SCOPING ANALYSIS ON LIVELIHOOD GENERATION FOR RECOVERY

- with Special Emphasis on the Agricultural Sector

Under Government of India – UNDP Project for 'Enhancing Institutional & Community Resilience to Disaster and Climate Change'

Assam State Disaster Management Authority
Government of Assam

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Preface

This is to record our sincere thanks to the Assam State Disaster Management Authority (ASDMA) for appreciating the need for preparing a document on 'Scoping Analysis on Livelihood Generation for Recovery - with Special Emphasis on the Agricultural Sector' and for reposing their confidence upon Rashtriya Gramin Vikas Nidhi (RGVN) in bringing out the above document.

We would like to express our sincere gratitude to Shri. P. K. Tiwari, IAS, Chief Executive Officer, ASDMA for providing his invaluable suggestions and guidance to the RGVN team in connection with the above assignment.

We are very thankful to Smti. N. Hazarika, ACS, State Project Officer, GOI-UNDP Programme; Smti. R. Sharma, Administrative Officer; Shri. M.R. Deka, Project Manager and other officers and staff members of ASDMA for extending their wholehearted cooperation and support in the performance of the above assignment, facilitating and providing all support to the RGVN team and patiently replying to all their queries.

We must thank the District Administration of the visited districts (Jorhat, Morigaon, Dhemaji and Barpeta) who extended their sincere cooperation and assistance to the RGVN team during the field work in connection with the performance of the above assignment.

A special word of gratitude goes to the following District Project Officers of ASDMA in the above districts and all their supporting personnel, who readily assisted the RGVN team during the district visits by making all arrangements for the District Stakeholders' Meetings and Community Consultations in the villages:

Smti. Minakshi Das, DPO, Morigaon
Shri. Lohit Gogoi, DPO, Dhemaji
Shri. Pran Krishna Gogoi, DPO, Jorhat
Shri. Jayanta Dutta, DPO, Barpeta

We also heartily acknowledge the fruitful participation of all district level officers of connected Line Departments and of NGO representatives during the District Stakeholders' Meetings held in the above districts. A big word of thanks must go to all community members of the contacted villages who are too numerous to be individually acknowledged here and who provided their valuable inputs - despite their busy schedule in the on-going farming operations and in household and other works.

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Acronyms

AACP	Assam Agricultural Competitiveness Project
ASDMA	Assam State Disaster Management Authority
ASRLMS	Assam State Rural Livelihood Mission Society
GOI	Government of India
HYV	High Yielding Variety
kg	kilogramme
km	kilometre
LLP	Low Lift Pump
MFI	Microfinance institution
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MIDH	Mission for Integrated Development of Horticulture
MT	Metric Tonne
NDRF	National Disaster Response Fund
NGO	Non Government Organization
NRLM	National Rural Livelihood Mission
OBC	Other Backward Class
RBA	*Rashtriya Barh Ayog*
RGVN	Rashtriya Gramin Vikas Nidhi
Rs	Indian Rupee
RSETI	Rural Self-Employment Training Institute
RTI	Right to Information (Act)
SC	Scheduled Caste
SDRF	State Disaster Response Fund
SHG	Self Help Group
SRI	System of Rice Intensification
ST	Scheduled Tribe
STW	Shallow Tube Well
UNDP	United Nations Development Programme

Local Terms Used

***ahu* paddy**	pre-autumn upland variety of paddy
***bao* paddy**	semi-deep and deep water variety of paddy
beel	wetland
bigha	unit of measure for area, being equal to 14,400 square feet [1 *bigha* = 1338 square meters = 0.134 hectare]
***boro* paddy**	crop cultivated with irrigation or in low lying land from November-December onward and harvested before the onset of monsoons
chari ali	a meeting of four (chari) roads (ali)
early *ahu* paddy	paddy crop sown in mid-February and harvested during the onset of rains
gamocha	Assamese towel
gaon	village
kharif	crop season corresponding to the monsoon period (June-September)
lakh	one hundred thousand
maund	a measure of weight (roughly 40 kg)
Panchayat	a body for rural governance at the village and higher levels
rabi	crop season covering the post-monsoon period (October onward)
winter (*sali*) paddy	rain-fed crop cultivated during the rainy season and harvested in the winter months of November and December.

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Executive Summary

1. Background

The Assam State Disaster Management Authority (ASDMA) has been working towards disaster preparedness, prevention, mitigation and response activities in the state of Assam. ASDMA has been undertaking projects and other initiatives under its scope of activities. An effort in the above direction has been the implementation of a project titled 'Enhancing Institutional & Community Resilience to Disaster and Climate Change' under Government of India (GOI) and United Nations Development Programme (UNDP). Under the component 'Knowledge Management' of the above mentioned project, a study was undertaken on the 'Scoping Analysis on Livelihood Generation for Recovery with special emphasis on the Agricultural Sector'.

The present report is based on the aforesaid study carried out in Assam by Rashtriya Gramin Vikas Nidhi (RGVN) of Guwahati and the report has been prepared based on an analysis of secondary data (available literature and documents) and primary data collected from the field in sampled areas of the state and from stakeholder discussions held in the district headquarters of these areas.

2. Existing Livelihoods in Flood Affected Areas

Chambers & Conway had defined in 1991 that 'A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base'. The sustainable livelihoods framework views livelihoods as systems and provides a way to understand the following aspects:

- Livelihood Assets - the assets people draw upon;
- Livelihood Contexts - the context within which a livelihood is developed; and
- Livelihood Strategies - the strategies they develop to make a living ;
- Livelihood Vulnerabilities - the factors that make a livelihood more or less vulnerable to shocks and stresses

The existing livelihood strategies of communities living in the flood affected areas of Assam can be clubbed under the following heads:

- Traditional Livelihoods; and
- Emerging Livelihoods.

Traditional Livelihoods: As per the village level discussions and district level stakeholder meetings, it is seen that farming has traditionally been the pre-dominant livelihood option followed in the flood affected areas of the visited districts. Other traditional livelihood options include fishing on commercial or subsistence basis in local rivers and other water bodies; rearing of livestock (pigs, cattle, poultry etc.) and sale of animals, animal products (eggs or milk), meat etc.; collection of firewood, driftwood and other timber or non timber forest produce for self use

or for exchange; handlooms for weaving of traditional clothes, *gamochas* (Assamese towels) etc.; and wage labour – especially in areas where immigrant communities are predominant and land holdings are small or non-existent for many households;

It may be noted that individuals and households combine one or more of the available livelihood options in their livelihood strategies. These are being shaped by the existing livelihood assets and contexts as indicated in detail in this section, which has been given under Table ES.1 ['Effect of Livelihood Assets & Contexts on Livelihood Strategies'] in the next few pages.

Emerging Livelihoods: The occurrence of changes in the prevailing economic, political, social, environmental, cultural and other conditions have enabled the emergence of new livelihood options in the rural areas of Assam. Alternatively, these changes have pushed households and communities to consider alternatives to their existing traditional livelihoods, which are being rendered less viable with the passage of time. Some of these emerging livelihoods are listed in this section and may be seen therein.

Vulnerability of Livelihoods: The access of the people to various livelihood assets (such as natural resources, technologies, their skills, knowledge and capacity, their health, access to education, sources of credit, or their networks of social support etc.) is strongly influenced by their vulnerability context. This takes account of various hazards like:

- Trends (like economic, political, and technological trends),
- Shocks (such as epidemics, natural disasters, civil strife) and
- Seasonality (in matters like prices, production, and employment opportunities).

It is seen that the existing livelihoods are highly vulnerable as analysed at Table ES.2, which is available at Pages I & J of the Executive Summary.

Table ES.1 – Effect of Livelihood Assets & Contexts on Livelihood Strategies
[Reproduced from Table 2.1 of Section 2]

Livelihood Asset / Context	Meaning	Examples obtained from the Field Visits
LIVELIHOOD ASSETS		
Human capital	Knowledge, Skills, health, ability to work etc.	**Skills:** Various livelihood skills are usually acquired under various settings – formal & informal. In most flood affected areas, informal means for skills development is the traditional norm. Recently, the Government has been active in promoting formal skills development programmes. In Jorhat district, the Rural Self-Employment Training Institute (RSETI) was visited. The Director informed that skills development programmes were popular amongst the trainees from flood affected areas like Majuli. The popular skills were livestock (piggery and goat rearing), beauty parlour, dress design and embroidery, driving etc. These programmes may help the trainees to find work or get self-employed. **Knowledge:** The communities had accumulated a knowledge base over generations that helped them in choosing appropriate livelihood strategies best suited for the existing natural surroundings (such as fishing in a cooperative manner in the Borsola Beel near Nimatighat in Jorhat) or they had acquired new knowledge (as in the case of vegetable farming in Raja Mayong in Morigaon, where a person who arrived from a traditional vegetable growing area had stimulated the activities in the field). Conversely, the lack of knowledge regarding cultivation in sandy soil has hindered the adoption of new livelihood strategies in the sand-casted areas near Jia Dhal river in Dhemaji. This has been accepted by the affected farmers. **Ability to Work**: It is found that in many of the flood affected areas; the young males have migrated to other places within the state and even outside the state. They are mostly in the age group of 18-30 and unmarried and hence not having any family liabilities to tie them down. On the other hand, young women are unable to migrate outside such villages on account of fears for personal safety.

Livelihood Asset / Context	Meaning	Examples obtained from the Field Visits
Social capital	Social resources, including informal networks, membership of formalized groups and relationships of trust that facilitate co-operation and economic opportunities	**Membership of Formal Group:** The Borsola *Meen Mahal Samabay Samiti* (Fishery Cooperative Society) has been formed by the fishing community of Bar Ali Gaon in Jorhat district, which has 315 households. The above Society has been allotted the fishing rights in the nearby Borsola Beel, a water body of 665 bighas (89 hectares) on the payment of annual lease of Rs 1.31 lakh to the State Government. As per the terms of the Society, the members have to hand over 40% of the catch to the Society and they can keep the balance for their own use or for sale. The Society pays the lease fees and makes dividend payments based on the share received by it. The output has a ready market which can be accessed by sellers from the village. Consequently, the above livelihood option has been able to facilitate co-operation and to enable members to access economic opportunities that provide sustenance to the households in the above mentioned village.
Natural capital	Natural resources such as land, soil, water, forests and fisheries	The availability of suitable soil and sufficient water during the rainy season has made the cultivation of winter paddy as the major traditional livelihood option for the villagers of the state. Further, enough land was available for each household. Hence, traditional agriculture practices were leading to low yields that were able to sustain the household and leave little for exchange in most areas. Hence, the development of agricultural markets has been less in the state. However, as the population has increased, land availability has shrunk. In many areas, the land has become unfit for the above livelihood strategy due to floods, water logging, sand casting etc. This has forced the affected households to look for alternative options like wage labour, cultivation of other crops, migration etc.
Physical capital	Basic infrastructure, such as roads, water & sanitation, schools, ICT; and producer goods, including tools, livestock and equipment	**Producer Goods:** Interestingly, the bullock has been substituted by tractors and power tillers as the means for land preparation before the cultivation of paddy. This has happened across the state on account of the economic factors. However, the transplantation and harvesting operations have not become similarly mechanized due to the availability of labour, including women labour.

Livelihood Asset / Context	Meaning	Examples obtained from the Field Visits
Physical capital [Continued]	Basic infrastructure, such as roads, water & sanitation, schools, ICT; and producer goods, including tools, livestock and equipment	**Basic Infrastructure**: The State Government has invested in rural roads and low lift irrigation facilities in the flood affected villages located in Mayong Block of Morigaon like Sonajan Borjhari and Bahapahar. This has enabled households to cultivate *boro* paddy (summer paddy) in lieu of winter paddy that gets affected by regular flooding in such areas. Further, the surplus gets a local market access on account of improved road transport facilities.
Financial capital	Financial resources including savings, credit, and income from employment, trade and remittances	**Bank Credit:** The availability of credit from banks has been constrained due to many factors. The main factor has been the reluctance of bankers to extend loans to farmers under Government schemes as these are perceived to carry a high risk of default. On the other hand, farmers view the bank procedures as unnecessary harassment and in many cases view bank officers are being influenced by other factors while extending loans. The expansion of rural livelihoods will require larger infusion of credit along with steps to promote financial literacy amongst the villagers. **Earnings of Migrant Labourers:** Young males of Dhemaji district who migrate outside the state to places like Kerala, Bangalore, Madras, Gujarat etc. can earn substantial amounts through over-time work. They can save Rs 100,000 in a year through prudential living. However, on return to their native villages, many of the youth spend their savings on conspicuous items of consumption. The promotion of financial literacy during the schooling stage can foster a culture of saving amongst the migrant youth. This can help them to invest in productive assets later on.
LIVELIHOOD CONTEXTS		
Social relations	The way in which gender, ethnicity, culture, history, religion and kinship affect the livelihoods of different groups within a community	**Ethnicity & culture:** The Mising tribe is an ethnic community, which has traditionally adapted to the surroundings of the flood plains of Assam where they have lived for the past few centuries.

Livelihood Asset / Context	Meaning	Examples obtained from the Field Visits
Social relations [Continued]	Given at previous page	This has enables them to develop appropriate livelihood strategies to cope with the annual flooding in such areas. For example, their dwellings are built on raised bamboo platforms which are located above the flood level. This protects their livelihood assets like tools and livestock during the flood season. **Religion**: Pig is considered to be an unclean animal in Islam and hence the breeding of pigs is hence not at all possible in villages inhabited by the immigrant communities in Morigaon district. Fisheries are a traditional livelihood option widely practiced by the above community.
Social & political organization	Decision-making processes, civic bodies, social rules and norms, democracy, leadership, power and authority, rent-seeking behaviour	**Panchayats in Assam**: The 93rd Amendment of the Constitution of India has provided for elected bodies for rural areas called Panchayats at the district, intermediate and village levels with control over many defined subjects. In Assam, the devolution of functions, functionaries and funds may be best described as a 'work in progress'. The above has limited the impact of the above constitutional amendment upon the decision making process and power structures at the grass roots level in the state. **Social Norms governing Women's Participation**: In the indigenous communities (including tribal communities like Mising in Dhemaji and Jorhat and Tiwa in Morigaon); women actively participate in many agricultural operations like transplantation, weeding, harvesting etc. In many areas, the role of male members is confined to 'heavy works' like land preparation and conveyance of harvested crops from the field to the household. On the other hand, the participation of women is missing in the immigrant community in Morigaon. All farming operations are carried out by the male persons. Women are mostly confined to house work. Of course, when women of the same communities migrate to Guwahati and other towns due to economic factors, they actively participate in different activities including working as labour in construction sites.

Livelihood Asset / Context	Meaning	Examples obtained from the Field Visits
Governance	The form and quality of government systems including structure, power, efficiency and effectiveness, rights and representation	**Form & Quality of Government Systems**: This is an area where much progress has been achieved, but much remains to be done. The design of many government programmes (for elementary education, rural health, water supply and sanitation, rural electrification, forestry etc.) has included the participation of stakeholders in the planning and monitoring stages. In some schemes (like the National Afforestation Programme), even the implementation is supposed to be done through community based organizations. However, at the working levels, government officials and staff are traditionally accustomed to a top down approach. It may take time for the new paradigm desired by policy planners in New Delhi and at State Capitals to be implemented in letter and spirit in the millions of villages throughout the length and breadth of India.
Service delivery	The effectiveness and responsiveness of state and private sector agencies engaged in delivery of services such as education, health, water and sanitation	**Delivery of social services**: This mainly remains a preserve of the State Government departments, who provide services like education, health, rural connectivity, electricity, irrigation, farming support, water supply, sanitation etc. to the rural areas. In addition, Non Government Organizations (NGOs) play a supplementary role – in the areas like awareness creation, publicity, IEC activities etc. International / national NGOs intervene as an outcome of disasters like floods and erosion, often staying on for a longer period (i.e. during the recovery phase) to develop aspects like water supply, sanitation, hygiene, livelihoods, education etc. as per programmes funded by international bodies and the Indian public. While they are widely scrutinized and often criticized, the quality of services rendered by most of the State Government departments may have improved in the recent past – often on account of generous funding and capacity building of the field level functionaries. The availability of information about schemes and projects through the Right to Information (RTI) Act may have helped to improve the public awareness about the government plans and funding under different heads. Public demand for better services at the grass roots level is a good way to improve the delivery of publicly funded services.

Livelihood Asset / Context	Meaning	Examples obtained from the Field Visits
Resource access institutions	The social norms, customs and behaviours (or 'rules of the game') that define people's access to resources	In Assam, the indigenous communities are generally less stratified as compared to the rest of the country. In the past, the availability of land and water was not a big issue. Hence, social customs and norms did not traditionally deny some ethnic / religious / social group the access to resources needed to pursue land based livelihoods.
Policy & Processes	The processes by which policy and legislation is determined and implemented and their effects on people's livelihoods	As reported by the inhabitants of Bar Ali Gaon in Jorhat district who depend upon fishing for their livelihood, the process of allotment of fishing rights in water bodies of the state is now being done through tenders where participation of organizations from other areas is possible. As many as 315 households depend solely upon fishing in the Borsola Beel (a local water-body of about 89 hectares) for their livelihoods. The fishing rights of their cooperative society will expire in 2017. Thereafter, their livelihoods may face a period of uncertainty. The process of tendering for fishing rights in the state is determined and implemented by the concerned department of the State Government in a top-down manner. It affects the livelihood options of the concerned communities. In Bar Ali Gaon, the above process has created uncertainty and apprehension in the minds of the local community of about the future of their traditional means of livelihood.
Changes in the environment & climate	---	Floods in Assam carry large amount of silt, which benefits farming activities. However, in recent years, in many flood affected areas this has led to the silting up of existing water bodies. This has affected households and communities that depend upon fishing as a livelihood option. In addition, climate change may have led to changes in the pattern of rain fall in Assam. In recent years, there have been prolonged period of dry days in the months like July and August. This has affected the traditional rice crop in the state, including in flood affected areas. Now, irrigation is sometimes needed during the monsoon period to grow rice.

[The above framework has been developed based on materials from the 'Guidance Note on Recovery: Livelihood' by International Recovery Platform & UNDP-India]

Table ES.2 – Vulnerability of existing Livelihood Strategies
[Reproduced from Table 2.2 of Section 2]

Type of Hazard ⇩	Vulnerability of existing Livelihoods			
	Traditional Cultivation (rain-fed paddy)	**Crop Diversification (summer paddy, pulses, mustard etc.)**	**Allied Activities (livestock, fishing, forestry)**	**Non-farm options**
TRENDS				
Economic trends	Prices of output are increasing, but the rise of prices of inputs is reported to be higher. If the cost of own labour is included, then the rain-fed cultivation of labour may be a loss making activity in many cases.	Summer paddy is more dependent on inputs Prices of inputs (wage labour, fertilizers, diesel for irrigation, pesticides etc.) is reported increasing more rapidly than sale prices	Due to the economic trends, livelihood options in the areas of livestock and fishery need high investments that are beyond the reach of the poor and vulnerable sections	The development of the economy has been transforming the need of many non-farm livelihoods over time. Some activities performed earlier may not be needed now or a few years later, while new vocations are emerging all the time due to changes in the economy. But exercising the latter options needs skills and investments that may be beyond the reach of the poorer sections of the rural people.
Political trends	Agricultural and allied activities are progressively finding a smaller space in public discourse due to the emergence of non-agricultural sectors as drivers of economic output and growth. Consequently, agriculture and allied fields may get lesser attention from various political parties.			---
Technological trends	Innovation is needed for meeting the challenges of climate variability during the crop season.	Technological developments are increasing costs since the farmers are cultivating small plots and unable to avail of economies of scale	---	Technological developments have necessitated the acquisition of new skills for exercising many of the non-farm livelihood options

Type of Hazard	Vulnerability of existing Livelihoods			
	Traditional Cultivation (rain-fed paddy)	**Crop Diversification (summer paddy, pulses, mustard etc.)**	**Allied Activities (livestock, fishing, forestry)**	**Non-farm options**
SHOCKS				
Epidemics	All these options are vulnerable to the occurrence of disease apart from attacks on crops by disease and pests. The availability of insurance, veterinary care, eco-friendly pest control etc. is low on the ground – which increases the vulnerability of such livelihood options to disease.			---
Natural disasters	Vulnerable to flooding during growing phase Also, erosion and sand casting may affect the soil in subsequent seasons	Less vulnerable to flooding, but erosion and sand casting may affect the soil	Livestock may be washed away. Fishing ponds may get affected and water bodies are prone to siltation which affects the yields.	
Civil strife	---	Civil strife may interfere with market access, even if the producing areas are strife free. In case of perishable items, the loss of free market access due to civil strife in markets or en-route may make the producers extremely vulnerable.		Civil strife in host areas may affect migrant labour who have gone to different places of India for their livelihoods
SEASONALITY				
Seasonality in prices	Vulnerable to low prices during and after harvesting season Also, farmers have low capacity to store surplus output		---	---
Seasonality in production	Highly seasonal as output is harvested during the months of November and December only	Seasonality in production exists	Some amount of seasonality exists in these sectors also, though not be as pronounced as in the case of farming	Less vulnerable to seasonality
Seasonality in employment opportunities	Engagement of self and of wage labour is seasonal, depending upon the crop calendar		---	-Do-

[The above table has been developed based on materials given at the IFAD website on 'The Sustainable Livelihoods Approach' and observations and discussions with community members during field tours and district level officials during District Stakeholders' Meetings]

3. Impact of Floods on Livelihood Resources & Options

This section examines the impact of floods upon the existing livelihood assets, contexts and strategies of the households and communities inhabiting the flood affected areas of the State. The recurrence of floods in Assam, along with associated aspects like sand casting and erosion, is having a debilitating socio-economic effect upon the rural communities of the affected areas.

Impact upon Livelihood Assets: The impacts of flooding events in Assam upon the livelihood assets of the households and communities have been given at Table 3.1 ['Effects of Floods upon Livelihood Assets'] which is reproduced below.

Table ES.3 – Effect of Floods upon Livelihood Assets

LIVELIHOOD ASSET	IMPACT OF FLOODS
Human capital	As follows:
• Knowledge	Schooling of young children may be affected during the floods due to relocation, problems of accessing the schools etc. In addition, many schools serve as places of shelter, which affects a larger number of the school going children.
• Skills	---
• Health	Outbreaks of disease may occur but these are largely contained now-a-days due to efforts of the Government and NGOs.
• Ability to Work	Floods force the affected households to relocate during their period. Afterwards, efforts have to be made for reconstruction and protection of assets. All the above divert the household members from their usual vocations and interfere with their ability to work, not only during the flood period but also during the aftermath.
Social capital	The impact of floods upon the social capital (formal and informal networks that facilitate cooperation) may vary as given below. • In many places, the social networking gets strengthened while households unite to prepare for floods and face its impact. • However, shortages of food, water, shelter, medicines etc. in the relief camps may adversely affect the relations between different households who are forced to shelter together. Uneven distribution of relief materials may aggravate a feeling of injustice. Further, improper targeting of measures in the recovery phase may heighten the sense of deprivation amongst some of the households. All these may erode the existing social capital.
Natural capital	As follows:
• Land	The availability of land is reduced in many places due to factors like: (a) Loss of land to erosion (it is reported that 8000 hectares of river bank land are eroded in Assam per annum); (b) Permanent water logging of land (nearly 500 km^2 of land is under permanent water logging or marsh in Assam, while over 1000 km^2 is seasonally water-logged); and

LIVELIHOOD ASSET	IMPACT OF FLOODS
• Land [Continued]	(c) Sand casting of land rendering it 'useless' given the existing skills and knowledge of the community. On the other hand, in some cases (in Dhemaji), existing water bodies have become totally filled up, thereby increasing the availability of land for various purposes.
• Soil	Soil is usually fertilized by alluvial deposits of floods. However, flash floods (in areas like Dhemaji) also bring along sand and rocky materials that adversely affect the soil and render it unfit for paddy cultivation.
• Water	Rivers may change course, especially in North Bank districts (like Dhemaji). For example, the River Jia Dhal has totally dried up and the water has diverted to River Kakuri, which has many channels. Water bodies may get silted up by the deposition of sand and silt. In the Borsola Beel, the water body measures about 89 hectares. However, only 27 hectares (30% of the total area) is now fit for fishing operations. Similar effects were reported in many areas of Dhemaji.
• Fisheries	In many areas, fisheries are washed away by flood waters. This makes it necessary to strengthen the banks of the fisheries and to erect nets around the tops of banks. In many areas, communities have stopped practicing fishery as a livelihood option due to the effects of floods.
• Forests	There are few forests in the flood plains of Assam. However, many of these areas are covered by thatch, reeds, grass etc. which is collected for economic use. Sand casted land in Dhemaji is observed to be covered by thick growth of thatch, reeds, grass etc.
Physical capital	
Basic Infrastructure	Floods cause damage to public infrastructure like roads, public buildings (schools, offices etc.), power lines, water supply systems etc. This causes problems to access the sheltering persons during the relief operations and in restoring basic services during the recovery phase. In addition, the State Government has to find funds to repair the flood damaged infrastructure. Privately owned facilities like shops, warehouses, toilets etc. may get damaged which can aggravate the shortage of essential items or cause health problems.
Producer Goods (tools, livestock and equipment)	Livestock may get washed away, especially during flash flooding. They may be affected by disease and lack of fodder, water, medicines etc. in the relief and early recovery phases. Immovable producer equipment may be damaged or washed away by flood waters.
Financial capital	As follows:

LIVELIHOOD ASSET	IMPACT OF FLOODS
• Savings	Usually, to face the losses and impacts of floods, the affected households have to draw down on whatever little savings that they may possess. Repeated economic losses due to annual floods have depleted the possibilities of savings in the affected communities.
• Credit	Flood affected households need credit to restart their livelihoods. Usually, these are sourced from the local money-lenders who lend at usurious rates of 10% per month. Farmers who have availed of credit from banks have problem to repay loans which may lead to loss of assets or to lowering of credit worthiness of such households.
• Income from employment	Many land based wage employment avenues are affected due to floods. In chronically affected areas, land owners are reluctant to cultivate paddy, which reduces the employment opportunity for wage workers in operations like land preparation, sowing, care of land and harvesting.
• Remittances	---

Impact upon Livelihood Contexts: Livelihoods are formed within particular contexts such as social, economic and political contexts. Institutions, processes and policies, such as markets, social norms, and land ownership policies affect our ability to access and use assets for a favourable outcome. As these contexts change they create new livelihood obstacles or opportunities.

The impact of floods in Assam upon the existing livelihood contexts is briefly examined at Table 3.2 ['Effect of Floods upon Livelihood Contexts'], which is given below.

Table ES.4 – Effect of Floods upon Livelihood Contexts

LIVELIHOOD CONTEXT	IMPACT OF FLOODS
Social relations	Floods may affect existing social relations on account of perceived discrimination in the provision of relief materials and in the assistance from Government / NGOs for recovery. Floods have led to large scale migration of young people of many communities from the affected areas. Consequently, many economic operations have to be carried out by women, including farming.
Social & political organization	Political organizations usually make floods as an issue in Assam during the election time. However, on account of many factors, the issue is an intractable one. Meanwhile, the public is led to believe that floods can be totally prevented in Assam, which may not be possible due to the reasons like the topography, nature of the rivers, soil conditions, funding constraints etc.

LIVELIHOOD CONTEXT	IMPACT OF FLOODS
Governance	Floods can affect the quality of governance in the affected areas during the occurrence period as well as in the aftermath, as the government machinery has to focus on relief and rehabilitation operations at the cost of other aspects of governance.
Service delivery	The effectiveness and responsiveness of state and private sector agencies engaged in delivery of services such as education, health, water and sanitation is adversely affected. Many assets are damaged or destroyed. These have to be replaced or repaired, which needs funds. Usually such replacements and repairs take time, which means that in the interim period the quality of services is affected. The utilization of funds for flood damage repairs means that less funding is available for creation of new assets in the flood affected areas or elsewhere.
Resource access institutions	Floods may create barriers for sections of the community to access different assets and resources.
Policy & Processes	Most of the policies related to flood management and provision of relief and rehabilitation of affected communities are drawn up centrally without wide consultations with the flood affected communities. Meanwhile, flood affected communities have other worries and can pay little attention to the process of policy formation and legislation.
Changes in the environment & climate	The repeated incidents of floods can change the physical environment (water, soil etc.) which can affect the existing livelihoods of the affected communities.

Impact upon Livelihood Strategies: Disasters like floods adversely impact the livelihoods of the affected households and communities. They deprive people of their sources of employment or reduce their ability to raise income, and thus diminish (permanently or temporarily) their capacity to make a living.

The recurrence of floods has a significant impact upon the existing livelihood strategies of the households and communities. Depending upon the range of assets and contexts, the range and diversity of existing livelihood strategies can vary. Such activities may be impacted by the occurrence of floods on a regular basis. Further, the regular occurrence of floods can adversely impact livelihood assets and contexts can narrow the livelihood options available to the individuals and communities. The impact of floods upon the agricultural and related sector and upon non-farm livelihoods has been captured in the two tables furnished in this sub-section.

Appendix IV gives some photographs from the field tours that exemplify the impact of floods upon livelihood assets and contexts in the visited districts.

4. Adaptation & Coping Practices for Livelihood Protection

This section examines the major adaptation and coping practices adopted by the rural communities for livelihood protection.

Disasters like floods cause disruptions in the living patterns of affected households and communities, interfering with their sources of food and income. In such times, the affected people use their ingenuity and abilities to help one another individually and collectively in order to meet their various needs. 'Coping' and 'adaptation' are terms used to refer to strategies that are used by the affected households and communities to address disruptions. The ad-hoc short term measures are termed as 'coping', while 'adaptation' refers to actions over a longer time frame, which become a part of the culture of affected communities. Both terms are clubbed together in this discussion as 'coping and adaptation practices'. This section discusses the coping and adaptation practices for the following major themes, along with photographs and related information:

(A) Adaptation & Coping Strategies for Agriculture

During the field tours, details regarding the following farming adaptations emerged from discussions and observations.

1. Cultivation of Summer Paddy under Irrigated Conditions;
2. Commercial Cultivation of Rabi Vegetables;
3. Cultivation of Vegetables in Low Lying Land;
4. Introduction of new varieties of Winter Rice to cope with flood situation; and
5. System of Rice Intensification.

(B) Adaptation & Coping Strategies - other Land Based Livelihood Options (Livestock & Fishery)

The following lists some of the coping and adaptation measures followed by affected communities with regard to the practice of livestock, fishing and other land based options:

1. Construction of flood resistant fisheries;
2. Cooperative fishing in large sized water-body;
3. Poultry Farming in Dhemaji District; and
4. Dairy Farming in Morigaon.

(C) Other Adaptation & Coping Strategies for Livelihoods

In addition to the measures outlined at above for adaptation of farming and other land based livelihood options; the affected households and communities have undertaken other measures of adaptation and coping for their livelihood options. These are listed below.

1. Raised Granaries & Homes;
2. Adaptation for Weaving;
3. Non-farm Livelihoods;
4. Migration of Young Males; and
5. Increased Participation of Women in Economic Activities.

The pertinent details have been furnished at this section regarding each of the above practices, along with photographs from the field.

5. Nature & Efficacy of Government Interventions

The aftermath of disaster is usually dealt with by the Government, with supplementary efforts being made by NGOs / International NGOs. Immediately after the disaster event (like flood), the priority of the Government and NGOs is to provide relief to prevent additional loss of lives and to extend assistance to the affected communities. In case of recovery from floods in Assam; the other priorities of the State Government include the clearance of affected areas and carrying out of basic repairs for the restoration of public infrastructure.

Regarding livelihood interventions for recovery in flood affected areas of Assam, the Government measures are subsumed within the various schemes for employment generation and for the development of the agriculture and allied activities (animal husbandry, fisheries, horticulture etc.). These are briefly discussed in this section under the following heads:

(A) Government Interventions for Wage Employment & Self Employment

The Government has several programmes for employment generation, which are being operated on an all-India basis. The major ones have been described in this section as follows:

- Mahatma Gandhi National Rural Employment Guarantee Scheme (MG-NREGS) for rural wage employment;
- National Rural Livelihoods Mission for self-employment; and
- Prime Minister Employment Generation Programme (PMEGP).

In addition, the State Government has been operating some schemes to assist livelihoods in rural areas of the state.

(B) Government Interventions by Line Departments in the Primary Sector

The agriculture and related areas include horticulture, animal husbandry, fishery, sericulture etc. During the field work in connection with the present assignment, stakeholders' meetings were organized at the visited districts that were attended by district level officials of the concerned Line Departments and NGO representatives. From the above, it is understood that the State Government is implementing the following major schemes through the different Line Departments working in the primary sector:

- Rashtriya Krishi Vikas Yojana (RKVY) supported by the Government of India;
- The World Bank supported Assam Agricultural Competitiveness Project (AACP);
- Mission for Integrated Development of Horticulture (MIDH); and
- Other schemes for development of livestock and fisheries

Additional details about the above schemes and programmes are available at this section.

6. Livelihood Programming during Recovery from Floods

Disasters affect the community in several ways over a period of time. The pressing needs of the affected communities have to be addressed in many areas – food security and nutrition; water, sanitation and hygiene; shelter; health; education; protection etc. to name a few. Amidst these,

the protection and development of the livelihoods of disaster affected households is becoming increasingly recognised and addressed to during the disaster recovery processes. There has been a shift in the approach of humanitarian agencies, which are becoming inclined towards taking earlier measures for recovery. The reactivation of disaster-stricken economies facilitates the transition from emergency relief to recovery. Further, disaster affected communities have also stated that livelihood restoration ranks as their greatest priority during recovery.

Livelihood programming during the Early Recovery Phase (as the relief phase is wound down and inmates sheltering in camps start returning) focuses on Livelihood Protection, whereby emphasis is upon protecting the household livelihood systems to prevent an erosion of productive assets and replacing or rebuilding productive assets. Later on during the Reconstruction & Development Phase, Livelihood Promotion can be undertaken in order to improve the resilience of household livelihoods, so that food and other basic needs can be met on a sustainable basis.

The present status of Government interventions for livelihoods has been discussed at the previous section. Regarding other stakeholders, the International NGOs have undertaken several programmes for development of resilient livelihoods in flood affected areas of Assam. The above activities help to improve the resilience of the flood affected communities to some extent. However, the sustainability of livelihood outcomes from the above interventions has to be better understood, especially in the period after the programmes have been ended by the donor agencies.

Developing Resilient & Sustainable Livelihoods during Recovery

The existing livelihood interventions of the Government and donor agencies to address the impact of disasters are time bound in nature. During the relief phase, these mostly address livelihood provisioning for the supply of critical food and non-food items needed for survival. Livelihood protection during early recovery and livelihood promotion during later recovery receives less coverage on account of various factors. There is a need to address efforts for developing livelihoods in the recovery stages - especially for livelihood promotion which marks the transition from recovery efforts to development goals.

For the development of resilient and sustainable livelihoods in flood affected areas of Assam, the following factors need to be considered in working out fresh approaches:

- Availability of markets for output and ensuring **market access**;
- Development of livelihood options on **cluster** basis;
- Availability of economically active **institutions** or alternatives;
- Building and strengthening availability of **micro-level credit and savings**;
- Ensuring **economic resilience and sustainability** and **environmental sustainability**.

The diagram at the Page No. 45 depicts the schematic positioning of the above factors in developing sustainable and resilient livelihoods in the flood affected areas. These factors have been briefly described at this section. The above diagram is reproduced at the next page for ease of reference. The elements given in this diagram have been explained thereafter.

Figure ES.1 – The Model for Resilient & Sustainable Livelihoods in Flood Affected Areas of Assam

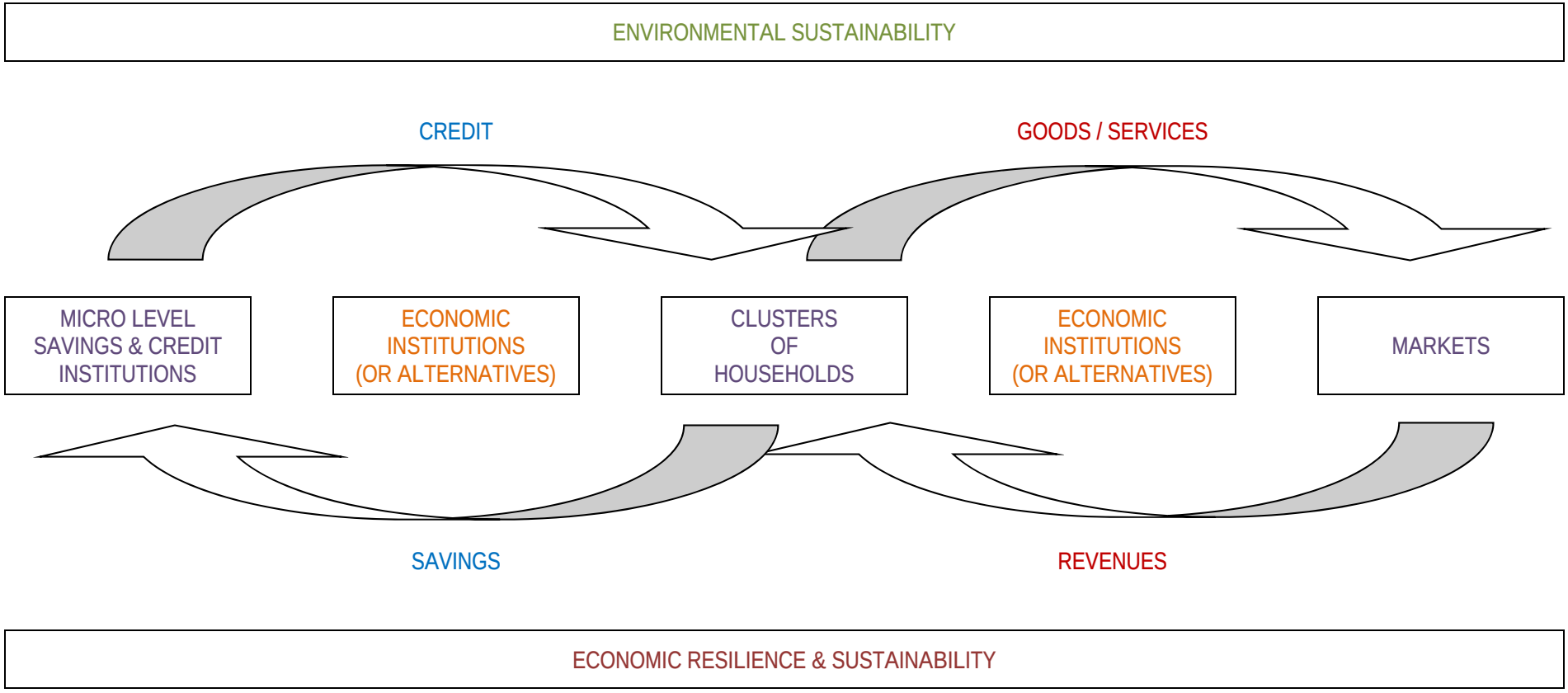


Table ES.5 – Factors for Development of Resilient and Sustainable livelihoods

Factor	Description
Markets & Access	The basic criterion is that all activities undertaken for livelihood promotion need to result in the output of goods or services that address available or emerging market demand in terms of price, delivery, quality etc.
Cluster Approach	The development of activities on a cluster basis creates its own economic momentum. Outside traders are willing to come to these areas on a regular basis to pick up the output whenever these are ready for dispatch. If some isolated household tries out an alternative livelihood, it needs to access the market on its own, which may compound the odds against such option of the household becoming sustainable in the longer run.
Economic Institutions	Clusters may be developed based on traditional skills of the people, availability of new markets, resource availability etc. so that the activities access some viable markets. **However, someone has to take the initiative**. This is the reason why the availability of economically active institutions or alternatives is necessary to develop resilient and sustainable livelihoods. In Assam, most institutions work in the social and cultural arena. There are few examples of economically active institutions, which have to be developed.
Micro-level Credit & Savings	Microfinance institutions (MFIs) have been able to develop financial products tailored to the requirements of segments like farmers who receive their incomes seasonally. People who are otherwise considered as being highly risky are now able to avail of credit. They no longer have to rely upon money lenders who charge extremely high interest rates.
Economic Resilience & Sustainability	The interventions must be generating cash through market based activities rather than relying on periodic infusions of funds from donors for their sustenance. In recent years; various stakeholders like governments, donors, advocacy groups etc. have considered market based interventions as a means of strengthening the livelihoods of the rural poor, including for livelihood promotion in the recovery phase.
Environmental Sustainability	The aspect of environmental sustainability is very important because rural livelihoods depend mainly upon natural resources. It is necessary to balance the economic needs with the long term capacity of the environment to provide such resources. Usually resilient, the natural environment can degrade quickly in a densely populated state like Assam.

7. Conclusion & Recommendations

As an outcome of the present assignment, the following measures are hereby recommended for policy formulation, planning and implementation under the above mentioned GOI- UNDP project; so that sustainable and resilient practices for restoration of livelihood options can be developed in the flood affected areas of Assam:

- Development of Livelihood Activities that are Economically & Environmentally Sustainable
- Identification of Viable Activities through exercises like Market Analysis and Value Chain Studies
- Cluster Development of Activities
- Development of Economically oriented Institutions
- Promotion of Social Entrepreneurs
- Provision of reasonably priced Financial Services
- Promotion of Financial Literacy
- Implementation in Coordination with Local Government Agencies / NGOs
- Communication with Stakeholders

These have been briefly described below.

1. Development of Livelihood Activities that are Economically & Environmentally Sustainable

Livelihood programming must result in economically sustainable activities to be undertaken by the beneficiary community or households. Such activities must yield surplus products and services as required in accessible markets. The groups or individuals, who undertake these activities, must be capable of sustaining and expanding the activities with their own efforts and with minimal recurring outside assistance in the future.

This can happen only if the activities result in activities that go beyond sustenance level production of goods or services. Based on the suggestions received, some economically sustainable activities that may be taken up during livelihood interventions in flood prone areas of Assam are given below.

(a) Cultivation of early and late varieties of vegetables during the dry season for sale in accessible markets at remunerative prices;
(b) Cultivation of pulses and oilseeds, which are in perpetual deficit in Assam and also in the country which has to resort to large scale imports;
(c) Cultivation of viable crops like ground nuts, melons, pumpkins etc. in sand deposited areas in Assam;
(d) Cultivation of banana;
(e) Development of value added products based on the above crops (such as banana chips, edible oil from mustard and ground nut, etc.) to meet existing and emerging markets;
(f) Utilization of water hyacinth for extraction of fibre and weaving of fibre that can be converted to many items of daily use;

(g) Rearing of pigs, ducks and broiler poultry;
(h) Water harvesting structures for multi-purpose use – irrigation, fish culture, duck rearing etc.
(i) Integrated fish farming with pigs and ducks;
(j) Handloom clusters in villages inhabited by communities where women have a tradition of weaving;
(k) Development of home-stay linked to eco-tourism, river tourism etc.; and
(l) Skills development of youth in viable trades such as driving (including heavy vehicles), carpentry, masonry, electrical and plumbing trades, machinery operations etc. for males and tailoring, embroidery, beauty parlour etc. for women.

There may be vulnerable groups in the affected communities that will lack the ability to sustain a market driven economic activity, e.g. households headed by elderly persons, unskilled widows, disabled persons etc. The short term needs of such households may be served by alternative forms of assistance such as carefully targeted cash and asset transfers, materials assistance and other social welfare measures. In the longer run, development of local institutions (having an economic focus) or alternatives will be necessary in order to address the specific needs of vulnerable households, including disabled persons.

2. Identification of Viable Activities through exercises like Market Analysis and Value Chain Studies

In order to identify which activities can be sustainable, exercises like market analysis and value chain studies can be undertaken by the stakeholders.

- Market analysis refers to 'the process of assessing and understanding the key features and characteristics of a market system, so that predications can be made about how prices, availability, and access will perform in future; and decisions made about whether or how to intervene'.

- A value chain 'describes the full range of activities that are required to bring a product or service from its conception to its end use and beyond, and includes activities, such as design, production, marketing, distribution, and support to the final consumer. The activities that comprise a value chain can be contained within a single firm or divided among different firms. Value chain activities can be contained within a single geographical location or spread over wider areas.'

The conduct of such studies may indicate that interventions will be necessary at different points across the value chain including inputs, support services, market development etc. While undertaking such analysis or studies, it is necessary to keep the abilities of affected communities and their economic participation in the planned activities at the centre of the exercise. In addition, members of the community can be consulted during the above process, which should reflect the views and opinion of the targeted beneficiaries. This will help the latter to understand the requirements of the targeted activities and thereby assist them in making informed choices during the implementation phase.

3. **Cluster Development of Activities**

Wherever possible based on market requirements, the activities may be developed on a cluster basis during the implementation of interventions. This will provide an economic momentum of its own.

If there are a large number of households engaged in a similar activity to feed a large market, the producers will become benefited in a number of ways. For example, cluster development will enable them to source inputs, engage service providers and transport the output at lower unit cost. Suppliers and market intermediaries also find an economic logic in addressing a cluster of producers.

However; if the output is feeding a stagnant or slowly growing local market, then the entry of a large number of producers may lower the prices of outputs and affect the economic interests of the producer households. The planned interventions need to guard against an over-supply of goods or services.

4. **Development of Economically oriented Institutions**

Considering the existing socio-economic conditions of flood affected communities, it may not be possible for them to perform all the activities needed to sustain and expand the identified and supported activity with their own efforts. In many other activities (value added products, eco-tourism, weaving etc.) it may be necessary to access distant or dynamic markets. Accessing such markets and fully understanding their dynamics may not be possible for the individual household.

In order to address these challenges, economically oriented institutions are needed like the *Meen Mahal Samabay Samiti* of Borsola Beel in Jorhat, which handles the bidding process and lease payments for fishing rights on behalf of its members.

5. **Promotion of Social Entrepreneurs**

In Assam, rural institutions have traditionally been active in the social and cultural arenas. Comparatively, fewer institutions are involved in the economic arena. It may be necessary to supplement the planned development of economically oriented institutions with the promotion of social entrepreneurs.

Like the economically oriented institutions, social entrepreneurs can mediate between markets and the community or households (or SHGs). They too can provide required services like market support (access, information etc.); credit and insurance services; training and capacity development to implement new practices on the field etc. as may be required by the changing nature of the accessed markets.

6. **Provision of reasonably priced Financial Services**

The sustenance and growth of economic activities will require the availability of reasonably priced financial services like credit, insurance, savings etc. at a micro-level. The long term

development of viable economic activities needs the availability of credit to the households on reasonable terms.

Currently, the local money lender is the only available source for credit. But, such credit is provided by the local money lender at usurious rates of 10% per month, which will erode the sustainability of most economic activities. Micro-finance is available from Micro-finance Institutions at rates of 18% per annum, but availability of such credit is usually limited in the project areas. There is a need to expand the reach of such institutions while developing livelihood interventions.

Another approach may be to assist households to open basic level savings accounts in the nearest bank branch, which can help them to access bank credit at the later stage.

7. Promotion of Financial Literacy

It will be necessary to promote financial literacy amongst the target communities. This is needed to enable them to understand the meaning of financial products like credit, insurance, and savings and use these products as aware and educated customers. This may be needed (for example) to prevent the occurrence of debt trap when micro-finance is readily available in the project areas on account of interventions. Further, financial literacy such programmes can develop a savings culture amongst the targeted households, which will improve the credit worthiness of the saving households.

Financial literacy programmes may also target the youth studying in the secondary education levels. As many of them may migrate outside, they are able to earn substantial sums – which they need to learn to save and invest properly.

8. Implementation in Coordination with Local Government Agencies / NGOs

It is necessary that the implementation of livelihood programming be carried out in coordination with the Government agencies working at the village level and with NGOs / donor agencies active in the flood affected areas of Assam. This will help to avoid duplication and waste at the community level, leading to ineffective performance and the objectives of the intervention not becoming realized at the end of the programme.

The ASDMA can work with the Inter-Agency Group (IAG), which coordinates with the work of International NGOs and donors at the state level. In the district headquarters, the DDMA can work with the District Administration to effect coordination with the associated Line Departments at the field level.

9. Communication with Stakeholders

It is necessary that the objectives of the entire programme be communicated regularly to stakeholders to avoid misconceptions and wrong expectations at the field level. The stakeholders will include the affected community, the District Administration, the district offices of Line Departments, associated institutions and entrepreneurs, suppliers and aggregators, financial institutions etc.

The communications should clearly specify the objectives of the planned livelihood generation programme, components and interventions, rationale for choosing certain interventions, targets of activities, limitations, time schedules etc. There must be a clear identification of grant based components and other components. Above all, the main message to the community is that the programme is to assist them to help themselves so that a culture of dependency upon grants and hand-outs does not develop as an outcome.

1. Introduction ...

1.1. Introduction

The Assam State Disaster Management Authority (ASDMA) has been working towards disaster preparedness, prevention, mitigation and response activities in the state of Assam. The Assam State Disaster Management Authority was notified in 2007 after the adoption of the Disaster Management Act in 2006. Subsequently, ASDMA became fully functional, and, since 2009, it has been working to fulfil its mandate. ASDMA has been undertaking projects and other initiatives under its scope of activities.

An effort in the above direction has been the implementation of a project titled 'Enhancing Institutional & Community Resilience to Disaster and Climate Change' [2013-17] under Government of India (GOI) and United Nations Development Programme (UNDP). This project seeks to provide technical support to strengthen the capacities of government, communities and institutions in ten states of India in order to fast-track the implementation of the planning frameworks on Disaster Risk Reduction and Climate Change Adaptation. One component of the above mentioned project is to conduct a study and thereby prepare a Scoping Analysis on Livelihood Generation for Recovery with special emphasis on the Agricultural Sector.

The present report is based on a study carried out in Assam by Rashtriya Gramin Vikas Nidhi (RGVN) of Guwahati during the months of January and February, 2015. It discusses the scope of works that may be considered under the aegis of the above mentioned GOI-UNDP project. The report has been prepared based on an analysis of secondary data (available literature and documents) and primary data collected from the field in sampled areas of the state and from stakeholder discussions held in the district headquarters of these areas.

1.2. Background: State Profile

Physical Setting

Assam possesses a unique geomorphic environment with most of it being covered by plain areas with a hilly and plateau system in the middle separating the two valley areas of the state. Most of Assam (nearly 72%) is covered by the long and narrow Brahmaputra Valley, while nearly one fifth of its area consists of two hill districts. The remaining area of the state (below 9%) is accounted for by the Barak Valley located to the south of the state.

Mountains and hills surround the state on most sides. The state is surrounded by the Himalayas to the north and by different hill ranges on the south and east. Only the west side opens to plain areas, but these are located in Bangladesh. The geographical separation of the state from the remaining parts of India, along with poor transport links in the past, has contributed to a sense of emotional isolation in Assam vis-à-vis the rest of India.

Studies have concluded that the River Brahmaputra, the life line of Assam, is an ancient river. Before entering Assam, the river passes through the mountains of Arunachal Pradesh where it is

called Siang and is marked by steep gorges and rapids. In Assam, the Brahmaputra becomes a braided river several kilometres wide, with the average width being about 5.5 km. The river is marked by numerous channels, sand bars and river islands.

The climate of Assam is humid sub-tropical marked by warm summers, a long rainy season and cool and dry winters. The state is located within a high rainfall area, with nearly two-thirds of the annual rainfall occurring during the four monsoon months (June-September).

Economic Profile

Assam is one of the eight states forming the North Eastern region of India. The state has a geographical area of 78,438 km^2 - about 2.4 % of India's land area. As per the Census of India 2011; the state has a population of 31,205,576 persons. Assam has a population density of nearly 398 persons per km^2, which makes the state more densely populated than the country as a whole. Further, most of the inhabitants (86%) reside in rural areas. Unsurprisingly, the economy of Assam substantially depends upon the primary sector consisting of agriculture and other related sub-sectors like animal husbandry, fishing, horticulture, forestry etc.

The share of the primary sector in the economic output of Assam is estimated to be just over a fifth (21.4%) of its Gross State Domestic Product as per the estimates for 2013-14. However, this sector directly employs 53% of the total workforce of the state. Further, considering indirect employment and effects, agriculture and allied activities support over three quarters of the population of the state.

The net cultivated area of the state is 2.81 million hectares, which is about 36% of its geographical area. The agricultural sector is constrained by the small size of farms and the subsistence nature of farming operations. More than 85% of the farmers are marginal or small farmers, and the average operational holding is 1.10 hectares only. The irrigation potential covers a fraction of the area under cropped. It is reported that the irrigation potential created from different schemes is about 0.83 million hectares – which is about one-fifth of the gross cropped area.

The tea industry of Assam produces more than half of the national crop. More than 686,000 persons are employed by the industry. In addition; there are nearly 65,000 small tea growers in the state, who are estimated to produce nearly one-seventh of the tea grown here. Rubber is a new plantation crop which has found popularity in parts of Assam.

Despite the existence of vast water resources covering over 6% of the area of the state, the growth of fish production has been sluggish in Assam. The livestock sector has been able to cover the local requirements only partially. The milk production in Assam is estimated to be about 74 ml per capita per day and the egg production to be 15 per capita per annum – both of which are below the recommended intake norms of the ICMR for milk and eggs. The production of meat is mainly from pig, goat and poultry. Over one-third of the state is under forests, which are sources of forest products like timber, bamboo, firewood, non-timber forest products etc.

The mining sector contributes to just over 5% of the economic output, with crude oil, coal and limestone forming the main mineral products of Assam. The industrial sector is constrained by

several factors like the state's isolation from the rest of India, an under-developed transport system, small local market, uncertain power availability and lack of capital. However, the Government of India and the State Government have been making efforts to promote the growth of manufacturing in Assam, which now contributes just 7.6% of the economic output of the state.

It is reported that over 2.5 million persons are involved directly or indirectly in weaving activities in Assam. Assam produces several types of silk like mulberry, *eri* and *muga*. It accounts for 97% of *muga* silk and 65% of *eri* silk produced in India.

Nearly 1.5 million educated job-seekers have been enrolled themselves in the employment exchanges of the state looking for work. The Employment & Unemployment Survey conducted in 2012 in Assam (as a part of the national exercise) indicates that over two fifths of rural households (40.5%) are self-employed in agriculture and nearly one-fifth (19%) are self-employed in non-agricultural activities. Over one-fifth (21%) are regular wage or salary earners. Nearly 17% of these households are agricultural or non-agricultural labourers. This indicates the low levels of organized economic activities in the rural areas of Assam. In urban areas; 42% of households are wage or salary earners, 36% are self-employed and nearly 16% are wage labourers.

Natural Hazards

Assam is located within a hazard prone area and it faces risks of disasters like floods, landslides, storms, earthquake etc. The state falls within a high rainfall intensity zone, with annual rainfall ranging from 1,750 mm to 6,400 mm. The state and the neighbouring areas experience spells of heavy rainfall and windy storms, which can lead to flash floods. The growth of activities and construction on unstable hill slopes has exposed large numbers of people to the hazards of landslides. Further, the entire region falls within Zone V, the most vulnerable seismic zone as per the Indian classification.

The above physical conditions in combination with the existing socio-economic conditions serve to increase the vulnerabilities of the population. This poses great challenges to the Government agencies in times of disasters. The Government has been taking steps in areas like preparedness, prevention, response and mitigation vis-à-vis disasters that may strike the state. The ASDMA is taking a lead role in such activities in Assam on behalf of the State Government.

1.3. Context of the Assignment

Floods are an annual occurrence in Assam owing to the existing rainfall pattern, topography of the state and its nearby areas and other pertinent factors. Nearly two-fifths of the area of the state has been officially assessed as being flood prone. Floods affect a large number of people in Assam almost every year. Further, floods are accompanied by river bank erosion and sand deposition. In fact, during most of the years, the affected places experience several waves of flooding, which force the affected communities to repeatedly relocate for shelter along with their movable belongings and livestock. Floods also affect individual fixed assets and public infrastructure in the affected areas, which deals a double blow to the communities. In addition;

during such occurrences of floods, the Government machinery is forced to concentrate upon relief and rehabilitation measures - keeping aside its normal functioning. Appendix II furnishes additional details about the floods in Assam.

Agriculture forms the major source of livelihoods in the rural areas. Flooding not only damages the standing crops but also hampers the associated livelihoods of the people in flood affected areas. Since floods occur during the rainy months, which form the traditional period for rain-fed farming in the state, they affect the existing rural livelihoods for farmers, labourers, artisans and others adversely. The subsistence nature of farming in the state, rain-fed nature of majority of farming operations and frequent occurrences of floods all combine to increase the vulnerability of livelihoods to floods. Hence, the generation of alternatives and creation of resilience in existing livelihoods during the recovery phase is one of the key concerns of the affected communities in Assam.

The above context makes it necessary for appropriate interventions at different levels including that of the affected communities, so that the latter can develop capacity to overcome challenges of sustainable livelihood options in the context of recurring floods. In this regard, there is a need to develop capacities of select vulnerable communities in order to enhance their resilience to cope with disasters and climate variability - i.e. the capacity to overcome stresses in times of disasters and to develop without recourse to outside assistance which may taper off during the recovery phase. This is intended to be done under the present project of ASDMA with the support of the Government and of UNDP.

The present study will form the basis for attempts of stakeholders to enable the affected and vulnerable communities to take initiatives for livelihood resilience in the wake of disasters like floods.

1.4. About the Study

Assam State Disaster Management Authority (ASDMA) had assigned Rashtriya Gramin Vikas Nidhi (RGVN) with the task of conducting a study and preparing a report on the Scoping Analysis on Livelihood Generation for Recovery with special emphasis on the Agricultural Sector. The said study was assigned in January 2015. The review of secondary data was carried out subsequently. The district visits were undertaken in February 2015 and the draft Report was submitted by the end of the above month.

The following paragraphs furnish some pertinent details regarding the present assignment.

Objective of the Study

The objectives of the present study include the following points:

1. To understand the economic vulnerability of flood affected agrarian population of the state of Assam;
2. To showcase the relationship between people's livelihood resilience and their adaptive capacities;

3. To examine and recommend measures for the sustainable, adaptive and resilient practices for restoration of livelihood options; and
4. To advocate for appropriate practice and policies for risk reduction in rural economy.

Scope of Work

The scope of work of the assignment includes the conduct of a scoping study preparation of Report on livelihood generation for recovery with special emphasis on agriculture sector with the following:

(a) Study the present livelihood patterns of the flood affected community with special emphasis on agriculture sector;
(b) Assess the impact of floods on livelihood resources and options of the affected population;
(c) Present coping / adaptive practices adopted for livelihood by the agro-based community;
(d) Nature and efficacy of livelihood generation support available under existing government programmes; and
(e) Recommend measures to strengthen the economic resilience of the rural communities.

Coverage of Study

The coverage of the study includes one of the most flood affected districts in each of the following Divisions of Assam. This was done in February 2015.

DIVISION	COVERED DISTRICTS
Upper Assam	Jorhat
North Assam	Dhemaji
Central Assam	Morigaon
Lower Assam	Barpeta

The impact of flood has been assessed in the context of multiple drivers of the rural economy through the lens of both primary and secondary data involving interviews and focus group discussions with community members and agencies responsible to help them, review of the government programmes, and analysis of existing reports and documents to evolve possible and viable solutions to the challenges being addressed to by the present assignment.

Additional details regarding the above study have been briefly discussed at Appendix I, and may be referred to therein.

1.5. Study Report

This Report is based on the study carried out in some districts of Assam as a part of the present assignment. It covers the points given in the 'Scope of Study', which has been given earlier in this section, while addressing the objectives of the study.

The comments of the Assam State Disaster Management Authority (ASDMA) have been addressed to while finalizing the Report.

2. Existing Livelihoods in Flood Affected Areas ...

2.1. Sustainable Livelihood Framework

In the present report, when we refer to 'livelihoods' the same will be guided by the definition suggested by Chambers and Conroy:

'A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base'. (Chambers & Conway, 1991)

Further the above, the sustainable livelihoods framework may be considered as defined by the UK Department for International Development (DFID), which views livelihoods as systems and provides a way to understand:

- Livelihood Assets - the assets people draw upon;
- Livelihood Contexts - the context within which a livelihood is developed; and
- Livelihood Strategies - the strategies they develop to make a living ;
- Livelihood Vulnerabilities - the factors that make a livelihood more or less vulnerable to shocks and stresses

The above framework is an analysis tool that is useful for understanding the various factors that affect a person's livelihood and how those factors interact with each other. It may be noted that the above framework places people at the centre of a web of inter-related influences that affect how these people create a livelihood for themselves and their households.

Closest to the people at the centre of the framework are the resources and *livelihood assets* that they have access to and use. These can include natural resources, technologies, their skills, knowledge and capacity, their health, access to education, sources of credit, or their networks of social support. The extent of their access to these assets is strongly influenced by their *vulnerability context*, which takes account of trends (for example, economic, political, and technological), shocks (for example, epidemics, natural disasters, civil strife) and seasonality (for example, prices, production, and employment opportunities). Access is also influenced by the prevailing social, institutional and political environment, which affects the ways in which people combine and use their assets to achieve their goals. These are their *livelihood strategies*.

The above approach may be used to improve understanding of the livelihoods of poor people. People are the main concern, rather than the resources they use or their governments. SLA is used to identify the main constraints and opportunities faced by poor people, as expressed by them. It builds on these definitions, and then supports poor people as they address the constraints, or take advantage of opportunities. The framework is neither a model that aims to incorporate all the key elements of people's livelihoods, nor a universal solution. Rather, it is a means of stimulating thought and analysis, and it needs to be adapted and elaborated

depending on the situation. Appendix III furnishes additional details regarding the sustainable livelihoods framework.

2.2. Existing Livelihood Strategies

The existing livelihood strategies can be clubbed under the following heads, which have been separately discussed in brief hereunder:

- Traditional Livelihoods; and
- Emerging Livelihoods.

It may be noted that individuals and households combine one or more of the available livelihood options in their livelihood strategies. These are being shaped by the existing livelihood assets and contexts as indicated at overleaf.

Traditional Livelihoods

As per the village level discussions and district level stakeholder meetings, it is seen that farming has traditionally been the pre-dominant livelihood option followed in the flood affected areas of the visited districts. Traditionally, the households used to cultivate winter paddy (also locally called as *sali* paddy), which is harvested during the winter months of November and December. This is a rain-fed crop which is cultivated during the monsoon months. Since floods can occur during such months and flooding after 15th September leaves no room for recovery; farmers in regularly flooded areas have now reduced or stopped the cultivation of winter paddy. They have adopted other livelihood strategies that are discussed elsewhere.

Other traditional livelihood options include the following major ones:

- Fishing on commercial or subsistence basis in local rivers and other water bodies;
- Rearing of livestock (pigs, cattle, poultry etc.) and sale of animals, animal products (eggs or milk), meat etc.;
- Collection of firewood, driftwood and other timber or non timber forest produce for self use or for exchange;
- Handlooms for weaving of traditional clothes, *gamochas* (Assamese towels) etc.; and
- Wage labour – especially in areas where immigrant communities are predominant and land holdings are small or non-existent for many households.

Further the above traditional livelihood options are found to be vulnerable to trends and shocks as discussed in the next sub-section.

Table 2.1 – Effect of Livelihood Assets & Contexts on Livelihood Strategies

Livelihood Asset / Context	Meaning	Examples obtained from the Field Visits
LIVELIHOOD ASSETS		
Human capital	Knowledge, Skills, health, ability to work etc.	**Skills:** Various livelihood skills are usually acquired under various settings – formal & informal. In most flood affected areas, informal means for skills development is the traditional norm. Recently, the Government has been active in promoting formal skills development programmes. In Jorhat district, the Rural Self-Employment Training Institute (RSETI) was visited. The Director informed that skills development programmes were popular amongst the trainees from flood affected areas like Majuli. The popular skills were livestock (piggery and goat rearing), beauty parlour, dress design and embroidery, driving etc. These programmes may help the trainees to find work or get self-employed. **Knowledge:** The communities had accumulated a knowledge base over generations that helped them in choosing appropriate livelihood strategies best suited for the existing natural surroundings (such as fishing in a cooperative manner in the Borsola Beel near Nimatighat in Jorhat) or they had acquired new knowledge (as in the case of vegetable farming in Raja Mayong in Morigaon, where a person who arrived from a traditional vegetable growing area had stimulated the activities in the field). Conversely, the lack of knowledge regarding cultivation in sandy soil has hindered the adoption of new livelihood strategies in the sand-casted areas near Jia Dhal river in Dhemaji. This has been accepted by the affected farmers. **Ability to Work**: It is found that in many of the flood affected areas; the young males have migrated to other places within the state and even outside the state. They are mostly in the age group of 18-30 and unmarried and hence not having any family liabilities to tie them down. On the other hand, young women are unable to migrate outside such villages on account of fears for personal safety.

Livelihood Asset / Context	Meaning	Examples obtained from the Field Visits
Social capital	Social resources, including informal networks, membership of formalized groups and relationships of trust that facilitate co-operation and economic opportunities	**Membership of Formal Group:** The Borsola *Meen Mahal Samabay Samiti* (Fishery Cooperative Society) has been formed by the fishing community of Bar Ali Gaon in Jorhat district, which has 315 households. The above Society has been allotted the fishing rights in the nearby Borsola Beel, a water body of 665 bighas (89 hectares) on the payment of annual lease of Rs 1.31 lakh to the State Government. As per the terms of the Society, the members have to hand over 40% of the catch to the Society and they can keep the balance for their own use or for sale. The Society pays the lease fees and makes dividend payments based on the share received by it. The output has a ready market which can be accessed by sellers from the village. Consequently, the above livelihood option has been able to facilitate co-operation and to enable members to access economic opportunities that provide sustenance to the households in the above mentioned village.
Natural capital	Natural resources such as land, soil, water, forests and fisheries	The availability of suitable soil and sufficient water during the rainy season has made the cultivation of winter paddy as the major traditional livelihood option for the villagers of the state. Further, enough land was available for each household. Hence, traditional agriculture practices were leading to low yields that were able to sustain the household and leave little for exchange in most areas. Hence, the development of agricultural markets has been less in the state. However, as the population has increased, land availability has shrunk. In many areas, the land has become unfit for the above livelihood strategy due to floods, water logging, sand casting etc. This has forced the affected households to look for alternative options like wage labour, cultivation of other crops, migration etc.
Physical capital	Basic infrastructure, such as roads, water & sanitation, schools, ICT; and producer goods, including tools, livestock and equipment	**Producer Goods:** Interestingly, the bullock has been substituted by tractors and power tillers as the means for land preparation before the cultivation of paddy. This has happened across the state on account of the economic factors. However, the transplantation and harvesting operations have not become similarly mechanized due to the availability of labour, including women labour.

Livelihood Asset / Context	Meaning	Examples obtained from the Field Visits
Physical capital [Continued]	Basic infrastructure, such as roads, water & sanitation, schools, ICT; and producer goods, including tools, livestock and equipment	**Basic Infrastructure**: The State Government has invested in rural roads and low lift irrigation facilities in the flood affected villages located in Mayong Block of Morigaon like Sonajan Borjhari and Bahapahar. This has enabled households to cultivate *boro* paddy (summer paddy) in lieu of winter paddy that gets affected by regular flooding in such areas. Further, the surplus gets a local market access on account of improved road transport facilities.
Financial capital	Financial resources including savings, credit, and income from employment, trade and remittances	**Bank Credit:** The availability of credit from banks has been constrained due to many factors. The main factor has been the reluctance of bankers to extend loans to farmers under Government schemes as these are perceived to carry a high risk of default. On the other hand, farmers view the bank procedures as unnecessary harassment and in many cases view bank officers are being influenced by other factors while extending loans. The expansion of rural livelihoods will require larger infusion of credit along with steps to promote financial literacy amongst the villagers. **Earnings of Migrant Labourers:** Young males of Dhemaji district who migrate outside the state to places like Kerala, Bangalore, Madras, Gujarat etc. can earn substantial amounts through over-time work. They can save Rs 100,000 in a year through prudential living. However, on return to their native villages, many of the youth spend their savings on conspicuous items of consumption. The promotion of financial literacy during the schooling stage can foster a culture of saving amongst the migrant youth. This can help them to invest in productive assets later on.
LIVELIHOOD CONTEXTS		
Social relations	The way in which gender, ethnicity, culture, history, religion and kinship affect the livelihoods of different groups within a community	**Ethnicity & culture:** The Mising tribe is an ethnic community, which has traditionally adapted to the surroundings of the flood plains of Assam where they have lived for the past few centuries.

Livelihood Asset / Context	Meaning	Examples obtained from the Field Visits
Social relations [Continued]	Given at previous page	This has enables them to develop appropriate livelihood strategies to cope with the annual flooding in such areas. For example, their dwellings are built on raised bamboo platforms which are located above the flood level. This protects their livelihood assets like tools and livestock during the flood season. **Religion**: Pig is considered to be an unclean animal in Islam and hence the breeding of pigs is hence not at all possible in villages inhabited by the immigrant communities in Morigaon district. Fisheries are a traditional livelihood option widely practiced by the above community.
Social & political organization	Decision-making processes, civic bodies, social rules and norms, democracy, leadership, power and authority, rent-seeking behaviour	**Panchayats in Assam**: The 93rd Amendment of the Constitution of India has provided for elected bodies for rural areas called Panchayats at the district, intermediate and village levels with control over many defined subjects. In Assam, the devolution of functions, functionaries and funds may be best described as a 'work in progress'. The above has limited the impact of the above constitutional amendment upon the decision making process and power structures at the grass roots level in the state. **Social Norms governing Women's Participation**: In the indigenous communities (including tribal communities like Mising in Dhemaji and Jorhat and Tiwa in Morigaon); women actively participate in many agricultural operations like transplantation, weeding, harvesting etc. In many areas, the role of male members is confined to 'heavy works' like land preparation and conveyance of harvested crops from the field to the household. On the other hand, the participation of women is missing in the immigrant community in Morigaon. All farming operations are carried out by the male persons. Women are mostly confined to house work. Of course, when women of the same communities migrate to Guwahati and other towns due to economic factors, they actively participate in different activities including working as labour in construction sites.

Livelihood Asset / Context	Meaning	Examples obtained from the Field Visits
Governance	The form and quality of government systems including structure, power, efficiency and effectiveness, rights and representation	**Form & Quality of Government Systems**: This is an area where much progress has been achieved, but much remains to be done. The design of many government programmes (for elementary education, rural health, water supply and sanitation, rural electrification, forestry etc.) has included the participation of stakeholders in the planning and monitoring stages. In some schemes (like the National Afforestation Programme), even the implementation is supposed to be done through community based organizations. However, at the working levels, government officials and staff are traditionally accustomed to a top down approach. It may take time for the new paradigm desired by policy planners in New Delhi and at State Capitals to be implemented in letter and spirit in the millions of villages throughout the length and breadth of India.
Service delivery	The effectiveness and responsiveness of state and private sector agencies engaged in delivery of services such as education, health, water and sanitation	**Delivery of social services**: This mainly remains a preserve of the State Government departments, who provide services like education, health, rural connectivity, electricity, irrigation, farming support, water supply, sanitation etc. to the rural areas. In addition, Non Government Organizations (NGOs) play a supplementary role – in the areas like awareness creation, publicity, IEC activities etc. International / national NGOs intervene as an outcome of disasters like floods and erosion, often staying on for a longer period (i.e. during the recovery phase) to develop aspects like water supply, sanitation, hygiene, livelihoods, education etc. as per programmes funded by international bodies and the Indian public. While they are widely scrutinized and often criticized, the quality of services rendered by most of the State Government departments may have improved in the recent past – often on account of generous funding and capacity building of the field level functionaries. The availability of information about schemes and projects through the Right to Information (RTI) Act may have helped to improve the public awareness about the government plans and funding under different heads. Public demand for better services at the grass roots level is a good way to improve the delivery of publicly funded services.

Livelihood Asset / Context	Meaning	Examples obtained from the Field Visits
Resource access institutions	The social norms, customs and behaviours (or 'rules of the game') that define people's access to resources	In Assam, the indigenous communities are generally less stratified as compared to the rest of the country. In the past, the availability of land and water was not a big issue. Hence, social customs and norms did not traditionally deny some ethnic / religious / social group the access to resources needed to pursue land based livelihoods.
Policy & Processes	The processes by which policy and legislation is determined and implemented and their effects on people's livelihoods	As reported by the inhabitants of Bar Ali Gaon in Jorhat district who depend upon fishing for their livelihood, the process of allotment of fishing rights in water bodies of the state is now being done through tenders where participation of organizations from other areas is possible. As many as 315 households depend solely upon fishing in the Borsola Beel (a local water-body of about 89 hectares) for their livelihoods. The fishing rights of their cooperative society will expire in 2017. Thereafter, their livelihoods may face a period of uncertainty. The process of tendering for fishing rights in the state is determined and implemented by the concerned department of the State Government in a top-down manner. It affects the livelihood options of the concerned communities. In Bar Ali Gaon, the above process has created uncertainty and apprehension in the minds of the local community of about the future of their traditional means of livelihood.
Changes in the environment & climate	---	Floods in Assam carry large amount of silt, which benefits farming activities. However, in recent years, in many flood affected areas this has led to the silting up of existing water bodies. This has affected households and communities that depend upon fishing as a livelihood option. In addition, climate change may have led to changes in the pattern of rain fall in Assam. In recent years, there have been prolonged period of dry days in the months like July and August. This has affected the traditional rice crop in the state, including in flood affected areas. Now, irrigation is sometimes needed during the monsoon period to grow rice.

[The above framework has been developed based on materials from the 'Guidance Note on Recovery: Livelihood' by International Recovery Platform & UNDP-India]

Emerging Livelihoods

The occurrence of changes in the prevailing economic, political, social, environmental, cultural and other conditions have enabled the emergence of new livelihood options in the rural areas of Assam. Alternatively, these changes have pushed households and communities to consider alternatives to their existing traditional livelihoods, which are being rendered less viable with the passage of time. Some of these emerging livelihoods are briefly given below:

(a) Non-farm based livelihoods like running of shops or vocations in rural areas;

(b) Performance of wage labour to avail benefits under government schemes like Mahatma Gandhi National Rural Employment Guarantee Scheme;

(c) Various livelihood options pursued under groups like Self Help Groups (SHGs) which are promoted under government schemes or by NGOs under their funded programmes;

(d) Diversification of existing farming practices to cover new areas like livestock rearing on commercial basis, dry season crops (summer paddy, mustard, pulses etc.), horticulture (mainly vegetables) etc.;

(e) Intensification of agriculture by using recommended package of practices (for scheduling, fertilizers, crop spacing, irrigation etc.) as land availability has become an issue all across the state; and

(f) Migration of male youth to other places in the state or elsewhere in India to seek livelihoods in cities (like security guards, factory workers, service sector employees in a variety of entry level categories etc.).

It may be noted that while availing of the opportunities under the emerging livelihood options, individuals or communities need to develop an additional set of skills and knowledge. This is necessary in order that their choice(s) of emerging livelihood options become sustainable in the long run.

2.3. Vulnerability of Existing Livelihoods

The access of the people to various livelihood assets (such as natural resources, technologies, their skills, knowledge and capacity, their health, access to education, sources of credit, or their networks of social support etc.) is strongly influenced by their vulnerability context. This takes account of various hazards like:

- Trends (like economic, political, and technological trends),
- Shocks (such as epidemics, natural disasters, civil strife) and
- Seasonality (in matters like prices, production, and employment opportunities).

It is seen that the existing livelihoods are highly vulnerable as exemplified by the following analysis.

Table 2.2 – Vulnerability of existing Livelihood Strategies

Type of Hazard ⇩	Vulnerability of existing Livelihoods			
	Traditional Cultivation (rain-fed paddy)	**Crop Diversification (summer paddy, pulses, mustard etc.)**	**Allied Activities (livestock, fishing, forestry)**	**Non-farm options**
TRENDS				
Economic trends	Prices of output are increasing, but the rise of prices of inputs is reported to be higher. If the cost of own labour is included, then the rain-fed cultivation of labour may be a loss making activity in many cases.	Summer paddy is more dependent on inputs Prices of inputs (wage labour, fertilizers, diesel for irrigation, pesticides etc.) is reported increasing more rapidly than sale prices	Due to the economic trends, livelihood options in the areas of livestock and fishery need high investments that are beyond the reach of the poor and vulnerable sections	The development of the economy has been transforming the need of many non-farm livelihoods over time. Some activities performed earlier may not be needed now or a few years later, while new vocations are emerging all the time due to changes in the economy. But exercising the latter options needs skills and investments that may be beyond the reach of the poorer sections of the rural people.
Political trends	Agricultural and allied activities are progressively finding a smaller space in public discourse due to the emergence of non-agricultural sectors as drivers of economic output and growth. Consequently, agriculture and allied fields may get lesser attention from various political parties.			---
Technological trends	Innovation is needed for meeting the challenges of climate variability during the crop season.	Technological developments are increasing costs since the farmers are cultivating small plots and unable to avail of economies of scale	---	Technological developments have necessitated the acquisition of new skills for exercising many of the non-farm livelihood options

Type of Hazard ⇩	Vulnerability of existing Livelihoods			
	Traditional Cultivation (rain-fed paddy)	**Crop Diversification (summer paddy, pulses, mustard etc.)**	**Allied Activities (livestock, fishing, forestry)**	**Non-farm options**
SHOCKS				
Epidemics	All these options are vulnerable to the occurrence of disease apart from attacks on crops by disease and pests. The availability of insurance, veterinary care, eco-friendly pest control etc. is low on the ground – which increases the vulnerability of such livelihood options to disease.			---
Natural disasters	Vulnerable to flooding during growing phase Also, erosion and sand casting may affect the soil in subsequent seasons	Less vulnerable to flooding, but erosion and sand casting may affect the soil	Livestock may be washed away. Fishing ponds may get affected and water bodies are prone to siltation which affects the yields.	
Civil strife	---	Civil strife may interfere with market access, even if the producing areas are strife free. In case of perishable items, the loss of free market access due to civil strife in markets or en-route may make the producers extremely vulnerable.		Civil strife in host areas may affect migrant labour who have gone to different places of India for their livelihoods
SEASONALITY				
Seasonality in prices	Vulnerable to low prices during and after harvesting season Also, farmers have low capacity to store surplus output		---	---
Seasonality in production	Highly seasonal as output is harvested during the months of November and December only	Seasonality in production exists	Some amount of seasonality exists in these sectors also, though not be as pronounced as in the case of farming	Less vulnerable to seasonality
Seasonality in employment opportunities	Engagement of self and of wage labour is seasonal, depending upon the crop calendar		---	-Do-

[The above table has been developed based on materials given at the IFAD website on 'The Sustainable Livelihoods Approach' and observations and discussions with community members during field tours and district level officials during District Stakeholders' Meetings]

Many factors make a vast majority of the rural households vulnerable to risks on account of hazards (shocks, trends and seasonality factors) of their livelihood options. These are listed below:

- Recurrence of natural disasters (floods, sand casting, erosion) in many areas during the prime cropping season from June to September;
- Damage to assets such as the sand casting or erosion of farm land, siltation of water bodies, loss of tools and livestock during floods etc. leading to closure or irretrievable decline of existing livelihood options in many areas;
- Subsistence nature of most livelihood options exercised on small parcels of land (average operational holding being just 1.10 hectares in the state) without the substantial utilization of capital, technology or innovation that can raise yields from such plots or the labour productivity that can reduce costs and improve viabilities;
- Lack of alternative livelihood options, especially in the non-farm sector;
- Non-existent or low quantum of savings in most households to tide over shocks and seasonality factors or to take advantage of emerging trends; and
- Slow break-down of existing social support systems due to political, social and economic factors such as political strife, migration of young men, recurrence of disasters in rural Assam etc.

Gender is an important issue, because women have different resources and may be more vulnerable to hazards. In addition, the elderly and the young are particularly exposed to hazards, because of their relative lack of mobility and dependence on others. The World Health Organisation estimates that between 7-10% of the world's population lives with disabilities of one form or another. The above groups are extremely vulnerable in the face of disasters.

To sum up, while exercising any livelihood option, consideration has to be placed not only upon its productive outcomes, but equally to its resilience to hazards like shocks, seasonal changes and trends. The risks on account of such hazards can pose serious obstacles to the future of many livelihoods as they impact the availability of assets and the opportunities to transform those assets into a viable livelihood. Under such conditions, people need to adapt existing strategies or develop new strategies in order to survive.

3. Impact of Floods on Livelihood Resources & Options ...

This section examines the impact of floods upon the existing livelihood assets, contexts and strategies of the households and communities inhabiting the flood affected areas of the state. This discussion is based on secondary literature as well as discussions and observations at the village and district levels carried out as a part of the present assignment.

3.1. Impact of Floods upon Livelihood Assets

It is understood that the recurrence of floods in Assam (along with associated aspects like sand casting and erosion) is having a debilitating socio-economic effect upon the rural communities of the affected areas, with very few positive outcomes.

The flooding events in Assam have the following impacts upon the livelihood assets of the households and communities.

Table 3.1 – Effect of Floods upon Livelihood Assets

LIVELIHOOD ASSET	IMPACT OF FLOODS
Human capital	As follows:
• Knowledge	Schooling of young children may be affected during the floods due to relocation, problems of accessing the schools etc. In addition, many schools serve as places of shelter, which affects a larger number of the school going children.
• Skills	---
• Health	Outbreaks of disease may occur but these are largely contained now-a-days due to efforts of the Government and NGOs.
• Ability to Work	Floods force the affected households to relocate during their period. Afterwards, efforts have to be made for reconstruction and protection of assets. All the above divert the household members from their usual vocations and interfere with their ability to work, not only during the flood period but also during the aftermath.
Social capital	The impact of floods upon the social capital (formal and informal networks that facilitate cooperation) may vary as given below. • In many places, the social networking gets strengthened while households unite to prepare for floods and face its impact. • However, shortages of food, water, shelter, medicines etc. in the relief camps may adversely affect the relations between different households who are forced to shelter together. Uneven distribution of relief materials may aggravate a feeling of injustice. Further, improper targeting of measures in the recovery phase may heighten the sense of deprivation amongst some of the households. All these may erode the existing social capital.
Natural capital	As follows:

LIVELIHOOD ASSET	IMPACT OF FLOODS
• Land	The availability of land is reduced in many places due to factors like: (a) Loss of land to erosion (it is reported that 8000 hectares of river bank land are eroded in Assam per annum); (b) Permanent water logging of land (nearly 500 km² of land is under permanent water logging or marsh in Assam, while over 1000 km² is seasonally water-logged); and (c) Sand casting of land rendering it 'useless' given the existing skills and knowledge of the community. On the other hand, in some cases (in Dhemaji), existing water bodies have become totally filled up, thereby increasing the availability of land for various purposes.
• Soil	Soil is usually fertilized by alluvial deposits of floods. However, flash floods (in areas like Dhemaji) also bring along sand and rocky materials that adversely affect the soil and render it unfit for paddy cultivation.
• Water	Rivers may change course, especially in North Bank districts (like Dhemaji). For example, the River Jia Dhal has totally dried up and the water has diverted to River Kakuri, which has many channels. Water bodies may get silted up by the deposition of sand and silt. In the Borsola Beel, the water body measures about 89 hectares. However, only 27 hectares (30% of the total area) is now fit for fishing operations. Similar effects were reported in many areas of Dhemaji.
• Fisheries	In many areas, fisheries are washed away by flood waters. This makes it necessary to strengthen the banks of the fisheries and to erect nets around the tops of banks. In many areas, communities have stopped practicing fishery as a livelihood option due to the effects of floods.
• Forests	There are few forests in the flood plains of Assam. However, many of these areas are covered by thatch, reeds, grass etc. which is collected for economic use. Sand casted land in Dhemaji is observed to be covered by thick growth of thatch, reeds, grass etc.
Physical capital	
Basic Infrastructure	Floods cause damage to public infrastructure like roads, public buildings (schools, offices etc.), power lines, water supply systems etc. This causes problems to access the sheltering persons during the relief operations and in restoring basic services during the recovery phase. In addition, the State Government has to find funds to repair the flood damaged infrastructure. Privately owned facilities like shops, warehouses, toilets etc. may get damaged which can aggravate the shortage of essential items or cause health problems.

LIVELIHOOD ASSET	IMPACT OF FLOODS
Producer Goods (tools, livestock and equipment)	Livestock may get washed away, especially during flash flooding. They may be affected by disease and lack of fodder, water, medicines etc. in the relief and early recovery phases. Immovable producer equipment may be damaged or washed away by flood waters.
Financial capital	As follows:
• Savings	Usually, to face the losses and impacts of floods, the affected households have to draw down on whatever little savings that they may possess. Repeated economic losses due to annual floods have depleted the possibilities of savings in the affected communities.
• Credit	Flood affected households need credit to restart their livelihoods. Usually, these are sourced from the local money-lenders who lend at usurious rates of 10% per month. Farmers who have availed of credit from banks have problem to repay loans which may lead to loss of assets or to lowering of credit worthiness of such households.
• Income from employment	Many land based wage employment avenues are affected due to floods. In chronically affected areas, land owners are reluctant to cultivate paddy, which reduces the employment opportunity for wage workers in operations like land preparation, sowing, care of land and harvesting.
• Remittances	---

3.2. Impact of Floods upon Livelihood Contexts

Livelihoods are formed within particular contexts such as social, economic and political contexts. Institutions, processes and policies, such as markets, social norms, and land ownership policies affect our ability to access and use assets for a favourable outcome. As these contexts change they create new livelihood obstacles or opportunities. Hence, it is useful to examine the impact of floods in Assam upon the existing livelihood contexts.

This is briefly discussed below.

Table 3.2 – Effect of Floods upon Livelihood Contexts

LIVELIHOOD CONTEXT	IMPACT OF FLOODS
Social relations	Floods may affect existing social relations on account of perceived discrimination in the provision of relief materials and in the assistance from Government / NGOs for recovery. Floods have to large scale migration of young people of many communities from the affected areas. Consequently, many economic operations have to be carried out by women, including farming.

LIVELIHOOD CONTEXT	IMPACT OF FLOODS
Social & political organization	Political organizations usually make floods as an issue in Assam during the election time. However, on account of many factors, the issue is an intractable one. Meanwhile, the public is led to believe that floods can be totally prevented in Assam, which may not be possible due to the reasons like the topography, nature of the rivers, soil conditions, funding constraints etc.
Governance	Floods can affect the quality of governance in the affected areas during the occurrence period as well as in the aftermath, as the government machinery has to focus on relief and rehabilitation operations at the cost of other aspects of governance.
Service delivery	The effectiveness and responsiveness of state and private sector agencies engaged in delivery of services such as education, health, water and sanitation is adversely affected. Many assets are damaged or destroyed. These have to be replaced or repaired, which needs funds. Usually such replacements and repairs take time, which means that in the interim period the quality of services is affected. The utilization of funds for flood damage repairs means that less funding is available for creation of new assets in the flood affected areas or elsewhere.
Resource access institutions	Floods may create barriers for sections of the community to access different assets and resources.
Policy & Processes	Most of the policies related to flood management and provision of relief and rehabilitation of affected communities are drawn up centrally without wide consultations with the flood affected communities. Meanwhile, flood affected communities have other worries and can pay little attention to the process of policy formation and legislation.
Changes in the environment & climate	The repeated incidents of floods can change the physical environment (water, soil etc.) which can affect the existing livelihoods of the affected communities.

3.3. Impact of Floods upon Livelihood Strategies

Disasters like floods adversely impact the livelihoods of the affected households and communities. They deprive people of their sources of employment or reduce their ability to raise income, and thus diminish (permanently or temporarily) their capacity to make a living.

This is true for the state of Assam, where nearly two fifths (39.5%) of the state's area has been declared as flood prone by *Rashtriya Barh Ayog* (RBA). Over 8,000 hectares of river bank land gets eroded every year on an average. While the State Government has reported that over half of the flood prone area of the state has been accorded protection from floods, it may not be possible to prevent floods in every nook and corner of the state.

The recurrence of floods has a significant impact upon the existing livelihood strategies of the households and communities. Depending upon the range of assets and contexts, the range and diversity of existing livelihood strategies can vary. An individual may take on several activities to meet his/her needs. One or many individuals may engage in activities that contribute to a collective livelihood strategy. Such activities may be impacted by the occurrence of floods on a regular basis. Further, the regular occurrence of floods can adversely impact livelihood assets and contexts can narrow the livelihood options available to the individuals and communities. The impact of floods upon the agricultural and related sector and upon non-farm livelihoods has been captured in the following tables.

Table 3.3 - Impacts of Disasters on livelihoods linked to the agricultural sector

Category	Loss / Damage	Duration	Remarks
Standing crops	Crop failure Loss of Income	One agricultural season	Owners face loss of output, while wage labourers face loss of workdays
Crops not planted	-Do-	-Do-	-Do- [Owners save on cost of inputs)
Livestock	Loss of Income	Medium to long term	Stock may be lost Output may be affected even if stock is saved
Fishing	-Do-	-Do-	-Do-
Stored output	Destroyed	One agricultural season	Loss of seed reserves may lead to reduction of output, higher indebtedness etc.

Source: PDNA Guidelines Volume B: 'Employment, Livelihood & Social Protection' (The European Commission, The United Nations Development Group & The World Bank)

Table 3.4 - Impacts of Disasters on livelihoods linked to the non-farm sectors

Category	Effect	Duration	Remarks
ASSETS			
Buildings & Equipment	Total or partial damage leading to closure & job losses	Medium to long term	Job loss for hired labour Livelihood loss for self-employed labour
Products & Stocks	Total or partial damage of stocks and supplies	Short term	-Do-
CHANGES IN INCOME & EMPLOYMENT			
Shortage of fuel	Temporary closure	Short term	Loss of income Temporary suspension of hired labour Loss of self employed income
Power cuts	-Do-	-Do-	
Damaged roads	-Do-	-Do-	
Reduced demand	Reduced activity	-Do-	-Do-

Source: PDNA Guidelines Volume B: 'Employment, Livelihood & Social Protection' (The European Commission, The United Nations Development Group & The World Bank)

In Assam, in chronically flood affected areas; the cultivation of winter paddy is widely seen as a risky undertaking. In such areas, farmers have diversified farming operations to encompass summer paddy and other *rabi* crops (such as pulses, mustard, winter vegetables etc.). Migration is an option that is being embraced by the young males. Consequently, in many areas, women members have taken up many farming operations. Many persons have also diversified into non-farm activities, which however need new skills as well as capital and markets for sustainability.

The above aspects are discussed in the next section which discusses the coping strategies vis-à-vis floods for livelihood protection.

As an impact of floods in Assam, there is usually a reduction of income flows of families engaged in farming. Even if the productive assets (land, tools etc.) may survive relatively unscathed, and a household may still count on operating its farm and employ its labour force, the season's harvest (or the seed reserves) may be usually lost, if the period of inundation exceeds a few days. Landowners, including small ones, who give land in tenancy under a sharecropping arrangement, may receive less income from sharecroppers if farm production is affected by a disaster. Another frequent change in income flows may come about when the costs of living increases in the post-flood months - particularly for such items as food, and other essential commodities.

Self-employed and informally-hired wage workers are most likely to lose their employment and wages during the period of inactivity. In addition to a potential reduction in the demand for labour due to disaster, employment problems may be compounded by an indirect effect on the supply of labour. Certain common occupations may be overflowed by new workers (e.g., people seeking jobs as domestic servants or hawking goods and services on the street). This extra supply of labour drives remuneration down and may result in an aggravation of the employment/ livelihood impact on all households engaged in such occupations, even if the households are not directly affected by the disaster.

Appendix IV gives some photographs from the field tours that exemplify the impact of floods upon livelihood assets and contexts in the visited districts.

4. Adaptation & Coping Practices for Livelihood Protection ...

This section examines the major adaptation and coping practices adopted by the rural communities for livelihood protection. Disasters like floods cause disruptions in the living patterns of affected households and communities, interfering with their sources of food and income. In such times, the affected people use their ingenuity and abilities to help one another individually and collectively in order to meet their various needs.

'Coping' and 'adaptation' are terms used to refer to strategies are used by the affected households and communities to address disruptions. The ad-hoc short term measures are termed as 'coping', while 'adaptation' refers to actions over a longer time frame, which become a part of the culture of affected communities. Both terms are clubbed together in this discussion as 'coping and adaptation practices'.

4.1. Adaptation & Coping Strategies for Agriculture

Rice is the main agricultural crop of Assam. Depending upon the soil, growing time, flood pattern etc. different varieties are grown in the state from time immemorial.

In the flood prone areas of Assam, farmers traditionally used to follow the practice of mixed sowing of *ahu* (pre-autumn upland rice) and *bao* (semi-deep and deep water rice) rice. This provided an insurance against the total crop failure in the event of drought or flood. In the years of early season deficit rainfall, the drought tolerant *ahu* rice became successful and the *bao* crop failed. However, if there was early season flood, then the flood tolerant *bao* crop became successful. Hence, mixed cropping of *ahu* and *bao* traditionally provided a minimum assured yield in the event of abnormal rainfall.

However, the flood pattern has changed in the past decades due to various factors, with the siltation of River Brahmaputra and the increased levels of climate variability being the major ones. In areas that were usually flood free, the farmers of Assam had traditionally cultivated winter rice during the rainy season. This crop is planted during the monsoon months and harvested in the winter months of November or December after a long gestation period of 5-6 months. However, the growing months coincide with the flood period. Inundation of the crop for a period beyond a few days may result in damage of standing crops. In many flood free areas, there have been incidents of flooding in the recent past.

In the flooded areas of the state, the following adaptation and coping strategies have been developed and used to address to disruptions due to floods in the area of agriculture:

(a) Growing HYV rice during the monsoon months with shorter gestation periods of 80-110 days that may be less vulnerable to flooding in lieu of traditional varieties which need 120-150 days and may be more affected by flood events;

(b) Cultivation of 90 days variety like Luit or Kopili by direct seeding in case floods subside before 1st week of September (the cut off date for start of cultivation of winter rice);

(c) Cultivation of submergence resistant varieties of paddy like Swarna Submergence 1 variety [developed by Indian Council of Agricultural Research (ICAR), the International Rice Research Institute (IRRI)] that can tolerate about 7-10 days of submergence;

(d) Cultivation of the following varieties of summer paddy, which mature during the flood free summer months under irrigated conditions (through means like Shallow Tube Well/ Low Lift Pump) and can be harvested before the onset of the rainy season:

- *Boro* paddy (sown in November–December and transplanted in next month);
- Early *ahu*, which is sown in mid-February and transplanted in end of March;

(e) Cultivation of other *rabi* season crops like mustard, pulses or *rabi* vegetables during the flood free dry season;

(f) Cultivation of deep rooted crops in sand casted areas or alternatives like cucurbits (melons, pumpkin etc.), ground nuts etc.

During the field tours, details regarding the following practices have emerged from discussions and observations.

1. Cultivation of Summer Paddy under Irrigated Conditions

Summer paddy is grown in the late winter and harvested before onset of rainy season after duration of 5-6 months for *boro* paddy and 4-5 months for early *ahu*. It is grown in Mayong Block of Morigaon district with irrigation being provided by the following methods:

(a) Low Lift Pump based system
(b) Individual Shallow Tube Well

In the former case, the River Kopili is used as the source of water as it is a perennial river. The water is pumped and led into fields by concrete canals. This has enabled the cultivation of summer rice in a huge field that regularly gets submerged during the monsoons and is unfit for normal paddy cultivation in the rainy season.

Cultivation of summer rice in flood prone area using Canal Irrigation fed by Low Lift Pump (LLP) in Morigaon

The adjacent photograph shows a concrete canal that irrigates a vast field in Baha Pahar, Mayong Block in Morigaon. The field is usually flooded in the rainy season, as the boat lying near the canal will attest.

The cost of production is about Rs. 3000-3500 per bigha (on cash basis, excluding self labour and non-cash costs like harvesting cost which is paid in kind). The yields of paddy can go up to 30 maunds per bigha (8.3 MT per hectare).

Pumping of Water by LLP into Head of the Canal System

The above canal is fed by a Low Lift Pump (LLP) array using the perennial River Kopili as the source.

The photograph on the left side shows a LLP system pumping water into the head of the canal system in Baha Bazaar in Mayong Block, Morigaon District.

Field Irrigated using STW Pumpsets

The Shallow Tube Well (STW) pump-set uses diesel to draw up ground water to irrigate a field cultivated with summer paddy in Sengmari near Pobitora Bridge in Mayong Block, Morigaon District.

The cost of cultivation using STW pump-sets for irrigation is costlier than using canal irrigation. Farmers have reported that they have to spend Rs. 1500/- per bigha for the cost of diesel. The water table is about 170 feet below the ground level in this area.

The use of surface water for irrigation usually entails higher initial investments (usually borne by the State Government), but reduces the cost of operations for the cultivation of summer paddy during the dry season.

2. Commercial Cultivation of Rabi Vegetables

Vegetables are cultivated in many rural pockets on a commercial basis. This is usually carried out in areas near urban centres. This ensures ready access to markets that can sustain the above activity. Another necessity is that farmers need to develop skills to cultivate different vegetable crops and they need to be trained / apprised about the package of practices for different crops.

In the present instance, vegetables are being grown on a relay basis by the Raja Mayong Seuji Vegetable Grower Committee on a 20 bigha (2.7 hectare) plot of land. The committee has 10 members. Vegetables found to be grown in the third week of February 2015 include chilli, sweet corn, lettuce, basil, onion, sugandhi etc. These will be replaced by *kharif* vegetables (gourds, okra, pumpkin etc.) in the coming months.

Further, it may be noted that the initial impetus came from one indigenous person who has settled down in the locality after migrating from Bhuragaon Block of the district. The latter is a flood prone area, where *rabi* vegetables are grown as an alternative livelihood option. The cultivation of new crops usually entails the development of skills at the grass roots level along with a suitable level of familiarity with the recommended package of practices for such crops.

Commercial Vegetable Farm in Morigaon District

The farm grows vegetables on a relay system. In February, crops like onion, lettuce, bottle gourd etc. were seen to be grown. Plastic mulching is seen to be used as an innovative measure.

The farm is located at a distance of about 50 km from Guwahati and it is well connected by a black-topped road to the city. This ensures ready access to a large market.

However, market prices have fallen in Assam for vegetables owing to over-production on account of the Government policies and farmers' acceptance of vegetable production as a livelihood option.

3. Cultivation of Vegetables in Low Lying Land

The cultivation and sale of vegetables has been taken up by households of Dainigaon village near Nimatighat in Jorhat district as an adaptation strategy. The area has ready access to the large Jorhat market, ensuring the sustainability of this option. The cultivation is done in a low lying tract that becomes flooded every rainy season and remains waterlogged till mid-October. Such inundation has now rendered the above area unfit for paddy cultivation, which was earlier the main crop grown by the local people.

Vegetable Cultivation in Rabi season in Dainigaon, Jorhat District

The field gets flooded regularly by the River Brahmaputra due to an old breach in the local dyke system measuring about 1.5 km. Cultivation is not possible in the rainy season as water logging persists till mid October. Rabi crops (late season crops) are taken up only afterwards. Each household has 2-2.7 hectares of land holdings.

As the area is not far from Jorhat town and ready access is available, 30 households now have taken up the growth of late varieties of *rabi* vegetables. In addition, members of 20 households are involved in the sale of vegetables in the Jorhat town.

However, the late start of cultivation of *rabi* vegetables makes the above option less profitable - as the output reaches the market at the peak-supply period. As the fields remain water-logged, there is no possibility of cultivating early season varieties, which might have fetched better margins. Lack of irrigation prevents the cultivation of late season varieties as the moisture gets lost during the latter part of the dry season.

4. Introduction of new varieties of Winter Rice to cope with flood situation

Winter rice (locally called as *sali* rice) is grown during the rainy season, when floods can interfere with the growth by damaging or destroying standing crops. Further, delay in transplantation due to flooded fields can reduce yields.

During the stakeholders' discussions in the districts, it was stated that short duration varieties have been developed (Luit and Kopili) for post-flood period. In addition, submergence tolerant varieties have been introduced (Swarna Sub 1), which can tolerate 7-10 days of water-logging.

The State Government has developed a protocol which enables affected farmers to deal with the delayed onset of rainfall and occurrence of flood during the monsoon period. Under this, rice can be transplanted till the end of August after recession of floods. In case flood waters recede by the first week of September, direct wet seeding of some short duration varieties is possible. Submergence resistant varieties that can withstand inundation for two weeks are available. Some varieties also permit transplantation of 30-60 day seedlings. These may help the affected farming households while adapting to floods.

5. System of Rice Intensification

In order to prevent the injudicious use of water and other inputs, the System of Rice Intensification (SRI) has been propagated in many pockets of the state by the State Government as well as by NGOs with funding from donors.

Courtesy: North East Social Trust (NEST)

Field Cultivated under SRI process in Jorhat District

SRI is a process for the improvement of yield of paddy, which has been adapted for rain-fed conditions. The main tenets of SRI include:

- Careful preparation of the land,
- Keeping the soil moist rather than saturated with water to minimize anaerobic conditions,
- Planting the rice seedlings singly (instead of clumps of three or four) and spaced optimally (usually 25 cm x 25cm),
- Transplantation of the young seedlings within two weeks of sowing (in lieu of the usual practice of three weeks) to reduce root trauma and transplantation shock,
- Early and regular weeding, and
- Use of compost / farm yard manure to the extent possible.

The above system may be regarded as a suite of flexible principles to be adapted to local conditions rather than a fixed technology package. It is optimal for small and marginal farmers using household labour in farming operations. It saves water and reduces production costs, thereby boosting the incomes of such farmers.

Since Assam is particularly prone to floods, the System of Rice Intensification (SRI) is a good adaptation tool – especially for the cultivation of summer rice in order to save water needs. This also reduces the diesel costs involved in the utilization of pump-sets. This intervention can be broadened during the coming years to improve the resilience of the affected communities in identified areas.

4.2. Adaptation & Coping Strategies - other Land Based Livelihood Options (Livestock & Fishery)

The following lists some of the coping and adaptation measures followed by affected communities with regard to the practice of livestock, fishing and other land based options.

1. Construction of flood resistant fisheries

During the occurrence of floods, fish ponds and tanks are affected in a twin manner. The cultured fish may be washed away and predatory fish may enter the fishery. The water may become contaminated by floods.

As adaptation, the following measures are used:

- Strengthening and raising of the embankments; and
- Placement of nylon nets at desired height with bamboo support along the periphery of the embankments.

Fish pond at Bahapahar in Mayong Block of Morigaon District

The fish pond is located in a flood prone area that gets flooded regularly. The Block has about 170 fish farmers.

As adaptation process, the embankment of the fishery has been strengthened and raised with the passage of time.

In addition, nylon nets are erected with bamboo support to prevent the exit of cultured fish and the ingress of predatory species that may come with the flood waters.

2. Cooperative fishing in large sized water-body

The Borsola Beel is a large sized water body in Jorhat district measuring about 89 hectares. The village of Bar Ali Gaon is located on the periphery of this water body. The villagers have lost their farm lands due to erosion by River Brahmaputra and now have no land for practicing agriculture. Consequently, they have to depend upon fishing in the Borsola Beel for their livelihood. Being fisher-folk by tradition, they have been able to adapt successfully. They have formed a Cooperative Society, which has been granted the fishing rights over the water-body for a period of 7 years from 2010. Individual fishermen keep 60% of the catch and hand over the balance to the Society, which pays the State Government fees and dividends to the members.

Cooperative Fishing in Borsola Beel of Jorhat District

The adjacent photograph shows the boats used by members of the Meen Mahal Samabay Samiti of Bar Ali Gaon to fish in the water body.

Fishing is now restricted to about 30% of the water-body as a large part has become silted up due to ingress of flood waters. Besides, large tracts are covered by water hyacinth.

However, this option is virtually the sole source of livelihood to the 315 households of the above village, who lost all farm land to erosion by River Brahmaputra. Individual fishermen get to keep 60% of their catch of fish; the balance goes to the Cooperative Society.

In this manner, the households of the village have been able to adapt to the loss of farm land and successfully practice a sustainable vocation that produces output having a ready market access.

3. Poultry Farming in Dhemaji District

The Dhemaji district is mostly a long and narrow strip of land lying between the Himalayan foothills of Arunachal Pradesh to the north and the River Brahmaputra on the south. Large tracts of the district are prone to flooding, including flash flooding, erosion and sand deposition. The area around Naruathan Chari-ali suffers extensively from sand deposition due to flash floods of the River Jia Dhal (which in Assamese means a 'live wave of water'). As an adaptation based on market access, as many as 20 households in the area have taken up poultry farming (commercial broilers). The output has a ready market access as it is sold locally or sent to markets in nearby towns of Arunachal Pradesh. Poultry is preferred as the chicks gain about 2.5 kg of weight during a short period of 45 days. Unlike pig rearing which has a cycle of nearly one year, there is no need to take risks during the monsoon season. Further, poultry farming (broilers) is more profitable compared to pig rearing.

4. Dairy Farming in Morigaon

There is a substantial population of ethnic Nepali households in Sonajan Borjhari Village of Mayong Block. Mr. Chettry, is a prosperous farmer of the village and acts as the Village Headman of the above village. His fields get flooded in the rainy season and the cultivation of paddy during the rainy season is certain to get no return. Hence, he has to depend upon summer paddy. His fields are irrigated by water pumped onto concrete canals from River Kopili. This enables him to get a good crop of summer paddy. As an adaptation measure, Mr. Chettry has taken up dairy farming with cross-bred cattle. He is able to carry on with this activity, despite the high cost of cattle feed and low availability of veterinary support in the area. He now has four heads of such cattle.

Poultry Farmer of Dhemaji District

Mr. Manik Saikia of Naruathan Chari-Ali of Dhemaji is one of the 20 poultry farmers of the area. The area has been badly affected by sand casting caused by repeated occurrences of flash floods due to the River Jia Dhal. This has rendered large tracts of land 'unfit' for cultivation, as local farmers are not aware of crops that may grow in this type of soil.

As an adaptation, poultry farming of broiler chicken has picked up in the area. Ready access to markets has ensured the sustainability of this livelihood option. The output is sold in local markets and also sent to the neighbouring state of Arunachal Pradesh.

The chicks grow 2.5 kg within 45 days, which makes the rearing of broiler chicken more profitable than rearing of pigs. Further, the stock can be disposed before the onset of the rainy season. Thus, there is less risk of the livestock being affected by floods.

Cattle rearing in Mayong Block of Morigaon District

Mr Chettry (person on extreme right) has four heads of cross bred cattle, which he rears through stall feeding system.

This is an adaptation to deal with annual flooding of his paddy fields. However, he has to deal with a poor veterinary support in the area. In addition, the cost of feed is rising sharply. His cattle consume 3 bags of feed per day.

4.3. Other Adaptation & Coping Strategies for Livelihoods

In addition to the measures outlined at above for adaptation of farming and other land based livelihood options; the affected households and communities have undertaken other measures of adaptation and coping for their livelihood options.

These have been listed below.

1. Raised Granaries & Homes

The practice of raised granaries is common in the flood affected areas. In addition, homes are constructed on raised platforms or with a high plinth. The following photographs exemplify the above measures.

Granary constructed on raised concrete frame in Samarajan, Dhemaji

The construction of the granary upon concrete frame is an adaptation of the traditional system of building raised houses (also called *chang ghars*, where '*chang*' in Assamese means a raised platform constructed with bamboo and timber supports).

Utilization of concrete frame has been done in expectation of better capacity to face the occurrences of flash floods.

Construction of House on raised platform using bamboo and timber supports in the Dhemaji District

This is the traditional system of construction of homes used by the Mising community in flood affected areas.

People of other communities have now adopted this system of building homes. The photograph shows the construction of a house in the Samarajan area, which is inhabited by non-tribal communities.

Home built on raised earthen plinth (Theng Bhanga Village, Mayong Block of Morigaon)

In the Morigaon district, the construction of homes and granaries is done by constructing a raised plinth using earth.

The concept of raised timber platforms is not used in this area. In the western areas of Assam, raised plinths are more common and raised platforms are not usually seen.

2. Adaptation for Weaving

Weaving has been practiced by women of the indigenous communities of Assam. The lack of market access is hampering the development of handlooms in many parts of the state.

In Dhemaji, weaving was being practiced by using the ground and laying the threads with the support from a few bamboo / timber pieces laid down on the ground. This has been done as an adaptation since looms will be damaged by flood waters.

New System for Weaving

In Laumoria Village of Dhemaji, Mrs. Bornali Hazarika is weaving without the use of any looms. This is an adaptation to floods, since any loom will be damaged by the flood waters of the River Jia Dhal.

The threads are laid down on the ground using a few supports (bamboo or timber pieces). The system is being used to weave as many as 17 *gamochas* (Assamese towels) is a single effort.

There is no market access for the handloom products being made by Mrs. Hazarika. The output is used within the family or to greet honoured visitors as per the norm of the Assamese people.

Consequently, Mrs. Hazarika is able to engage herself and one helper for 3-4 months. Market access would have enabled her to produce output for 7 months, as stated by her. It may be noted that women members of nearly 100 households practice weaving in the area.

3. Non-farm Livelihoods

The problem with non-farm livelihoods is that the existing rural economy can support only a narrow range of such livelihoods in the flood affected areas of Assam – typically as follows:

(a) Wage labourers to work on public works or establishments like brick kilns;
(b) Artisans and other household workers;
(c) Owners of establishments in local markets and their staff members;
(d) Service providers (mechanics, tractor or tiller drivers, other specialized services etc.) depending upon the range of equipment, tools and other assets in the local areas.

Wage employment is only resorted to by those without sufficient farm lands, as the income is seasonal and very inadequate. Regarding the avenues for self-employment, the same need both capital and skills. Most households lack sufficient amount of capital to start any self-employment venture. Further, once the rural youth picks up any skills under some programme run by the Government or NGO, he or she tends to migrate to the urban or semi-urban areas where the earnings from such skills are usually higher.

4. Migration of Young Males

One coping mechanism that is being widely practiced in most flood-hit areas of the state is that young males are migrating outside their villages. Their destinations include urban areas in the state and (increasingly) locations outside Assam. The migrants widely work in low level positions such as factory workers, security guards etc. Their earnings may be transitory in nature, unless they can save the surplus of their wage earnings (including overtime) and invest the same in productive assets in their native places.

Rural Market Places in Flood Affected Areas

The adjacent photographs show two market places in the flood affected areas of the state as follows:

(a) Naruathan Chari-Ali, Dhemaji (upper photograph)

(b) Baha Bazaar, Mayong Block, Morigaon (bottom photograph).

The range of establishments is narrow as the rural economy usually lacks much depth and width. Further, most households will not be able to open an establishment as they lack capital, business experience, supply networks etc. Even if some funds are made available, they may not be able to find any unfilled niche to cater to.

In view of the above position; the avenues for non-farm livelihoods are very restricted in the flood affected areas of Assam. For example, in Mayong Block of Morigaon, such employment (excluding wage labour) was reported to be below 10% of the total employment.

Non-farm employment avenues in unsustainable areas

Wage employment may exist in units like brick kilns, stone quarries etc. that serve the booming construction sector. While providing wage earnings during the working season, these units are damaging to the environment and compromise future livelihood options.

This brick kiln in Morigaon district is being fed by fertile soil that is excavated from nearby fields. Thereby, fertile land is being rendered unfit for future cultivation. Reclamation of excavated land will be costly and time consuming affair, well beyond the financial capacity of the average farmer.

5. Increased Participation of Women in Economic Activities

In many places, the large scale migration of young males has led to increased participation of women in various economic activities, including agriculture. Among many communities, women are involved in a wide range of farming work – except for land preparation and transporting the produce back to granaries and homes. They work in sowing seeds, transplantation, weeding and cutting the harvest.

This is an example whereby a particular coping strategy (i.e. migration by young males) has cascaded and necessitated another coping measure (viz. - the increased participation by women in farming operations and other economic activities).

Women beneficiaries of MKSP scheme at Barpeta

The photograph shows women farmers of Khandakarpara Village of Barpeta district, who have benefitted from the Govt. if India funded *Mahila Kisan Sashaktikaran* Pariyojana (MKSP) sub-component of the National Rural Livelihoods Mission.

The village gets submerged during the monsoons. The women have taken up cultivation of Boro paddy during the Rabi season on a 12 bigha (1.6 hectare) plot of land.

Males play a part in land preparation, harvesting and carriage of harvested paddy to the granary. Otherwise, women farmers manage the fields.

Weaving as a traditional activity for women

Weaving is a traditional activity practiced by women in Assam. It has economic potential if market linkages are developed, and women take up the activity on a cluster basis.

Photograph shows a woman weaving a *gamocha* (Assamese towel) in Khandakarpara Village.

5. Nature & Efficacy of Government Interventions ...

5.1. Background

The aftermath of disaster is usually dealt with by the Government, with supplementary efforts being made by NGOs / International NGOs. The disaster management is done in a cycle consisting of four phases; viz. relief, recovery, reconstruction, and preparedness. Immediately after the disaster event (like flood), the priority of the Government and NGOs is to provide relief (humanitarian assistance) to prevent additional loss of lives and to extend assistance to the affected communities in matters like temporary shelter, food, clothing, medical care, water, fodder and water for cattle etc. The Government makes provisions as per the applicable norms with funds from SDRF, NDRF and other sources.

In the recovery phase, measures need to be taken for the restoration and improvement of facilities, livelihoods and living conditions of the affected communities, including efforts to reduce risks from disasters. In case of recovery from floods in Assam; the other priorities of the State Government include the clearance of affected areas by the removal of debris, dead bodies and animal carcasses and to carry out basic repairs for the restoration of public infrastructure such as roads, bridges, drinking water supply works, irrigation systems, power lines, public buildings (like schools, primary health centres etc.).

In the Government norms for assistance from the NDRF and SDRF sources; there are provisions for financial assistance to the affected households for damaged or destroyed houses and for the restoration of livelihoods of small and marginal farmers engaged in agriculture and animal husbandry, fishermen and artisans. Regarding livelihood interventions for recovery in flood affected areas of Assam, the Government measures are subsumed within the various schemes for employment generation and for the development of the agriculture and allied activities (animal husbandry, fisheries, horticulture etc.). These are discussed below in brief. It may be noted that there are no specific schemes to promote livelihoods in disaster affected areas.

5.2. Government Interventions for Wage Employment & Self Employment

The Government has several programmes for employment generation, which are being operated on an all-India basis. The major ones are described below.

(a) Mahatma Gandhi National Rural Employment Guarantee Scheme (MG-NREGS) for rural wage employment

The above scheme had been introduced in 2006 under the Mahatma Gandhi National Rural Employment Guarantee Act to enhance the livelihood security of people in rural areas. It seeks to guarantee one hundred days of wage-employment in a financial year to a rural household whose adult members volunteer to do unskilled manual work. This has been envisaged as a measure to supplement the income of rural households during the lean agricultural season.

Household members can avail of wage-employment by doing unskilled work. Works implemented under this scheme in rural areas can have a maximum of 40% as the material component for the purchase of materials. The balance has to be spent on wage payment to the job card holders who work on the project. In 2013-14, there were 4.15 million job card holders – of whom 1.25 million were provided with wage work. The average man-days generated was just 23.64 days in that year.

(b) National Rural Livelihoods Mission for self-employment

The National Rural Livelihood Mission (NRLM) has been launched in 2013 by restructuring the erstwhile Swarnjayanti Gram Swarozgar Yojana (SGSY) scheme for self-employment. NRLM seeks to develop institutions at the village, block and district levels to support Self Help Groups (SHGs) formed by women members. These SHGs are to be assisted through capacity building programmes and thereafter enabled to access a range of financial services (savings, credit, insurance etc.) and livelihood services; apart from an initial infusion of revolving funds. In addition, there would be efforts to work towards stabilizing and enhancing the existing livelihoods in rural areas and subsequently diversifying the existing livelihoods. Rural Self Employment Training Institutes (RSETIs) have been established to impart skills development programmes to benefit the rural youth of BPL families. It is envisaged that the above programme will reach all blocks and districts of Assam within 6-7 years.

(c) Prime Minister Employment Generation Programme (PMEGP)

The objective of the above scheme is to provide self-employment to the youth of India. This is being done by facilitating the establishment of business ventures, service centres, MSME units etc. with a limited quantum of bank loan and subsidy from the Government. The subsidy rate varies from 15%-35% depending upon the category of the beneficiary. Self Help Groups and Societies are also eligible for assistance under the above scheme. In 2012-13, 7336 cases were assisted under the above scheme in Assam.

In addition, the following schemes are being operated by the State Government to assist livelihoods in rural areas of the state:

- Multi Disciplinary Skill Development Programme – for creating skilled manpower and employment of rural youth, including skill enhancement of entrepreneurs;
- Mukhya Mantrir Karmajyoti Aachani – for assisting the skill development and economic uplift of traditional artisans
- Vocational Training Programme – to provide assistance to unemployed youth for self employment

5.3. Government Interventions by Line Departments in the Primary Sector

The agriculture and related areas include horticulture, animal husbandry, fishery, sericulture etc. During the field work in connection with the present assignment, stakeholders' meetings were organized at the visited districts that were attended by district level officials of the concerned

Line Departments and NGO representatives. During the above meetings; inputs were received from the participants regarding the government schemes being implemented at the district level, performance in the different primary sector areas (agriculture, horticulture, animal husbandry and fishery) in the district, challenges in the field on account of floods and suggestions for future consideration.

From the above, it is understood that the State Government is implementing the following major schemes through the different Line Departments working in the primary sector:

- Rashtriya Krishi Vikas Yojana (RKVY) supported by the Government of India including 'Bringing Green Revolution in Eastern India' (BGREI) programme;
- The World Bank supported Assam Agricultural Competitiveness Project (AACP);
- Mission for Integrated Development of Horticulture (MIDH); and
- Other schemes for development of livestock and fisheries

Additional details about the above schemes and programmes are available at overleaf.

It is seen that the above schemes / programmes can assist the development of livelihood options based on agriculture and other related areas (livestock, fishing, forestry etc.) in the flood affected areas. During stakeholders' meetings, the following pertinent suggestions were made by the district level functionaries:

(a) Cultivation of summer paddy and other *rabi* crops (potato, vegetables, pulses, oilseeds fodder crops etc.) can be taken up with government assistance in flood affected areas in lieu of winter paddy, which is affected by flooding;

(b) Regarding vegetable production, timing of output is important. Hence, cultivation of vegetables like tomato, cucumber, capsicum etc. can be taken up under poly-house with assistance from government scheme;

(c) In case of winter paddy, submergence resistant varieties are distributed by the government that can tolerate up to two weeks of submergence and give higher yields compared to local varieties of winter paddy;

(d) Pig and poultry are suggested for flood affected areas for which scheme based assistance is available, (cattle and goat rearing not being suggested for these areas);

(e) Integrated development of fish ponds with pig and duck rearing may be done with assistance from the government in order to boost the earnings of the farmers;

(f) Reclamation of derelict water bodies can be done under RKVY scheme to boost incomes of fishermen; and

(g) In areas having flash floods, rearing of fish may be done up to fingerling level (in three months) which can be sold in the market before the flood season.

Table 5.1 – Major Schemes of Line Departments linked to agricultural & related sectors

Line Department	Name of Scheme(s)	Particulars
Agriculture	Rashtriya Krishi Vikas Yojana (RKVY) including programme for 'Bringing Green Revolution in Eastern India'	
	The World Bank supported Assam Agricultural Competitiveness Project (AACP)	Although the over-riding objective is to stimulate the growth of Assam's agricultural economy, project activities are predominantly pro-poor, directed primarily at small and marginal landholders, poor fishing communities and the landless. The project also aims to empower the poor farming communities (as clusters/ groups) by providing knowledge-tools-financial support for achieving higher agriculture productivity and facilitate efficient linkages with agriculture commodity markets for better remunerative prices and thereby ensuring an increase in farm family income.
Horticulture	Mission for Integrated Development of Horticulture (MIDH)	Scheme for the holistic growth of the horticulture sector covering fruits, vegetables, root & tuber crops, mushrooms, spices, flowers, aromatic plants, coconut, cashew, cocoa and bamboo. In the case of North Eastern States and Himalayan States, the GOI contribution is 100%.
Animal Husbandry & Veterinary	AACP – Livestock Development Component RKVY National Programme on Cattle Buffalo Breeding (NPCBB)	Main programmes are aimed at: • Improvement of cattle breed by artificial insemination • Backyard rearing of poultry and production of broiler • Development programmes for rearing of pig, goat • Fodder development and popularization of stall feeding
Fishery	Freshwater aquaculture under Fish Farmers Development Agency (FFDA) – Centrally Sponsored Scheme (CSS)	Development of individual ponds for fish culture
Fishery [Continued]	Development of Waterlogged areas into Aquaculture estate (CSS)	For enhancement of fresh water fish production
	RKVY	These schemes / programmes have fishery components.

Line Department	Name of Scheme(s)	Particulars
	AACP	Under RKVY, works have been taken up to construct ponds, develop wetlands for fish farming, create fish hatcheries etc.

Source: Discussions in the District Stakeholders' Meetings, supplemented by materials from the Government websites

6. Livelihood Programming during Recovery from Floods ...

6.1. Livelihood Programming for Recovery

Disasters affect the community in several ways over a period of time. The pressing needs of the affected communities have to be addressed in many areas – food security and nutrition; water, sanitation and hygiene; shelter; health; education; protection etc. to name a few. Amidst these, the protection and development of the livelihoods of disaster affected households is becoming increasingly recognised and addressed to during the disaster recovery processes. There has been a shift in the approach of humanitarian agencies, which are becoming inclined towards taking earlier measures for recovery. The reactivation of disaster-stricken economies facilitates the transition from emergency relief to recovery. Disaster affected communities have also stated that livelihood restoration ranks as their greatest priority during recovery.

The recurrence of floods in Assam has adversely impacted the livelihood options of affected households. In response, interventions can been planned and implemented by the Government and other stakeholders to develop resilient livelihoods for people living in the flood prone areas. These include livelihood provisioning, livelihood protection, and livelihood promotion. Livelihood provisioning is a relief-based objective for the provision of critical food and non-food items necessary for survival. In the recovery stages, livelihood protection and promotion can be undertaken. Livelihood protection deals with the protection, replacement and rebuilding of productive assets needed for livelihood activities. Livelihood promotion involves measures to start and strengthen livelihoods that are economically and environmentally sustainable, apart from being resilient to future disasters.

Initially, this section outlines certain action points for developing sustainable and resilient livelihoods in flood prone areas of Assam, which have been used to finalize the study recommendations. In addition, this section also gives the suggestions received from district level Government officers during the consultative process for livelihood recovery. It also suggests some guidelines to prioritize these livelihood options.

6.2. Present Status of Livelihood Programming during Recovery

The present status of Government interventions for livelihoods has been discussed at the previous section ['Nature & Efficacy of Government Interventions']. Regarding other stakeholders, the International NGOs have undertaken several programmes for development of resilient livelihoods in flood affected areas of Assam. These are mainly focused on the following measures:

- Cash transfers to vulnerable households;
- Support to households for income generating activities;
- Supplementing Government efforts to promote *rabi* season cultivation in affected areas;

- Piloting adaptive farming practices;
- Protection of livelihood assets like granaries, water sources etc.;
- Veterinary care for livestock, fisheries; and
- Capacity building of Partner NGOs and affected communities.

The above activities help to improve the resilience of the flood affected communities to some extent. However, the sustainability of livelihood outcomes from the above interventions has to be better understood – especially in the post-programme period after the withdrawal of funding and personnel by the donor agencies.

6.3. Developing Resilient & Sustainable Livelihoods during Recovery

The existing livelihood interventions of the Government and donor agencies to address the impact of disasters are time bound in nature. During the relief phase, these mostly address livelihood provisioning for the supply of critical food and non-food items needed for survival. Livelihood protection during early recovery and livelihood promotion during later recovery receives less coverage on account of various factors. Hence, there is a need to address efforts for developing livelihoods in the recovery stages - especially for livelihood promotion which marks the transition from recovery efforts to development goals.

While developing suitable livelihood options for the flood affected communities in Assam, the following aspects to be considered:

(a) *Resilience*: the ability of the practicing household members to absorb the effects of floods and to recover from the same without recourse to outside assistance;

[The term 'resilience' is increasingly used in the context of disasters. The concept describes the ability of complex systems to absorb significant change and disturbance, while maintaining the critical relationships that enable the system to function. Inherent in the notion of resilience is the acceptance that disruption may occur and result in significant change, but that it should not lead to breakdown or catastrophic failure.]

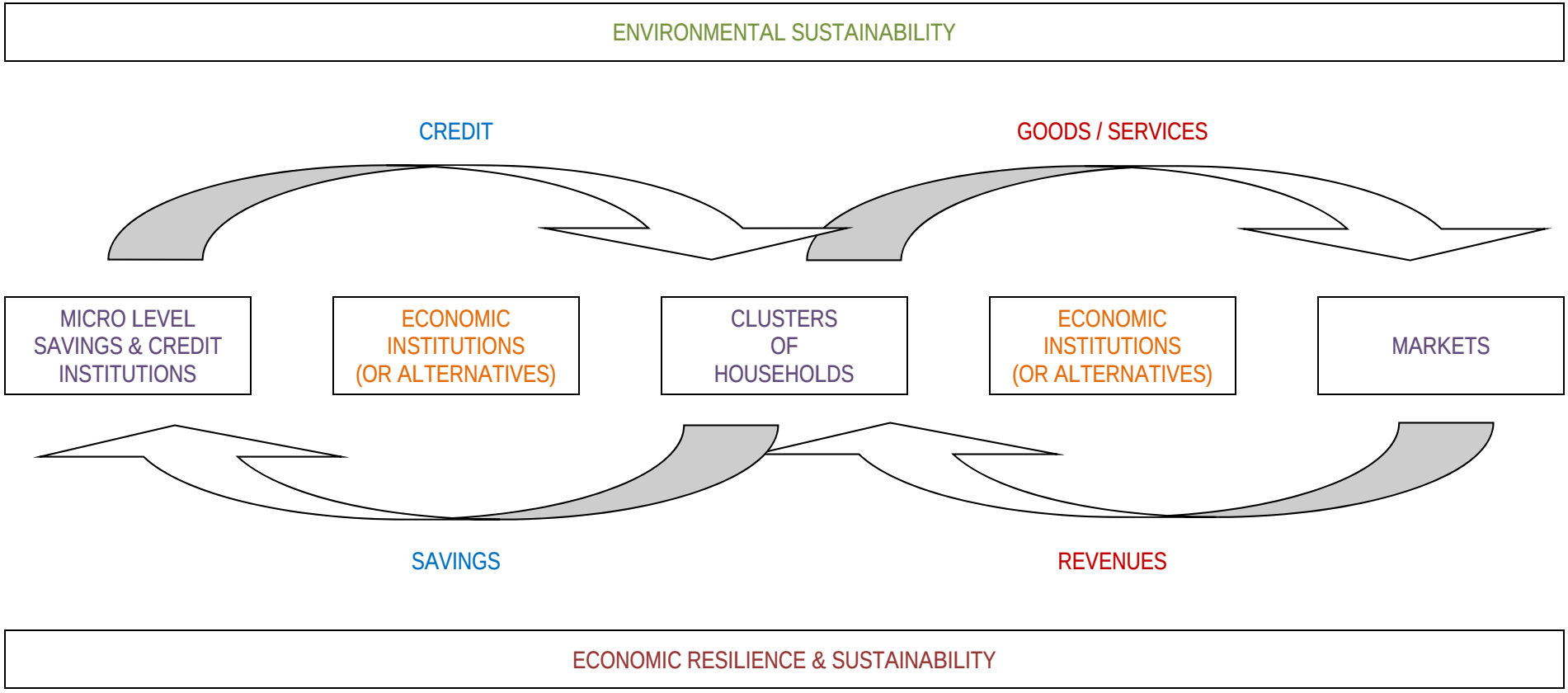
(b) *Sustainability*: the development of local capacity to address the recurring constraints.

For the development of resilient and sustainable livelihoods in flood affected areas of Assam, the following factors need to be considered in working out fresh approaches:

- Availability of markets for output and ensuring **market access**;
- Development of livelihood options on **cluster** basis;
- Availability of economically active **institutions** or alternatives;
- Building and strengthening availability of **micro-level credit and savings**;
- Ensuring **economic resilience and sustainability** and **environmental sustainability**.

The diagram at the next page depicts the role of the above factors in developing sustainable and resilient livelihoods in the flood affected areas. The above areas have been described thereafter in a brief manner.

Figure 6.1 – The Model for Resilient & Sustainable Livelihoods in Flood Affected Areas of Assam



Markets & Access

The basic criterion is that all activities undertaken for livelihood promotion need to result in the output of goods or services that address available or emerging market demand in terms of price, delivery, quality etc. There is no point in undertaking activities that fail to meet the above criteria. It is seen from field visits that alternative livelihood options (vegetable cultivation in Raja Mayong, summer paddy in Morigaon or poultry farms in Naruathan area of Dhemaji) become sustainable when they address market demand for their output (for vegetables in Guwahati, rice in Assam or meat in Arunachal Pradesh respectively in the above cases). On the other hand, the weaving activities of household members in many areas (e.g. Mrs. Hazarika of Laumoria Village of Dhemaji) remain at the subsistence level due to the lack of market access, even though the level of activity can be scaled up considerably if such access is developed.

Further, the output must have ready access to the markets. In the above examples, the improvement of rural connectivity in the past decade has helped in the quick transportation of output (vegetables, rice, poultry etc. in these cases) from rural areas to the markets.

Cluster Approach

Next, the development of activities on a cluster basis creates its own economic momentum. In case of poultry farming (in Naruathan area of Dhemaji) or summer rice in Morigaon, the activity is being undertaken by a large number of households. Hence, outside traders are willing to come to these areas on a regular basis to pick up the output whenever these are ready for dispatch. In the case of community based fishing in Borsola Beel, it is seen that a large number of households also work as sellers in the Jorhat fish market. This helps to sustain this activity over the time period. On the other hand, if some isolated household tries out an alternative livelihood, it needs to access the market on its own, which may compound the odds against such option of the household becoming sustainable in the longer run.

Economic Institutions or Alternatives

Clusters may be developed based on traditional skills of the people, availability of new markets, resource availability etc. so that the activities access some viable markets. However, someone has to take the initiative. This is the reason why the availability of economically active institutions or alternatives is necessary to develop resilient and sustainable livelihoods.

In Assam, most institutions work in the social and cultural arena. There are few examples of economically active institutions like the Meen Mahal Samabay Samiti of Borsola Beel. In order to connect the markets and (latent) clusters, there is a need to develop viable alternatives as an innovation under the proposed programme.

Micro-level Credit & Savings

Microfinance has provided rural households with an access to credit and savings. Microfinance institutions (MFIs) have been able to develop financial products tailored to the requirements of segments like farmers who receive their incomes seasonally. People who are otherwise considered as being highly risky are now able to avail of credit. They no longer have to rely upon

money lenders who charge extremely high interest rates (typically 10% per month in rural Assam). Microcredit not only serves as an alternative to high interest informal loans, but also can free many borrowers from long term debt.

In addition, there is an important role of microfinance in livelihood recovery. The local MFIs can work with affected households to enable them to replace lost assets, restart businesses, develop new livelihood strategies, and reduce risks to future disasters. Such MFIs can provide small loans for repairing or replacing livelihood assets (like homes, tools, initial stocks etc.), development of new livelihoods, financing existing debt (high-interest informal loans) etc. Loan repayment by the households can build credit worthiness, leading to larger loans and greater opportunities in the future years. Savings accounts can be opened to be used for further development of livelihoods and during times of stress.

Economic Resilience and Sustainability & & Environmental Sustainability

All the considered livelihood options must be sustainable from the economic and environmental angles. The interventions must be generating cash through market based activities rather than relying on periodic infusions of funds from donors for their sustenance. In recent years; various stakeholders like governments, donors, advocacy groups etc. have considered market based interventions as a means of strengthening the livelihoods of the rural poor, including for livelihood promotion in the recovery phase. It is necessary to engage the households in the process since these beneficiaries develop business skills and market knowledge to adapt to future changes.

The aspect of environmental sustainability is very important because rural livelihoods depend mainly upon natural resources. It is necessary to balance the economic needs with the long term capacity of the environment to provide such resources. Usually resilient, the natural environment can degrade quickly in a densely populated state like Assam when human demands outweigh its capacity to replenish itself. If no effort is made to rehabilitate the environment, it may become incapable of providing for future human needs. Sustainable livelihood recovery is not possible without active measures to conserve the natural resources on which such livelihoods rely.

6.4. Suggestions received for Livelihood Generation during Recovery

As a part of the assignment, district stakeholders' meetings were held in the visited districts. In addition, discussions were held with people in the villages. Based on the same, the following suggestions were received for the development of resilient livelihood in flood prone areas - including measures for livelihood promotion during recovery.

1. Cultivation of Paddy during the Flood Season

The practice of growing winter paddy (paddy harvested in winter after being grown during the rainy season) has totally ceased in chronically flooded areas. In occasionally flooded areas, it is practiced as a gamble by the farmer. In such areas, submergence resistant paddy varieties can be popularized as they can resist submergence for 7-10 days and give higher yields (35-50% higher) compared to local varieties.

In occasionally flooded areas, paddy seedlings can be once again transplanted if the flood waters recede by the end of August. Community nurseries need to be developed in flood free land for supplying paddy seedlings for this purpose.

Seed bank may be developed to supply seeds to households in flood prone areas to replace washed away seeds.

2. Cultivation of Paddy in the Post-Flood season

Summer paddy (*boro* paddy and early *ahu*) is being cultivated in flooded areas, especially chronically flooded areas as a substitute for winter paddy. This crop has higher yields but needs additional inputs, especially irrigation. The cost of fuel has gone up and hence irrigation using shallow tube well (STW) sets is adding up to costs and increasing the break-even yields in many areas which lack sources of surface water in the dry season.

The System of Rice Intensification (SRI) practice has the potential to bring down the consumption of water and other inputs while increasing yields through additional deployment of farm labour.

3. Cultivation of other Crops (including Horticulture)

The cultivation of other crops may be tried out in the dry season as a livelihood option in areas that are usually flooded in the monsoon months. The widely practiced crops include pulses, mustard and *rabi* vegetables. Banana may be a very suitable crop for the flood affected areas as banana trees can be used by the affected households to make rafts for traversing flooded areas during the rainy season.

The cultivation of vegetables needs to consider market conditions and early season and late season output may fetch better returns. In case vegetables are produced during the peak arrival time, then the farmer may not receive remunerative prices. Hence, the cultivation of vegetables under poly-house conditions may be considered. This will enable the grower to maximize his return. Market information needs to be collected regularly to avoid over-production of certain crops by the farmers.

In addition, value-addition of agricultural crops can be explored based on the market requirements. For this purpose, value chain analysis may be done for some crops across the state. For other crops, a district wise analysis can be carried out.

Further, there is a need to evaluate the suitable crops for lands covered by sand deposits (especially in Dhemaji). The package of practices may be developed for such crops. As suggested, some of the suitable crops for such soils may include groundnuts, cucurbits (melons, pumpkins etc.), deep rooted perennial crops etc.

4. Livestock Rearing

The suitable livestock for rearing include poultry and pig. Poultry farming needs to concentrate upon broiler production, which has a short cycle. Pig rearing can include

fattening of piglets for sale. Further, pigs and ducks may be reared with fish pond under an integrated scheme.

However, the rearing of cattle and goats is not viable in flood prone areas due to problems of feed and shelter for cattle during floods. Goats develop disease after the occurrence of floods. In addition, erosion has reduced the availability of grazing areas for cattle in the flooded areas.

Raised platforms may be constructed in flood prone areas for use as cattle shelter. The location and size of such platforms needs to be done in consultation with the flood affected community.

5. Fishing

Fisheries in flood prone areas need additional investment for protection of embankment and for protecting the cultured fish by erection of nylon nets of suitable height on the embankment. But, the investment in fishery can be profitable, especially if markets are accessible. Further, in case of fears of washing away of cultured fish, the same may be sold for table use as three month old fingerlings.

As mentioned earlier, integrated fish farming (including components for pig, fish and duck) may be considered.

6. Cross Cutting Theme – Gender

Due to the migration of male youth, women in many areas are getting involved in farming in a bigger way. This factor seems to have been considered by policy makers while framing schemes for the rural sector.

[For example, the National Rural Livelihoods Mission (NRLM) is promoting SHGs formed by women members for rural self-employment. Further, the *Mahila Kisan Sashaktikaran* Pariyojana (MKSP) has been launched as a sub-component of the NRLM for promoting sustainable agriculture for women. The MKSP projects which are under implementation in Assam would be treated as pilot projects. Subsequently, the successful interventions would be scaled up under the NRLM across the state.]

Weaving clusters need to be promoted for women in the rural areas in order to enable them to earn additional income from their homes.

7. Use of Water & Water Bodies

The flood plains of Assam face a paradoxical situation of too much water in the rainy season, leading to floods and of too less water in the dry season, which causes difficulties for farming then. In this connection, it was suggested as follows:

(a) Water harvesting structures may be developed to harvest flood waters in areas where the extraction of sub-surface water is becoming problematic over time. These structures can be used for integrated fish farming (pig + fish + duck).

(b) Reclamation of derelict water bodies may be taken up in order to use the same for different purposes.

(c) Water hyacinth that flourishes in derelict water bodies may be extracted and converted for economic use.

8. Other Suggestions

In addition, the following suggestions of relevance for livelihood options in the flood affected areas of Assam were received during the field tours:

(a) Eco-tourism may be creatively developed, as many of the flood-prone areas can hold a great appeal for some emerging segments like bird watchers (these areas harbour a wide variety of local and migratory birds), fishing enthusiasts etc.

(b) It is necessary to promote a culture of savings amongst migrant youth, who fritter their earnings on conspicuous items on return to their villages. They can be encouraged to save their surplus and invest the same in productive assets in their native villages. Financial campaigns may be targeted amongst the youth.

(c) Skill development of rural youth will enable them to explore non-farm options more fruitfully.

6.5. Guidelines to Prioritize Livelihood Options

The prioritization of livelihood options to be adopted has to be determined by the policy-makers. Some of the pertinent factors that may be considered while fixing the priorities amongst competing proposals are listed below:

(a) **Vulnerable Sections:** Needs of vulnerable sections (households headed by women, disabled and elderly persons; BPL households; SC, ST and OBC households etc.) may be accorded high priority;

(b) **Viability & Growth Potential:** Economic viability of the planned activities has to be determined while according priority, along with the growth potential of the proposed activities;

(c) **Preference of Households:** Options preferred by more of the target households in a community may be accorded priority;

(d) **Experience of Target Community:** Livelihood options that are similar to existing practices of the community and which can be adopted without much capacity building and capital need to be accorded priority, provided that these are sustainable and resilient;

(e) **Environmental Footprint:** Options having a smaller environmental footprint (in terms of effects upon soil, water, air, land, forests etc.) may be accorder priority over projects with larger footprints; and

(f) **Innovative Approaches**: Some priority may be accorded to innovative approaches which have a growth potential in the future.

7. Conclusion & Recommendations ...

7.1. Conclusion

The present assignment was undertaken as a Scoping Study to develop certain measures for building sustainable and resilient livelihoods in the flood affected areas of Assam. The same can be implemented after due deliberation and stakeholder consultations under the GOI-UNDP project for 'Enhancing Institutional & Community Resilience to Disaster and Climate Change' [2013-17].

As a Scoping Study, the present effort has relied upon the analysis of secondary data and field level interactions at the district and community levels to understand the needs of affected communities regarding livelihood protection and promotion in the flood prone areas of Assam. The recommendations given below may be used to define the scope of works to be taken up while planning and implementing livelihood generation interventions in the agricultural and allied areas under the above mentioned GOI-UNDP project.

7.2. Recommendations

As an outcome of the present assignment, the following measures are hereby recommended for policy formulation, planning and implementation under the above mentioned GOI- UNDP project; so that sustainable and resilient practices for restoration of livelihood options can be developed in the flood affected areas of Assam.

1. Development of Livelihood Activities that are Economically & Environmentally Sustainable

Livelihood programming must result in economically sustainable activities to be undertaken by the beneficiary community or households. Such activities must yield surplus products and services as required in accessible markets. The groups or individuals, who undertake these activities, must be capable of sustaining and expanding the activities with their own efforts and with minimal recurring outside assistance in the future. This can happen only if the activities result in activities that go beyond sustenance level production of goods or services.

Based on the suggestions received, some economically sustainable activities that may be taken up during livelihood interventions in flood prone areas of Assam are given as follows:

(a) Cultivation of early and late varieties of vegetables during the dry season for sale in accessible markets at remunerative prices;
(b) Cultivation of pulses and oilseeds, which are in perpetual deficit in Assam and also in the country which has to resort to large scale imports;
(c) Cultivation of viable crops like ground nuts, melons, pumpkins etc. in sand deposited areas in Assam;
(d) Cultivation of banana;
(e) Development of value added products based on the above crops (such as banana chips, edible oil from mustard and ground nut, etc.) to meet existing and emerging markets;

(f) Utilization of water hyacinth for extraction of fibre and weaving of fibre that can be converted to many items of daily use;
(g) Rearing of pigs, ducks and broiler poultry;
(h) Water harvesting structures for multi-purpose use – irrigation, fish culture, duck rearing etc.
(i) Integrated fish farming with pigs and ducks;
(j) Handloom clusters in villages inhabited by communities where women have a tradition of weaving;
(k) Development of home-stay linked to eco-tourism, river tourism etc.;
(l) Skills development of youth in viable trades such as driving (including heavy vehicles), carpentry, masonry, electrical and plumbing trades, machinery operations etc. for males and tailoring, embroidery, beauty parlour etc. for women

Further; it must be ensured that none of the adopted activities leads to unsustainable effects on the physical environment (land, water bodies and resources, soil, air, forests etc.), as such activities may become unsustainable in the longer run.

There may be vulnerable groups in the affected communities that will lack the ability to sustain a market driven economic activity, e.g. households headed by elderly persons, unskilled widows, disabled persons etc. The short term needs of such households may be served by alternative forms of assistance such as carefully targeted cash and asset transfers, materials assistance and other social welfare measures. In the longer run, development of local institutions (having an economic focus) or alternatives will be necessary in order to address the specific needs of vulnerable households, including disabled persons.

2. Identification of Viable Activities through exercises like Market Analysis and Value Chain Studies

In order to identify which activities can be sustainable, exercises like market analysis and value chain studies can be undertaken by the stakeholders.

- Market analysis refers to 'the process of assessing and understanding the key features and characteristics of a market system, so that predications can be made about how prices, availability, and access will perform in future; and decisions made about whether or how to intervene'. Such analysis will answer questions about the market size, existing levels of supply and competition, future trends, possible volumes of production, availability of inputs and services etc.

- A value chain 'describes the full range of activities that are required to bring a product or service from its conception to its end use and beyond, and includes activities, such as design, production, marketing, distribution, and support to the final consumer. The activities that comprise a value chain can be contained within a single firm or divided among different firms. Value chain activities can be contained within a single geographical location or spread over wider areas.' A study of the value chain of selected products can be carried out at the district level or at a wider level (covering a few contiguous districts having similar socio-economic profiles) in order to identify the opportunities and challenges, as well as the profitability at different stages of the value chain.

The conduct of such studies may indicate that interventions will be necessary at different points across the value chain including inputs, support services, market development etc.

For example weaving interventions may have to consider support for improved inputs (threads, tools etc.), design services, training, improvement of loom design, provision of solar lamp to enable the women to work at night, aggregation of output, logistics, marketing support etc. Livestock projects may similarly need to consider the availability of feed, development of fodder sources locally, veterinary support (doctors, medicines, vaccination etc.), and market access etc. instead of becoming limited to the supply of animals and support for erection of sheds.

While undertaking such analysis or studies, it is necessary to keep the abilities of affected communities and their economic participation in the planned activities at the centre of the exercise. In addition, members of the community can be consulted during the above process, which should reflect the views and opinion of the targeted beneficiaries. This will help the latter to understand the requirements of the targeted activities and thereby assist them in making informed choices during the implementation phase.

3. Cluster Development of Activities

Wherever possible based on market requirements, the activities may be developed on a cluster basis during the implementation of interventions. This will provide an economic momentum of its own. If there are a large number of households engaged in a similar activity to feed a large market, the producers will become benefited in a number of ways. For example, cluster development will enable them to source inputs, engage service providers and transport the output at lower unit cost. Suppliers and market intermediaries also find an economic logic in addressing a cluster of producers.

However; if the output is feeding a stagnant or slowly growing local market, then the entry of a large number of producers may lower the prices of outputs and affect the economic interests of the producer households. The planned interventions need to guard against an over-supply of goods or services that may be detrimental to the community.

4. Development of Economically oriented Institutions

Considering the existing socio-economic conditions of flood affected communities, it may not be possible for them to perform all the activities needed to sustain and expand the identified and supported activity with their own efforts. For some products (vegetables, fish, pigs etc.), local markets may exist or markets in nearby towns may be readily accessible to some persons of the villages who can act as aggregators and sellers to ensure the sustainability of the activity.

In many other activities (value added products, eco-tourism, weaving etc.) it may be necessary to access distant or dynamic markets. Accessing such markets and fully understanding their dynamics may not be possible for the individual household. In order to address these challenges, economically oriented institutions are needed like the Meen Mahal Samabay Samiti of Borsola Beel in Jorhat, which handles the bidding process and lease payments for fishing rights on behalf of its members.

Such economically oriented institutions may be locally available or they may be developed under the planned interventions with the participation of the beneficiary community and households. These institutions can play an intermediary role between markets and the community or households. They can provide services like market access and information, reasonably priced financial services (such as credit and insurance) and manage changes in the activities whenever these are needed due to market dynamics.

5. Promotion of Social Entrepreneurs

In Assam, rural institutions have traditionally been active in the social and cultural arenas. Comparatively, fewer institutions are involved in the economic arena. It may be necessary to supplement the planned development of economically oriented institutions with the promotion of social entrepreneurs.

Like the economically oriented institutions, social entrepreneurs can mediate between markets and the community or households (or SHGs). They too can provide required services like market support (access, information etc.); credit and insurance services; training and capacity development to implement new practices on the field etc. as may be required by the changing nature of the accessed markets. They can bring innovative and technology-based approaches to address the local challenges and devise sustainable solutions.

6. Provision of reasonably priced Financial Services

The sustenance and growth of economic activities will require the availability of reasonably priced financial services like credit, insurance, savings etc. at a micro-level. Grants may be given by some donor(s) for the one-time replacement of lost assets or for other short-term purposes. But, the long term development of viable economic activities needs the availability of credit to the households on reasonable terms.

Currently, the local money lender is the only available source for credit. But, such credit is provided by the local money lender at usurious rates of 10% per month, which will erode the sustainability of most economic activities. Micro-finance is available from Micro-finance Institutions at rates of 18% per annum, but availability of such credit is usually limited in the project areas. There is a need to expand the reach of such institutions while developing livelihood interventions.

The planned interventions for livelihood generation will need to address the wider availability of micro-finance in the flood affected areas. Another approach may be to assist households to open basic level savings accounts in the nearest bank branch, which can help them to access bank credit at the later stage.

7. Promotion of Financial Literacy

It will be necessary to promote financial literacy amongst the target communities. This is needed to enable them to understand the meaning of financial products like credit, insurance, and savings and use these products as aware and educated customers. This may be needed (for example) to prevent the occurrence of debt trap when micro-finance is readily available in the

project areas on account of interventions. Further, financial literacy such programmes can develop a savings culture amongst the targeted households, which will improve the credit worthiness of the saving households.

Another target for financial literacy programmes may be the youth studying in the secondary education levels (Class IX-XII). Many of these youth will migrate outside their villages for getting suitable engagement. They can save a substantial part of their earnings through overtime work. Such migrant workers can be motivated to save money and invest it on productive assets or reliable saving instruments in their native places. This will enable the workers to shift back to their homes and live off such assets, when they become older. The creation of assets will also help the local economy to generate output and employment.

8. Implementation in Coordination with Local Government Agencies / NGOs

It is necessary that the implementation of livelihood programming be carried out in coordination with the Government agencies working at the village level and with NGOs / donor agencies active in the flood affected areas of Assam. This will help to avoid duplication and waste at the community level, leading to ineffective performance and the objectives of the intervention not becoming realized at the end of the programme.

The ASDMA can work with the Inter-Agency Group (IAG), which coordinates with the work of International NGOs and donors at the state level. In the district headquarters, the DDMA can work with the District Administration to effect coordination with the associated Line Departments at the field level such as Agriculture, Animal Husbandry & Veterinary, Fishery, District Rural Development Agency, district offices of the Assam State Rural Livelihood Mission Society (ASRLMS) etc. This is necessary so that the community is not burdened by different study and assessment teams at the planning phase. During implementation, coordination is necessary to avoid confusion and wastage of funds at the beneficiary level.

9. Communication with Stakeholders

It is necessary that the objectives of the entire programme be communicated regularly to stakeholders to avoid misconceptions and wrong expectations at the field level. The stakeholders will include the affected community, the District Administration, the district offices of Line Departments, associated institutions and entrepreneurs, suppliers and aggregators, financial institutions etc.

The communications should clearly specify the objectives of the planned livelihood generation programme, components and interventions, rationale for choosing certain interventions, targets of activities, limitations, time schedules etc. The rights and responsibilities of the community and participating households must be clearly communicated at the outset. There must be a clear identification of grant based components and other components. Above all, the main message to the community is that the programme is to assist them to help themselves so that a culture of dependency upon grants and hand-outs does not develop as an outcome of the programme.

List of Appendices

Appendix I
Study Methodology & Coverage

The discussion below presents the study methodology adopted to undertake the present assignment in order to achieve the study objectives within the stated scope of work. The following may be seen in this regard.

Objective of the Study

The same are reproduced below for the ease of reference.

1. To understand the economic vulnerability of flood affected agrarian population of the state of Assam;
2. To showcase the relationship between people's livelihood resilience and their adaptive capacities;
3. To examine and recommend measures for the sustainable, adaptive and resilient practices for restoration of livelihood options; and
4. To advocate for appropriate practice and policies for risk reduction in rural economy.

Scope of Work

The scope of work of the assignment is reproduced below for the ease of reference. The same includes the conduct of a scoping study preparation of Report on livelihood generation for recovery with special emphasis on agriculture sector with the following:

(a) Study the present livelihood patterns of the flood affected community with special emphasis on agriculture sector;

(b) Assess the impact of floods on livelihood resources and options of the affected population;

(c) Present coping / adaptive practices adopted for livelihood by the agro-based community;

(d) Nature and efficacy of livelihood generation support available under existing government programmes; and

(e) Recommend measures to strengthen the economic resilience of the rural communities.

Coverage of Study

The coverage of the study included one of the most flood affected districts in each of the following Divisions of Assam. The following table gives the districts covered in the study. It may be noted that the districts were covered during February & March 2015 as a part of this assignment.

DIVISION	COVERED DISTRICTS	DATES
Upper Assam	Jorhat	11th & 12th February 2015
North Assam	Dhemaji	20th & 21st February 2015

DIVISION	COVERED DISTRICTS	DATES
Central Assam	Morigaon	17th & 18th February 2015
Lower Assam	Barpeta (*)	20th & 21st March 2015

(*) Could not be covered as planned in February 2015 as the District Disaster Management Authority was busy for preparatory works in connection with the conduct of the Barpeta Emergency Management Exercise (23rd -27th February 2015). The above district will be covered subsequently in March 2015 and findings will be incorporated while preparing the Final Report.

The impact of flood was assessed in the context of multiple drivers of the rural economy through the lens of both primary and secondary data involving interviews and focus group discussions with community members and agencies responsible to help them, review of the government programmes, and analysis of existing reports and documents to evolve possible and viable solutions to the challenges being addressed to by the present assignment.

In each district, the following activities were carried out:

District Stakeholders Meeting — To understand the district position about the study objectives from the Government agencies (Agriculture, Veterinary & Animal Husbandry, Fishery, DRDA, Block Offices, Assam State Rural Livelihood Mission etc.), NGOs etc. & get inputs on the study objectives

Focus Group Discussions in Villages — To understand the position regarding livelihoods and impact of floods / coping mechanisms from the community (incl. women, elderly persons, youth etc.) & get inputs for the development of resilient livelihood alternatives during the recovery. The following areas were covered in various districts, where the RGVN team was accompanied by the personnel of the District Disaster Management Authority who assisted in the conduct of the discussions at the village level:

Jorhat	Bar Ali Gaon	Dhemaji	Laumuria
	No 2 Sarigaon Sapori		Kesukhana
	Dainigaon		Naruathan Sari-Ali
Morigaon	Sonajan Borjhari	Barpeta	Khandakarpara
	Bahapahar		
	Diprang Bazaar		
	Raja Mayong		
	Pokoriya Beel		

The above works were successfully carried out. The stakeholders at the district level and village level were able to furnish the desired ground level inputs for farm and non-farm livelihoods which are incorporated wherever appropriate in the present report.

Some photographs are given below regarding the district stakeholders' meetings and field work carried out as a part of the assignment.

DISTRICT STAKEHOLDERS' MEETINGS

JORHAT

JORHAT

DHEMAJI

DHEMAJI

MORIGAON

MORIGAON

BARPETA

BARPETA

COMMUNITY CONSULTATIONS

BAR ALI GAON, JORHAT

DAINIGAON, JORHAT

SONAJAN BORJHARI, MORIGAON

DIPRANG BAZAR, MORIGAON

LAUMORIA, DHEMAJI

NARUATHAN CHARI ALI, DHEMAJI

KHANDAKARPARA, BARPETA

POKORIYA BEEL, MORIGAON

Appendix II
Effect of Floods in Assam

The following pages give the nature of floods in Assam, along with details about their impacts in the recorded past and effects upon livelihoods.

Major River Systems

All the rivers in Assam are liable to floods, mainly because they receive heavy rainfall a short time. These rivers are in their early stage of maturity and are very active agents of erosion. The river waters collect a tremendous amount of silt and other debris and raise the level of the river beds. Therefore, it becomes impossible for the main channel to cope with the vast volume of water received during the rains. The extremely dynamic monsoon regime vis-à-vis the unique physiographic setting of the basin has been considered as the single most important cause for frequent occurrence of flood in this region.

The Brahmaputra and the Barak are the two major river systems of the state. The Brahmaputra River originates at an elevation of about 5000m above (M.S.L.) in Tibet. The Brahmaputra River known as Tsang Po in Tibet, after a long eastward course of 1600km abruptly veers towards south around Namcha Barwa Peak (7710 m) in Eastern Himalaya. This southward course of the River flowing through Arunachal Pradesh is locally known as Siang River. It passes though tortuous course across the mountains of Arunachal Pradesh and then emerges on to the plains of Assam, Where downstream it is met by the Dihang, which is known as the largest tributary of the Brahmaputra, further fed by tributaries like Dibang Sessiri, Lohit and Noa-Dihing around Saikhwaghat.

The river known as Brahmaputra in Assam initially flows south- westward and thereafter towards west in the Brahmaputra valley. Further downstream, the river swings towards south and passes on the plains of Bangladesh. The Brahmaputra River between Nancha Barwa and the confluence with Dihang descends by about 2,200m and its water power resources have been estimated to be the third largest in the world coming after Congo and Amazon basins.

Along the northern bank the Brahmaputra River is joined by about 20 major tributaries like Subansair, Ranga Nadi, Dikrong, Gabharu, North Dhansiri, Pagladiya, Manas, Aiae, Beki, Champamati, Gangadhar, and Raidak. And the south bank about 13 tributaries like Burhi-Dihing, Disang, Dikhau etc join the river Brahmaputra

District wise Flood Hazard Index

Flood Hazard index (FHI) gives an idea on the severity of flood hazard. To find the severity of flood hazard for different district of Assam, the flood hazard was classified into 5 categories based on the frequency of inundation and weight ages were given to each category of the flood hazard zones. Weight ages were also given as per the percentage of Flood Hazard Area of its district. Finally the Flood Hazard index was calculated by multiplying the weight age given for different hazard category with weight age given for the Flood Hazard Area.

Table-A.II 1: Flood Hazard Index

Sl. No	District	District Area (Hectares)	Total Flood Hazard Area (Hectares)	Flood Hazard Area (%)	Hazard Index
1	NALBARI	110586	51737	46.78	27
2	MARIGAON	149300	107834	72.23	25
3	DARRANG	155598	116294	74.74	21
4	LAKHIMPUR	289686	153527	53.00	19
5	DHEMAJI	252527	117417	46.50	19
6	BARPETA	213851	147591	69.02	18
7	SIBSAGAR	262656	122519	46.65	18
8	JORHAT	283134	121074	42.76	18
9	UDALGURI	197518	48867	24.74	17
10	NOWGONG	400002	191193	47.80	16
11	GOLPARA	200731	76987	38.35	16
12	KAMRUP	306706	116849	38.35	16
13	BONGAIGAON	110160	41605	37.77	16
14	DHUBRI	271003	98753	36.44	16
15	DIBRUGARH	337723	117234	34.71	16
16	SONITPUR	527723	160450	30.40	16
17	GOLAGHAT	353499	104814	29.65	16
18	TINSUKIA	383365	74345	19.39	16
19	KARIMGANJ	185840	51968	27.96	15
20	HAILAKANDI	132892	32661	24.58	15
21	CACHAR	378136	92772	24.53	15
22	KAMRUP (M)	102705	21987	21.41	15
23	KOKRAJHAR	258923	33665	13.00	15
24	BASKA	262748	26191	9.97	---
25	CHIRANG	188189	13167	7.00	---
26	KARBI ANGLONG	1042757	46337	4.44	---
27	DIMA HASAO	486293	462	0.10	---
--	**TOTAL**	**7844251**	**2288300**	**29.17**	

Source: Flood Hazard Atlas for Assam State: NRSC, Government of India

Flood in Assam

Floods are a recurring phenomenon in Assam as 45% of its area in prone to floods. Assam falls in the highest rainfall intensity zone of the country where average annual rainfall ranges from 1750 mm in the plains to 6400 mm in the hill making the State very highly prone to floods. Apart from the heavy rainfall that occurs in the State, the Brahmaputra and its tributaries and the Barak river and their tributaries swell up during the monsoon on account of rains in the upper reaches of the catchment areas of various rivers in China, Myanmar and Bhutan besides the neighboring states of Arunachal Pradesh, Meghalaya, Nagaland etc.

The state has been experiencing floods every year ranging in severity from negligible to moderate to very severe. During post-independence period, Assam faced major floods in 1954, 1962, 1972, 1977,

1984, 1988, 1998, 2002, 2004, 2010 & 2012. The magnitude and intensity of flooding is dependent on deforestation, rainfall and soil erosion factors as well as physical and anthropogenic causes. The problem of flood in the plain of the lower Brahmaputra can be summarized as bank spilling, drainage congestion due to adverse outlet condition and morphologic problems caused by heavy sediment load related to land use and seismic activities.

1. Lower Brahmaputra river basins carry flows in excess of the transporting capacity within their banks. This is due to excessive precipitation in north-eastern India.
2. Heavy rainfall coinciding with river spills over a short period of time.
3. Heavy local rainfall.
4. Inadequate drainage to carry away surface water quickly.
5. Lack of proper control of land use and development works.
6. Deforestation in the upper catchment areas reducing retaining capacity of water and holding soil and consequent soil erosion resulting in silting of riverbeds.

The basin of the Brahmaputra River is among the most prone area. The problem is further exacerbated by riverbank erosion, which destroys an annual average of about 8,000 hectares of riparian land along the Brahmaputra. Floods, therefore is one of the most severely damaging disasters in the State that is recurring and has the greatest detrimental effect on not just the lives but the livelihoods of the people of the State. The most affected are the agriculture farmers who either are unable to undertake any agriculture activity in the monsoon season or often lose the standing crop and they face damage due to erosion as well.

Impact of Floods & Erosion

Annual floods between the months of May and August wreak havoc in both Brahmaputra and Barak valley in Assam. People lose their homes, livelihood and also their family members. As much as three-fourths of the State's districts are faced with it annually. The peak discharge in the Rivers varies significantly from year to year. As per Central Water Commission records, the flood affected area ranged from 4.22 million hectares in 1988 to a low of 0.19 million hectares in 1961. Around 0.475 million hectares equivalent to 19.1 per cent of the net Area Sown is chronically flood prone in the State. The history of flood occurrences in Assam indicates that after 1950, floods occurred in Assam in '54, '62, '66, '72, '74, '77, '78, '84, '86, '87, '88, '89, '90, '91, '92, '93, '94, '96, '97, '98, '99, `2000, `2011, `2012, and 2014. Therefore, floods are not a new phenomenon and many flood based disasters have occurred through the years. In fact, Assam is almost annually ravaged by floods which lead to submergence of approximately 6000 hectares of agricultural land and consequent destruction of standing crops mainly paddy.

Table-A.II 2: Flood damage Trends in the Brahmaputra Valley

Period	Average Annual Area Flooded (mha)		Average Annual Population affected	Affected population (per ha of flooded area)	Average Annual Damage (Rs in Lakh)	Value of crop lost as % of Total Damage
	Total	Cropped				
1953-59	1.13	0.10	860,000	0.8	586	66%
1960-69	0.75	0.16	5,20,000	2.0	757	92%
1970-79	0.87	0.18	20,00,000	2.3	1,518	89%

Period	Average Annual Area Flooded (mha)		Average Annual	Affected population	Average Annual	Value of crop lost as % of
1980-88	1.43	0.40	45,50,000	3.2	14,552	96%
1999-05	1.07	0.38	45,86,000	4.3	71,717	34%
2006-11	0.26	0.17	10,28,000	4.0	3,880	22%

Source: Water Resource Department

Table-A.II 3: Area & Population affected

Year	Area Affected (lakh ha)	Population Affected (lakh)	% Area Affected	% Population Affected
1953	0.8	4.1	0.02	3.80
1957	31.5	16.8	40.16	15.56
1955	14.1	8	17.98	7.41
1956	6	5.6	7.65	5.19
1957	4	3.1	5.10	2.87
1958	12.5	4.7	15.94	4.35
1959	10.4	17.6	13.26	16.30
1960	4.7	13.2	5.99	12.22
1962	16.2	40.5	20.65	27.74
1963	5.8	8.3	7.39	5.68
1964	7.6	7.7	9.69	5.27
1965	6	2.4	7.65	1.64
1966	17.8	46.5	22.69	31.85
1967	2.6	6.8	3.31	4.66
1968	4.1	9.2	5.23	6.30
1969	8.1	14.7	10.33	10.07
1970	7.2	17.1	9.18	11.71
1971	3.6	6.7	4.59	4.59
1972	11	32	14.02	17.78
1973	27.5	22.9	35.06	12.72
1974	11.2	28.5	14.28	15.83
1975	0.1	0.3	0.13	0.17
1976	5.7	14.6	7.27	8.11
1977	11	45.5	14.02	25.28
1978	3.1	9.2	3.95	5.11
1979	6.7	23.5	8.54	13.06
1980	11.6	33.6	14.79	18.67
1981	4.6	13.6	5.86	7.56
1982	6.1	14.2	7.78	6.34
1983	7.3	22.6	9.31	10.09
1984	15.2	56.8	19.38	25.36
1985	6.5	23.8	8.29	10.63
1986	4.3	23.5	5.48	10.49
1987	15.3	104.9	19.51	46.83
1988	38.2	84.1	48.70	37.54
1989	7.2	25.3	9.18	11.29
1990	4.88	16.92	6.22	7.55
1991	10	53.07	12.75	23.69
1992	2.31	9.97	2.95	3.75
1993	12.49	53.61	15.92	20.15
1994	0.53	1.77	0.68	0.67
1995	7	65.53	8.92	24.64

Year	Area Affected (lakh ha)	Population Affected (lakh)	% Area Affected	% Population Affected
1996	10.01	30.73	12.76	11.55
1997	7.53	27.51	9.60	10.34
1998	13.24	69.57	16.88	26.15
1999	2.23	8.91	2.84	3.35
2000	9.66	38.88	12.32	14.62
2001	2.03	5.43	2.59	2.04
2002	11.87	75.51	15.13	24.20
2003	9.32	56.52	11.88	18.12
2004	23.64	126.37	30.14	40.50
2005	2.22	10.25	2.83	3.29
2006	0.58	5.55	0.74	1.78
2007	15.04	108.67	19.17	34.83
2008	4.16	29.06	5.30	9.31
2009	0	0	0.00	0.00
2010	0	25.46	0.00	8.16
2011	NA	9.12	0.00	2.92
2012	15.10	36.8	19.25	11.79

Source: Central Water Commission [Vide - letter no 3/38/2011-FFM/465-556]

Table-A.II 4: Human Lives Lost

Year →	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Lives Lost	4	32	NA	19	5	4	20	14	3	115

Year →	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Lives Lost	13	10	5	57	3	19	12	37	1	116

Year →	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Lives Lost	19	40	4	67	76	2	29	57	21	16

Year →	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Lives Lost	22	90	59	15	127	232	34	28	108	12

Year →	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Lives Lost	72	7	53	37	28	125	3	36	4	65

Year →	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Lives Lost	52	497	29	7	134	40	0	12	11	149

Source: Central Water Commission [Vide letter no 3/38/2011-FFM/465-556]

Table-A.II 5: Value of damages due to Floods

Year	Damage to Crop		Damage to Houses		Damage to Public Utilities	Total damages
	Area (lakh ha)	Value in Rs. Crore	Nos.	Value in Rs Crore	Value in Rs Crore	Value in Rs Crore
1953	Neg	2.12	Neg	0.29	0.25	2.66
1954	2.7	10.62	Nil	Nil	5.147	15.767
1955	0.9	2.466	Nil	Nil	1.24	3.706
1956	0.8	3.098	8737	0.13	0.036	3.264

Year	Damage to Crop		Damage to Houses		Damage to Public Utilities	Total damages
	Area (lakh ha)	Value in Rs. Crore	Nos.	Value in Rs Crore	Value in Rs Crore	Value in Rs Crore
1957	0.2	1.007	1867	0.043	3.465	4.515
1958	0.7	1.705	2138	0.028	0.968	2.701
1959	1.9	6.065	53505	0.252	2.082	8.399
1960	2.2	0.431	773	0.064	0.083	0.578
1961	3.8	19.205	44530	0.676	0.447	20.328
1963	0.8	1.974	5030	0.081	Neg	2.055
1964	1.5	2.381	9041	0.055	0.02	2.456
1965	0.2	0.65	1616	0.03	0.01	0.69
1966	4	21.7	33296	0.59	0.24	22.53
1967	0.7	2.38	3995	0.05	0.01	2.44
1968	1.3	8.032	6656	0.329	Nil	8.361
1969	1	5.509	44491	0.863	2.096	8.468
1970	2	8.603	57746	0.89	0.936	10.429
1971	1.1	4.721	6098	0.889	0.02	5.63
1972	3.8	23.248	37139	0.668	0.234	24.15
1973	2.9	15.68	33556	0.754	0.06	16.494
1974	2.6	17.767	70664	1.407	0.065	19.239
1975	0.1	0.32	11100	0.016	Nil	0.336
1976	1.1	8.652	58817	2.745	0.583	11.98
1977	4.5	26.537	45327	1.587	2.96	31.084
1978	0.8	3.925	23423	0.294	0.05	4.269
1979	2.4	26.142	22690	1.234	0.784	28.16
1980	2.9	32.366	37457	2.235	5.199	39.8
1981	0.7	7.011	1169	0.225	0.162	7.398
1982	1	8.9	4661	0.173	12.822	21.895
1983	1.4	14.743	22939	1.157	40.279	56.179
1984	4.9	48.985	168800	1.061	0.778	50.824
1985	0.8	1.979	114390	0.004	52.754	54.737
1986	3.2	98.01	322320	0.971	105.615	204.596
1987	9.9	139.04	401110	75.21	132.35	346.6
1988	11.3	334.1	618272	103.92	225.821	663.841
1989	3.7	69.15	116051	16.25	223.223	308.623
1990	2.07	63.7	36685	4.191	6.649	74.54
1991	3.48	117.05	321355	43.166	32.428	192.644
1992	0.43	17.898	10012	2.209	4.978	25.085
1993	2.15	51.09	189645	17.77	16.46	85.32
1994	0.25	8.377	2557	0.371	0	8.748
1995	2.18	0	38644	0	0	0
1996	5.02	52.042	27539	8.074	0	60.116
1997	1.03	19.456	18104	9.985	6.92	36.361
1998	4.78	463.304	220436	33.646	82.957	579.907
1999	0.59	50.461	13280	1.499	2.185	54.145
2000	3.22	173.516	55014	16.485	54.063	244.064
2001	0.36	8.358	14680	2.595	0.196	11.149
2002	2.99	145.6	96705	41.187	566.243	753.03
2003	9.32	147	74638	18.692	181.402	347.094
*2004	11.00	92.77	415211	120.00	951.14	1163.91
2005	0.98	23.47	10789	9.344	0.068	32.882
2006	0.1	1.11	7346	1.63	0.24	2.98
2007	6.75	0	15846	0	0	0

Year	Damage to Crop		Damage to Houses		Damage to Public Utilities	Total damages
	Area (lakh ha)	Value in Rs. Crore	Nos.	Value in Rs Crore	Value in Rs Crore	Value in Rs Crore
2008	3.14	3.29	56550	0.029	0.233	3.552
2009	0	0	0	0	0	0
*2010	1.98	44.91	395372	134.10	551.38	730.39
2011	Na	Na	Na	Na	Na	Na
**2012	2.55	109.05	503743	270.37	3206.49	3591.88

Source: Central Water Commission [Vide letter no 3/38/2011-FFM/465-556]

Erosion

The severity of flood problem of the state has been further aggravated by the acuteness of erosion on both banks of river Brahmaputra and its tributaries. Studies reveal that an area of 4.27 Lakh Hectare of land has been eroded by the rivers since 1950, which is 7.40% of area of the state. The average annual rate of erosion is 8,000.00 Ha. The world's largest river island Majuli is also under the grip of erosion by river Brahmaputra and about 60% of its original area has been engulfed by the river. The width of river Brahmaputra has increased up to 15.00 Km at some places due to bank erosion. The surveys carried out at different periods reflect an alarming picture regarding widening of river Brahmaputra as follows:

Table-A.II 6: Survey Report

	Survey period	Area covered by the river Brahmaputra
1	First survey (1921-28)	3,870 km^2
2	Second survey (1963-75)	4,850 km^2
3	Third survey (2006 NESAC)	6,080 km^2

Source: Water Resource Department, Govt. of Assam

The extent of damage due to bank erosion is alarming in nature which can be seen from the following table (as assessed the Revenue Department):

Table-A.II 6: Extent of damage due to Erosion

Year	Area Eroded in Ha	Nos. of Villages Affected in No	Family affected in No	Value of property (including land loss) Rs. In Lakh
2001	5348	227	7395	377.72
2002	6803	625	17985	2748.34
2003	12589.6	424	18202	9885.83
2004	20724	1245	62258	8337.97
2005	1984.27	274	10531	1534.00
2006	821.83	44	2832	106.93

Source: Water Resource Department

The impact of flood & erosion on all aspects of people's lives and livelihood is very much evident at individual, family, and community levels. It is in general, true that the agrarian communities have become poor, marginalized, and more vulnerable to environment as well as socioeconomic changes because of the impacts of floods and water related hazards over the years. Each year, floods leave them more susceptible to the next year's flood, creating a vicious cycle of impacts and vulnerability.

Studies indicate that the severity of floods has increased over the period and that 'the flood waters which inundated an area for just few days (earlier) continued to remain flooded for several weeks (now) causing water logging and damage to crop. This also led to (increased) health hazards. Erosion and siltation too have shown a rapid increase. In recent years, the impact of climate change and weather variability or aggravating the situation has been scientifically established. After 1950, floods have been continuously occurring in the State.' (Suparana Katyainin) As per Prof. Samudra Dev Phukan "floods in Assam showed much lesser magnitude of record prior to 1950…. The magnitude increased with time and frequency of flood increased."

The seismic instability of the still rising Himalayan region aggravates the problem. The bed of many rivers like Brahmaputra, Dibang, Subansiri etc., got raised by as much as 22 cm (Brahmaputra) following the earthquake of 1950. The beds of several ox-bow lakes and swamps that acted as reservoirs of excess water too got raised. This rise of the bed reduced the volume of water the river channels, lakes and swamps could carry thereby choking them and increasing the chances of floods.

Relation between Climate Change and Occurrence of high intensity Floods

Experts predict that with global warming, the Himalayan river basins like that of the Brahmaputra river may experience increased summer flows and more flooding for a few decades initially, due to rapid melting of Himalayan and Trans-Himalayan snow and glaciers in the long run however, such rivers will face scarcity of water as a result of progressive reduction of flow as the river-feeding glaciers recede and disappear from the headstreams (kundzewicz et al., 2007). In fact, the Upper Brahmaputra river basin has already lost roughly 20% of its water reserves bound in glaciers during the thirty years between 1970 and 2000, which is equivalent to the loss of 175 cubic km of glacier mass in that period and about 7 cubic km of glacial mass lost par year (Frauenfelder and Kaab 2009). While such melting of glaciers leads to increased dry season runoff in the short term, In the long-term there could be a decline of dry season river runoff from glaciers, turning perennial rivers like the Brahmaputra into seasonal river system (Cruz et al, 2007).

As per Indian Network for climate Change Adaptation (INCCA) Report, 2010-

- ✓ The annual temperatures are set to increase from a minimum of 26.8 degree C to a maximum of 27.5 degree C in the 2030s. The rise in temperature with respect to the 1970's (climatology) shows a range between 1.7 to 1.8 degree C
- ✓ Seasonal temperatures for all the three QUMP (Quantified Uncertainty in Model Projections) simulations also projects a rise from 1.5 to 2.2 degree C, with the monsoon months of June, July, August and September showing maximum rise amongst all the season.
- ✓ The main annual rainfall over is projected to increases in the region and found to vary from a minimum of 940 149mm to 1330 174.5mm.

- ✓ Rate of increase in rainfall over Assam while projected to increase, is projected to be slightly lesser when compared to the state of Arunachal Pradesh and some parts of North Assam adjoining Arunachal Pradesh.
- ✓ On an overall the number of rainy days is projected to decline in Assam, but intensities.
- ✓ Changes in rainfall patterns and its increasing variability in the future may have some regions experiencing scarcity of rainfall and others an increase. Drought like conditions might prevail given the climatic variations expected.
- ✓ Projected increase in rainfall, rainfall intensities and accelerated summer flows may produce more frequent conditions of floods, flash floods in the Brahmaputra valley.

Extreme precipitation events (heavy rain storm, cloud burst) may have their own on the fragile geomorphology of the Himalayan part of the Brahmaputra basin causing more widespread landslides and soil erosion. The response of hydrologic systems, erosion processes, and sedimentation in the Himalayan river basins could alter significantly due to heavy rainstorms or cloud bursts in the state or in the upper catchments of the rivers in the neighboring states (Meghalaya, Arunachal Pradesh) and highlands in other countries (Bhutan, China). Some of the major flash flood episodes took place in Goalpara (2004), Bordekorai (Sonitpur, 2004), Dhemaji (Jiadhal, 2007), Lakhimpur (Ranganadi, 2008), North Kamrup (Puthimari, 2008), and Dhemaji (Nanadi, 2009). These flash floods have caused hundreds of deaths, huge economic loss and colossal damage to infrastructure and public and private property in downstream plan of Assam. Such extreme events, many of which go unrecorded due to lack of adequate hydro meteorological gauging network, may be indicators of a changing climate in this region. The southern of Nagaon district in central Assam valley and adjoining parts of Karbi Anglong from a rain-shadow zone where annual rainfall is as low as 80-1200 mm. water scarcities are a potential constraint for the people living in these areas. Absence of effective irrigation system and water harvesting practices adds to the vulnerability of the people. Lumding, located centrally in this zone shows a decline in rainfall at a rate 2.15mm per year (Das, 2004). As a result water crisis might aggravate in this region in the coming years. Over exploitation of the ground water resources in this belt is one of the probable causes of increased proliferation of fluoride contamination in the natural sources of ground water. The current spate of deforestation and degradation of primary forests will make the state even more susceptible to climate change in the coming years.

A number of studies have been conducted on Climate change impacts in Assam and some of the key findings are

- One of the major implications of climate change is its effects in forest and Agriculture. Assam being in the 7 biodiversity hotspots in India huge species diversity is going to lose its resources with the direct impact of climate change in its forests. Agricultural on the other hand is the mainstay for the people in Assam and with the cases of increasing floods, siltation problem, increased pest attack etc. It is imperative that day by day the agriculture productivity will be in the lower side. This necessitates the development and promotion of effective mitigation and adaptation strategies for **a climate-resilient agriculture production system in Northeast India**. Promotion of alternative livelihood, stress resistant crop varieties; proper dissemination of agriculture technology can help to maintain the productivity.

- With flood is associated a much greater problem of erosion which is leading to loss of agriculture land and also habitat loss. To sustain this proper **Integrated Flood and Riverbank Erosion Risk Management** system with the use of new technology like improved embankments and river guidance system is required. Promoting **alternative livelihoods for the peoples living near the riverbanks** can be suitable adaptation mechanism.

- The **impact of climate change is more prominent** among those marginalizes people who are economically and socially deprived. A means of mitigation in the form of **risk reduction or risk sharing tool needs to be development** to help those marginalized to sustain their livelihood. Micro insurance can be good option along with financial incentives with proper identification to target groups.

- **Protection of livelihood and lands from recurrent floods** for the most flooded districts along with river islands like *Majuli* should need special policy initiatives.

- Strengthening the knowledge and data base of the effected regions along with developing socially and economically **feasible adaptation measures would immensely help** in enhancing the adaptation capacity of the communities.

- Identification of most vulnerable groups from the society for the climate change related disaster impacts and **developing measures to protect** their livelihood means should be a priority. Improved agricultural infrastructures, health care infrastructure, communication and coordination among various stakeholder groups, line departments of Government, proper risk sharing tools like insurance etc. can help to enhance adaptation capacity.

Appendix III
Sustainable Livelihood Framework

The discussion given below furnishes additional details regarding the sustainable livelihoods framework introduced at Section 2. As stated previously, the above framework is an analysis tool that is useful for understanding the various factors that affect a person's livelihood and how those factors interact with each other. It may be noted that the above framework places people at the centre of a web of inter-related influences that affect how these people create a livelihood for themselves and their households.

The following paragraphs interpret the above framework and its components.

Livelihood Assets

Such assets are drawn upon by people draw upon to make a living may be tangible assets as well as intangible assets. The former category (tangible assets) can include land, livestock, tools, granaries, cash savings etc., while the intangible assets can comprise of access to services, opportunities, networks etc.

An alternate way of looking at the assets, or capitals, that is to categorize them into the following five groups: human, social, natural, physical, financial, and political capitals.

Human capital:	Skills, knowledge, health and ability to work
Social capital	Social resources, including informal networks, membership of formalized groups and relationships of trust that facilitate co-operation and economic opportunities
Natural capital	Natural resources such as land, soil, water, forests and fisheries
Physical capital	Basic infrastructure, such as roads, water & sanitation, schools, ICT; and producer goods, including tools, livestock and equipment
Financial capital	Financial resources including savings, credit, and income from employment, trade and remittances

Source: 'Guidance Note on Recovery: Livelihood', UNDP & IRP

Livelihood contexts

Livelihoods are formed within particular contexts such as social, economic and political contexts. Institutions, processes and policies, such as markets, social norms, and land ownership policies affect our ability to access and use assets for a favourable outcome. As these contexts change they create new livelihood obstacles or opportunities. These are described as follows:

Social relations	The way in which gender, ethnicity, culture, history, religion and kinship affect the livelihoods of different groups within a community

Social & political organization	Decision-making processes, civic bodies, social rules and norms, democracy, leadership, power and authority, rent-seeking behavior
Governance	The form and quality of government systems including structure, power, efficiency and effectiveness, rights and representation
Service delivery	The effectiveness and responsiveness of state and private sector agencies engaged in delivery of services such as education, health, water and sanitation
Resource access institutions	The social norms, customs and behaviors (or 'rules of the game') that define people's access to resources
Policy & Processes	The processes by which policy and legislation is determined and implemented and their effects on people's livelihoods

Source: 'Guidance Note on Recovery: Livelihood', UNDP & IRP

It may be noted that livelihoods are also shaped by the changing natural environment, such as the quality of soil, air and water; the climatic and geographic conditions; the availability of fauna and flora; and the frequency and intensity of natural hazards etc. Changes in such factors may influence livelihood decisions of the community and households.

Livelihood Strategies

The various ways in which people combine and use their assets to achieve their goals are encompassed within the term 'livelihood strategies'. These strategies are formed within the above-mentioned social, economic, political and environmental contexts, depending upon the assets at the disposal of the household or community. As a result, the type of livelihood strategies is enormous.

At the individual level, a person may take on several activities to meet his/her needs. Collectively, a group of individuals may engage in activities as a collective livelihood strategy. Further, within households, individuals often take on different responsibilities for the sustenance and growth of the family.

Livelihood Vulnerability

The strength of a given livelihood is not only measured by its productive outcomes, but equally by its resilience to shocks, seasonal changes and trends. Shocks might include natural disasters, wars, and economic downturns. Availability of resources, income-generating opportunities, and demand for certain products and services may fluctuate seasonally.

More gradual and often predictable, trends in politics and governance, technology use, economics, and availability of natural resources, can pose serious obstacles to the future of many livelihoods. These changes impact the availability of assets and the opportunities to transform those assets into a "living". Under such conditions, people must adapt existing strategies or develop new strategies in order to survive.

Livelihood Interdependence

One final important characteristic of livelihoods is their interdependence. Very few livelihoods exist in isolation. A given livelihood may rely on other livelihoods to access and exchange assets. Traders rely on farmers to produce goods, processors to prepare them, and consumers to buy them. Livelihoods also compete with each other for access to assets and markets. Thus positive and negative impacts on any given livelihood will, in turn, impact others. This is a particularly important consideration when planning livelihood assistance.

[Adopted from: 'Guidance Note on Recovery: Livelihood' by International Recovery Platform & UNDP-India]

Appendix IV
Impact of Floods on Livelihoods – A Pictorial Journey

The following photographs were taken during the field tours in connection with the preparation of the present report. They illustrate the impact of floods upon livelihood assets and contexts in the visited districts.

Silted Water bodies

Due to repeated ingress of flood waters, the Borsola Beel has become silted up. Many parts are covered with water hyacinth.

Only 30% of the water body is now available for regular fishing, which has reduced the livelihood options of the local fishermen.

Dried up River Beds

The River Jia-Dhal in Dhemaji no longer flows through its original channel. The river bed has become an expanse of sand during the dry season.

The loss of a living river is not common in a state like Assam. It can have many consequences on livelihood options like farming during the dry season, fishing etc.

Flood Damage to Houses

The house is located in a flood prone area near Nimatighat in Jorhat. It gets flooded regularly during the rainy season, forcing the household members to take shelter on the nearby embankment. This interferes with household activities and school education of the children. In addition, the household members are exposed to problems of shelter, food supplies, water and sanitation etc.

The house has to be repaired and cleaned up once the flood waters recede.

Damage to Fisheries

Fisheries in flood affected areas of Morigaon district (like the one shown in the photograph) suffer from the loss of cultured fish and invasion of predatory species which get washed up by flood waters.

In many places, new fisheries are coming up. But flooding affects them forcing the owners to come up with investment on stronger and higher banks and provision of nylon nets on the embankments.

Flooding of fertile Crop Land

The land is now under summer paddy (in February 2015) cultivated with the help of canal irrigation.

But, in the rainy season, it gets flooded totally under 5-6 feet of water. This prevents the cultivation of rain fed *sali* paddy during the rainy season. The affected households have to consider alternative livelihoods to tide over the situation.

Loss of fertile land due to sand deposition

In the Dhemaji district, vast expanses of fertile farm land have been covered by sand and gravel owing to the occurrence of flash floods by rivers descending from the Himalayan foothills to the north.

Sand-casting has been a problem that has become visible in the past decade. So far, the local farmers have not been able to find suitable crops to grow in such affected soils. This has reduced avenues for self employment as well as wage employment in such areas.

Loss of shelter due to sand deposition

In Dhemaji, many areas have become affected by the deposition of sand. Apart from rendering the fertile fields unfit for cultivation practices known to the local communities, such sand casting has also resulted in the widespread loss of shelter and public buildings such as schools. Buildings are getting progressively buried under the sand deposits.

This has made the livelihood challenges all the more difficult in such areas.

Destruction of existing groves of areca nut trees

Sand deposition in the Kesukhana Village of Dhemaji has also destroyed the existing areca nut trees, which have lost all their vegetation and fruits.

This has reduced the livelihood options of households in such affected areas.

Land degradation due to Growth of Scrub

Areas covered by sand deposits have started witnessing the growth of scrub like conditions due to the profuse sprouting of thatch, reeds, savannah grass etc.

This has converted once fertile farm land into waste land, which has become unfit to the traditional livelihoods of the local people.

Damage to existing rural road infrastructure

Existing black-topped rural roads have become covered up by sand deposits in Kesukhana in Dhemaji District.

This has impeded the pre-existing rural connectivity provided with public funding in order to improve market access for sustaining livelihoods in the rural areas.

Weak markets in flood affected areas

Market places in the flood affected areas do not have depth. This is natural considering the low purchasing capacity of the rural households in flood affected areas.

In turn, the lack of vibrant market places reduces the impact of farm based livelihood options and lowers the potential for developing non-farm livelihoods in these areas.

The following photographs have been taken by the Consultant while working on related assignments. They illustrate other effects of floods in Assam on livelihood options of the affected communities.

Erosion affected farm land in Morigaon district

Large tracts of fertile land have been lost to the River Brahmaputra owing to river bank erosion.

This has rendered large number of communities landless and uprooted them from their traditional places of stay. Now such households are largely dependent upon wage labour and migration for their livelihoods.

Water logged areas in Jorhat district

Floods also create water logging conditions long after the cessation of rains. The photograph shows water logged areas in Jorhat district in the month of September 2014 after the cessation of rainfall.

Appendix V
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