermeable strata under the embankment and the water surface; at least 2.5 m to 3.0 m water depth over 15-20% of submergence area at normal level; these are the most important considerations for sustainability of sites.
(2)	In general, the embankments up to 15 m high with average soil the upstream slope of 3:1 and the downstream slope of 2:1would be satisfactory. The upstream slope should be protected by a cover of hand placed rip rap of suitable stones. The downstream slope may be sodded with thick layer of grass to protect it from erosion.
(3)	To effectively seal all percolations under the earth embankment, an impervious cut-off wall (cement concrete 1:3:6) extending from the surface to the impervious (rock) layer is essential along the central axis of the embankment. The stone masonry corewall, built on the cut-off wall, provides a perfect barrier to the seepage water passing from the upstream side to the downstream of the embankment.
(4)	Removing loose and potentially unstable materials from the foundation, thorough compaction of all embankment zones, impervious core and cut-off walls adequate drainage provisions, all the measures would check the seepage from the water harvesting structures effectively.
(5)	As per the experience, generous allowance of 10% of the designed height is essential to be added to the embankment top to neutralize the settlement. To prevent sagging of the embankment top, maximum fill should be on the natural stream with crown sloping at either.

Source: Prepared by JICA Survey Team based on Steps Towards Modernization of Agriculture in NEH Region, ICAR

Attachment-6.4.2 Problems and Countermeasures in Marketing and Processing

Sector	Problem to be solved	Countermeasure	Descriptions
Market and distribution	(1) Producer No bargaining power due to small sales unit by a producer. Producers cannot increase profit from sales. Difficult access to market information. Difficult access to market.	✧ Promotion of aggregation and shipping system among producers. ✧ Fostering producers who have basic business skill and manage their farming based on market needs. ✧ Extension of production technology to meet market needs. ➢ Strengthening extension system of market information ➢ Extension of road network and strengthening maintenance of roads.	Producers have low mindset to collective activities in general. In Nagaland, villagers are cohesive in a village. Most of producers could not answer the cost of a product. Number of qualified producers who can manage agri-business including marketing shall be increased through provision of training for basic skill of business management starting book keeping IBDLP training program in Meghalaya is expected as a model training program for this field. Production technology that can increase profit by meeting market needs shall be extended through the projects concerning agricultural production and/or livelihood improvement. Dept. of Agriculture and Cooperation is promoting the new extension system through MSM by mobile phone. Meghalaya and Tripura states have just started it already and Nagaland has not introduced it yet.
	(2) Market system Weak management and organizing ability to markets by the State Agricultural Market Board (SAMB). New issues of Model Market Act such as direct sales market by producers to consumers and contracted farming have not been promoted well yet. Poor market facilities.	➢ Strengthening management ability SAMB. ✧ Promotion of direct sales markets and contracted farming. ✧ Improvement market facilities	Improvement of unorganized market system is priority subject. APMB is under DoA now, and may be required to have more rights and responsibilities through reorganization. Rural markets are managed by traditional local authorities who receive profit like market levies and APMB is difficult to control them well. For city markets which are managed by city authorities, a model project may be possible to modernize a facility and improve management system of a market. At near Shillong in Meghalaya, there is Mawiong market directly managed by SAMB to provide the place where producers can sell their products to wholesalers directly. They are operating it for four items of products now. The project for strengthening and expanding their function can be applicable. The project components can be considered as (i) modernization and expansion of facilities, (ii) improvement of management system, (iii) increase items of products and (iv) strengthening supply chain of products through promotion of collective shipment by producers among production clusters. Provisions of New Market Act have not been adapted to State Market Act yet in Meghalaya. It is desired that that direct sales market and contracted farming as well as collective shipment will be considered as components of the projects concerning agricultural production and/or livelihood improvement. SAPMB has low ability of management and budget then improvement of market facility of rural markets has not progress well. It is noted that many people said the needs of storages including cold storage attaching to markets but it cannot be used as planned without qualified staff for proper management of it. Such results can be seen here and there.

Sector	Problem to be solved	Countermeasure	Descriptions
Market and distribution	(3) Export No visible increase of export of agricultural products	➢ Improvement of export circumstance ➢ Extension of quality control technology needed for export. ➢ Establishment of inspection and certification institute in NER	As official export to Bangladesh is discouraged by the high import tax in Bangladesh, more diplomatic efforts is necessary for improvement toward free trade condition. Since some requirements of export license for agricultural products that were regulated to meet the condition in mainland of India cannot match the local condition in NER and make various disadvantages to local exporters. Such condition shall be improved to suitable condition to NER. In Tripura located in very far distant place from mainland of India, they are eager to free accessing condition to Bangladesh. If it would be true, accessibility to mainland of India and international market could be improved drastically. Extension of quality control technology is essential to meet the requirement of markets in developed countries. As It takes long time to get quality certification on export products from far distant institutions in big cities in mainland of India and it is one of the big constraints for exporter in NER. Then such inspection and certification institute which can provide quality certification suited to requirements by import countries shall be established in NER.
Post-harvest Processing	Low mindset for improvement of post-harvest processing among producers.	✧ Extension of post-harvest processing technology to meet market demand. ✧ Support to improved post-harvest processing activities attaching to collective shipping activity.	In the program, the technologies that can give profit to producers shall be extended. As the producers who can manage their business can improve and manage their post-harvest processing by themselves, such qualified producers shall be fostered in the program. Necessary post-harvest processing activities such as cleaning, grading, packaging and storage of products will be introduced to ensure income increase through collective shipping of the products among producers.
Agro-processing (Adding value)	Less number of people who has basic business skill. Difficulty for micro and small enterprises to expand their business capacity. Difficulty for purchasing raw materials in quantity and quality. Business circumstance inhibits investment. Poor industrial infrastructure.	✧ Improvement and strengthening entrepreneurship training program. ➢ Provision of adequate loan program. ➢ Provision of match making service between processors and producers. ➢ Improvement of lows, regulations and traditional practices. ➢ Extension of road network and strengthening maintenance of roads. ➢ Provide stable utility condition.	As only 1-2% of people trained by the existing training programs are qualified entrepreneurs who can manage business, according to estimation by officers in charge, the entrepreneurship program shall be improved and strengthened. IBDLP training program in Meghalaya is expected as a model training program for this field. It is the critical bottleneck for development of agro-processing industries that entrepreneurs cannot access effective loan program from banks to start and expand their business, especially difficult for working capital. Match making function based on the needs of processors will be established among industry department and departments in charge of production, and promote and make a win-win condition between producers and processors. In Tripura, small and medium enterprises facing such difficulties exist already. In Nagaland, there are constraints like that land is not available to the collateral for borrowing from banks and informal taxes are levied during transportation. Such lows, regulations and traditional practices that inhibit investment to the sector shall be improved. Stable supply of water and electricity is basic requirement of agro-processing industry, especially in industrial areas and zones. Stable supply of electricity has not been available in industrial areas in Nagaland.

✧ : Measures can be considered as components of JICA assistant projects.