

অসম চৰকাৰ



সত্যমেব জয়তে

GOVERNMENT OF ASSAM

FLOODS AND IMPACTS ON LIVELIHOOD IN RURAL ASSAM

HOW COULD THE STATE BREAK THE
POVERTY TRAP

SPONSORED BY
STATE INNOVATION AND TRANSFORMATION
AAYOG (SITA)
GOVERNMENT OF ASSAM

PREPARED BY
COTTON UNIVERSITY, PANBAZAR
GUWAHATI



অপ্ৰমত্তেন বেদ্বব্যম্

Floods and Impacts on Livelihood in Rural Assam

How could the State break the Poverty Trap?

Study Sponsored by
State Innovation and Transformation Aayog, Assam
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Foreword

This study affirms the impact of floods, and the negative externalities subsequently generated on multiple fronts at present physical and institutional settings, are emerging as major impediment of development and persistent poverty in Assam. The HDI of Assam could have been much higher and the state would have been a front runner in India's pursuit to achieve the SDGs if the state addresses to ameliorate the negative externalities emerging from floods. It will require long term planning for appropriate land use in the river valleys, the hills of the state, and in neighbouring states as well, and even reversal of land use pattern. The study tried to understand and capture the diverse dimensions from the flood affected areas – the sufferings and coping in hostile environment; and what could be done to ameliorate the crisis and ensure wellbeing in the environ set by the nature and anthropogenic interventions.

The study is conducted on behest of the State Innovation and Transformation Aayog (SITA), Assam. Cotton University expresses gratitude to Maananiyo (Late) Dipok Kumar Borthakur, former Vice-Chairperson, SITA, Assam for his persistent concern for floods affected people of Assam and desire to have a comprehensive plan to mitigate the sufferings caused by floods. Our heartfelt tribute for Late Manijyoti Baruah, former OSD, SITA, Assam who has been warmly encouraging in the initial phase of the study.

We are also grateful to honourable Vice-Chairperson of SITA, Assam, Shri Ramen Deka; Liaison Officer Shri Dipankar Bora, and other members of SITA, Assam for their encouragement and insistence to complete the study on time.

We hope that policy makers as well as general public will find the study useful.

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Section 1: Introduction

1.1 Certain critical concerns

The proportion of people below the poverty line in Assam was 32 percent in 2012. This proportion though had declined from 37.9 percent in 2009-10, absolute number of populations living under poverty however has increased with growth of population in subsequent years. The SDG report of NITI Aayog 2020-21 states that during 2015-16 in Assam 36.2 percent people were multi-dimensionally poor; higher than the national average of 27.9 percent. The figures leave the state to accomplish certain tasks to address multiple deprivation of a significant section of people.

The Assam Human Development Report (2014) on the other hand revealed critical evidence on life expectancy, mean years of schooling, and per capita annual income in the flood affected areas (captured and presented by development blocks) of the state. The flood affected areas of the state are laggard in these vital and inclusive outcome indicators of development, face severe damages on economy and livelihood fronts, there is workdays loss, thus loss in earning; school days loss that impede human capability development process, and there is intensity of morbidity and deaths. All thus require intervention to assess the negative externalities generated by floods and what best can be achieved with appropriate institutional interventions.

There are a web of factors influencing or determining development and development indicators of Assam. The approaches for development, and development interventions need to be holistic as all the development indicators are interlinked and thus need careful monitoring on intervention for each intervention. For instance, the state cannot afford to be complacent from the higher score (78) in Sustainable Development Goal number 15, life on land, than the national average (66). One of the integrated indicators to measure uncongeniality of life on land that assumes significance or critical is the percentage increase in land area under desertification, that is sand deposition in agriculture fields of Assam. The proportion of degraded land to total land areas (about 9.5 percent to the NITI Aayog's SDG 2020-21 report) and the increase of degraded land (25 percent increase over a short time span) is considered significant. We are concerned about the outcomes of flood induced sand deposition in agriculture fields and subsequent non-feasibility of agriculture operation. The outcomes culminated in loss of income source at the poorly diversified local economy and outmigration for work, which are persistent and evident in many parts of the state. The root cause of floods and sand deposition is often indicated to anthropogenic interventions and activities of hills and mountains of the neighbouring states, country, and hills of the state as well.

Land degradation is now a widely reported phenomenon caused by floods in Assam. Satellite imagery from 1999 revealed that over 11,000 ha of land have been rendered unproductive by sand deposition only in Dhemaji district of the state alone (National Resource Management Foundation, 2006); and intensity has increased in recent years across the state as reported by the SDG report of NITI Aayog. This is evident from the field visit, particularly in the north bank of the state.

How much compensation packages would be enough to prevent the negative fallouts in floods and sand affected villages/households or resources will be required to bring back productivity of land in affected villages, is a question difficult to answer. This study throws some light on the outcomes of repeated high and frequent waves of floods; considers it futile to concentrate only on the measure of sand removal, even though the approach takes advantages technology (excavators). It will require a holistic mitigation plan.

This study re-affirms the impact of floods, and the negative externalities subsequently generated on multiple fronts in certain physical and institutional settings, are emerging as major impediment of development and persistent poverty in Assam. The HDI of Assam could have been much higher and the state would have been a front runner in India's pursuit to achieve the SDGs if the state addresses to ameliorate the negative externalities emerging from floods. It is also fact that to adopt certain interventions, the state needs to go beyond its internal jurisdiction, would require supports of neighbouring states and government of India.

This study from a sample survey estimates that 40 percent households in floods affected areas of that state earn less than Rs. 2250/ a month (income below this figure makes a household eligible to have the BPL card in Assam) from their primary occupations. The constraints put by this meagre income figure however believed to ameliorated because of two reasons – one, the support received by the households from different flagship programme of the state and two, the households now have diversified their income sources even by migrating out event to distant locations for work (outmigration for work emerged as a mode of coping). The state supported programmes have able to address certain multidimensional deprivations of people; the study confirms.

It requires long term planning for appropriate land use in the valleys and the hills of the state and neighbouring states as well in specific context, and even reversal of land use pattern. In the meantime, the state needs to continue with certain real services and regulatory supports to ensure sustainability of whatever livelihood opportunities feasible in the affected areas and address deprivations in health care provisioning, education, and basic living amenities would pull out a significant proportion of people from the poverty trap. Resource provisioning in appropriate areas of interventions, and governance of provisioning made thus remain as the critical factors. The governance component also needs to keep an eye that no negative externalities are being generated in floods affected areas by the line departments of the state (for instance, road construction, public distribution systems), rather help to generate positive externalities for speedier convergence of the efforts made. In this context convergence of the initiatives of the stare are reflected in multidimensional fronts - rural employment guarantee programmes, social assistance programme of the elderly, PDS, housing, sanitation, rural health, child development services.

Concern is that recurrent floods leave little scope to make rooms for new provisioning by the people or state, and restoration of the damage done. People, in certain pockets however have developed and provisioned their own way of coping and adaptation; calls for certain institutional supports to supplement the efforts.

1.2 How people perceive the floods

In floodplains across the world, farmers have been welcoming floods as traditional mechanism to upgrade soil quality because they enable silt deposition (Mishra 2001, D'Souza 2006, Dixit, 2009) and the state of Assam was no exception (observed in certain parts of the state). Mud values (D'Souza, 2006) or siltation drives the desire of farmers to allow floods into their agriculture fields, while this also reveals their disliking for embankments along the river course (revealed in certain locations of the state).

Evaluation of the issues on embankments in the state however reveals complexity of the problems, but perceived benefits of the people appear more. There are multiple uses of the embankments in the flood affected areas and it has clearly emerged that likening and confidence of people and the State on embankments continues. People's confidence on embankment has been responded well by the State with budgetary allocation for reconstruction of the embankment even though embankments breaches on multiple occasions. People's confidence went to such extreme that there is opinion - had there been effort of the water resource department it was possible to control the damages caused by a small river (People by the river Jiadhal, Dhemaji).

We also find that the structural measure of embankment is criticised or objected even by people on the grounds of denial of entry of fertilising silt to the agriculture fields, rise in bed levels of rivers because of sedimentation, blockage of natural drainage from the countryside and the catastrophe created on breaching. People are also aware how the landscape of the state has been entirely changed by construction of the embankments. The case of Gelahati village, in Lakhimpur is a blatant example how vast areas of productive paddy field now have converted into marshland.

Uncertainties and anxieties over the embankments however continue with probable breach by the fury of flood water. In this context there is need to perceive that the efficacy of the embankments depends on the ongoing anthropogenic activities its catchment areas of the river and treatment of the catchment areas. The negative outcomes generated by the embankments also make us think it flood management strategies are much more than mere 'river control' though embankments or excavation of the riverbeds. This issue is perceived well what we find from the recommendations of the working group on Flood Management and Region-Specific Issues for XII Plan of Government of India. Thus, it requires a review on the approaches beyond the structural approach, including the isolated approach of removal of sand from the tributaries of Brahmaputra. The state perhaps needs management of watershed of every river.

Floods are now often perceived as unusual events, frequently as a disaster (Bandyopadhyay 2009:49). The rivers in the state of Assam (Brahmaputra and Barak, and their tributaries) are perennial, and flows are very high during the monsoons. Moreover, the hydrographs of all the rivers are not the same because of differentiated characteristics of their catchments, results in differentiated level of flows. People in study localities of North Bank of River Brahmaputra have reported drastic changes in behaviours of the tributaries of Brahmaputra. River originating from the Himalayas, run off with high velocity immediately after a high rainfall, but dry up soon after. There is scanty or no water during the off-monsoon period, turning the perennial rivers to non-perennial ones.

This was not the case about two decades back and thus questions certain negative developments happening in the watersheds of the rivers.

Recent observations (also reported by people) on floods in Assam reveal that floods are more often unexpected (not related to normal precipitation level) and more damaging in nature in the forms of sand deposition and riverbank erosion (as has been repeatedly indicated). The issue of erosion though widely mentioned and debated in public, the issue of sand deposition and its determining factors find little space. Both the factors of sand deposition and erosion are irreversible damages create serious forms of livelihood crisis in the affected areas.

1.3 Some explanations on the present crisis

The earlier paragraphs though have indicated some explanations on the persistent crisis - the often-reported rising intensity of the floods and damages has two clear explanations. One, the water flow has become sudden and high, as stated in a previous paragraph; and two, people have established settlements in low lying areas. There could be few determinants for the first explanation. Certain kinds of anthropogenic activities and land use changes in the catchment areas of the rivers generate high flow of water than in general read or expected by the common people. On the other hand, human settlements in low lying and traditionally flood prone areas not only expose people to adversities (though in such situation people build their own mechanisms to adapt), but it also pushes the water level high during inundation. These phenomena are very much observed in the floodplains of Assam.

The ecology of floods is complex and intimately related to the rainfall-runoff and surface-subsurface hydrological linkages. The underground and subsurface storage of water plays a vital role in moderating and modulating the surface water regime and surface ecosystem (Newman, 1997: 72), extracted from Bandyopadhyay, 2009:52). We know that nourishment of ground water largely depends on the vegetation covers, absence of which causes sudden surface flow. This issue is convinced well by the flood affected people of the state and can be adopted as one of the approaches in flood disaster mitigation approach.

The vanishing wetlands of the state has made the crisis more intense; make the space limited for water to get accumulated or stored, and spills over to areas which were traditionally not affected by inundation. The natural depressions, swamps and lakes are considered as effective water detention basins and are less expensive mode of flood disaster mitigation. People in Dhemaji district suggest excavation along the banks of rivers, that would allow to store excess water and even sand, and thus prevent to get spilled over agriculture land.

The 20th century experienced massive growth of population in Assam from a mere 3.3 million in 1901 to 26.7 million in 2001 and 31.2 million in 2011 (population now could be around 40 million in the state); put tremendous pressure on its resources – land and forests. Increasingly a significant number of people have moved into and started economic activities in areas that are traditionally prone to natural inundation. Anthropogenic activities such as deforestation, accelerated changes in land use, conversion of wetland for habitation (we have data of Directorate of Economics and Statistics to validate), all have contributed to flood induced vulnerability in the state. It is rightly stated that natural

regulation of river flows has a history of about 8000 years, but the degree of structural interventions and flow regulations has increased spectacularly in past 100 years with advancement of technology and resources ((Bandyopadhyay, 2009:64), and we observe along with the positive outcomes many negative externalities.

The pressure on land in the state of Assam can be ascertained from expansion of area under paddy. Area under winter paddy has increased by 550,000 hectares during 1958-59 (1,307,000 ha) to 2012-13 (1,857,000 ha) and further by 22,500 hectares in 2018-19 (1,857,000 ha). On the other hand, area under autumn paddy has declined by 281,000 ha during 1958-59 to 2018-19. In case of summer paddy, the area has increased by 389,606 ha (Statistical Handbooks of Assam, 1960, 2013, and 2019). The changes of seasonal operations of paddy coverage are shaped by the effort of the people to cope and finally adapt with the inundation of flood waters, particularly in case of villages in lower Assam districts. Considering the net area sown of 2,722,530 hectares in the state and that of the plantation crops (tea and rubber) which in most of the cases does not come under conflicts with land use of paddy and flood inundation, the changes in paddy coverage reveal intense pressure on land in the state.

The National Flood Commission of Ministry of Water Resources had estimated the area vulnerable to floods in Assam at 31.60 lakh hectares. This is against 335.16 lakh hectares for India as a whole (estimates of Rastriya Barh Aayog, 2018). Assam thus accounts for 9.4 per cent of total flood prone areas in the country and affects about one third of Assam's population. Flood in 2012 had breached embankments in 53 places, brought catastrophe in many areas; and the state placed a demand of Rs. 3460 crores at Centre for repairment of the embankment. In the year 2017 there were 26 reported cases of embankment breach and in 2020 there were 220 cases of embankment breach to the information of ASDMA. In 2020 altogether 56.7 lakh people of the state affected by floods and there were 108 deaths, across the districts of Assam till July 30, 2020. The recurrences of flood and riverbank erosion (erosion has wiped out about 2500 villages till now in the state) are the major obstacles towards development of Assam. These two factors for decades as perceived have been causing huge destruction and irreparable loss to the state's economy which is largely agrarian. Moreover, in the post flood period the State face challenges to address issues relating to health of affected people and reconstruction activities to ensure the livelihood systems.

Fall of agriculture operations along with other farm based activities such as livestock rearing lead to layers of affects in the villages and society - decline in work participation, women being the most suffers to have a job, decline in food consumption and nutrition requirements, increase in workload of women to perform daily chores including accessing the water sources and sanitation provisioning in floods devastated situation and insecurity of running the household in absence of the male members who are forced to migrated out (Udas et al, 2018).

Adaptation to the situations with changed cropping pattern and high yielding varieties and quick gestation crops are visible in some localities not having the catastrophic effect of sand. However, land unavailability in rising population growth context has aggravated the situation further. The critical concern at present is how best the state could plan to use the available land resources including the homestead land. Out-migration for jobs in the context of unavailability of land and inability to invest in degraded land and to thereby to

derive a sustainable return, and subsequent discontents in the study localities emerge as concern.

1.4 Role of the state

As stated, ensuring uninterrupted access to resources and provisioning of all forms (health services, drinking water and sanitations, food, infrastructure, and educational institutions) in flood affected areas vital to lessen the sufferings. The affected people are either unable to invest to make provisioning on their own or will not invest even though are capable reading well the futility of invested in repeated waves and damages done.

Restoration of educational institutions in flood affected areas may take time and challenges emerge for making up for the loss incurred in the process of human capital formation. The impact of floods on education in terms of attendance rate is mainly attributed to damaged infrastructure such as the bridges, culverts, classroom blocks and toilets.

Incidences of untreated morbidity in flood affected areas and certain outcome indicators in health sector such as maternal health and children malnutrition (the study has some indication on this aspect) would question not only physical access but also on provisioning in the health care institutions. There are enormous issues on such contexts having serious economic and social manifestations which are often unaddressed. This study captures perspectives of people on the approaches of the state to have a measure on the requirements.

1.5 Objectives of the study have been

As the effects of floods are asymmetric –

1. How the households concentrated in remote low-lying floods prone areas have coped and adapted with adversities. Is there reflection on accumulated long-term effects on multi-dimensional deprivations?
2. Do the markets provide the farmers incentives to adapt to pursue activities during the off-floods season?
3. How are the households coping with unpredictable in nature of floods with repeated waves, sand, and riverbank erosion?
4. To what extent existing state provisioning help to address the crisis and the poverty level would vary if the factor of state provisioning is accounted.

1.6 Methodology: Capturing the impacts and outcomes

This study keeping the objectives in front to assess the differentiated outcomes of floods and to have a comparative analysis in pursuit to understand the outcomes of normal, beneficial, and catastrophic flooding and including the remoteness criterion of villages visited 83 villages across eighth districts of the state and interacted with 1100 households for a detailed study. The flood affected villages are identified with consultation of local knowledgeable people of the study districts, on occasion are purposively identified reading the newspaper reportages.

As the effects of floods are asymmetric, certain criteria were kept in mind to cover the situation in remote floods affected areas, how people with their own capabilities cope and finally adapt; or there is lack of adaptation leading to accumulation of inter-generational and long-term negative effects (persistent poverty) in such settlements.

The state also has areas of non-catastrophic floods, where the people remaining in flood-prone areas derive the benefits by adapting to the situation to ensure better agriculture returns during the floods and off-floods situation as well. People in such situation however may not be able to improve their conditions (except ensuring household food security) because of not having access to the right markets to place their produces. This study tries to assess the market factor towards ensuring a remunerative return. An exploration on presence of markets and how the markets work as institutions in remote and ecologically hostile areas are thus a matter of concern.

In certain locations of the state floods now have become unpredictable in nature with repeated waves and households are unable to read the unpredictability and thus become vulnerable weakening their adaptive capability.

Analysis thus required all the above-mentioned points from field insights; to have an understanding on possible combinations of impacts and capture outcomes of multiple natures on livelihood and poverty in the state. To unbind the poverty traps and restore as well as to plan for new livelihood options in the constrained situations it requires careful readings on the developments, understand the underlying determinants and locality specific, and inclusive mitigation approaches.

High population growth and poor social capital in certain locations of the state make the task for the state hard; and poor policy and governance in such context could aggravated the crisis further. Provisioning with clear perspectives on women's development would leave differentiated outcomes on livelihood and poverty front in flood affected areas. Such viewpoints however need to be well supported by gender sensitive policies and programmes of the state as well as comprehensive provisioning in the social sectors. This study reviews policy and programme components of the state, also draws insights from qualitative personal interviews to have an assessment on these fronts.

1.7 Organisation of the study

Section two of the report provides a brief background on education and human capability development, and the structure of occupations in the study villages. This section puts insights how floods have aggravated ecological crisis along with affecting capabilities and space of work leading to distressed diversification in the affected areas.

Section three of the report assess land resources available with the households, and agriculture activities and return from agriculture activities; how the farmers have coped and adapted in the new environment.

The fourth section assesses the availability of homestead land and to what extent farm-based activities in homestead and smallholdings could raise carrying capacity in the constrained situation. The concern is how people trapped in poverty in rural areas, and

rural out-migrants in urban ghettos could be accommodated with effective use of local resources, and if so to what extent? Concern overall is how a flood affected household could plan available physical resources and manpower in the constrained situation?

The fifth section raises the concern that flood affected households remain in flood-prone areas could derive the benefits of non-catastrophic floods, adapting to the situation to ensure better agriculture returns during the off-floods situation. People in such situation however may not be able to improve their conditions, except ensuring household food security because of not having access to the right markets to place their produces. This section assesses the nature of markets emerging in the study villages and to what extent the present forms of markets could ensure wellbeing of the people.

Section sixth assesses the credits sources for consumption and development activities in floods affected areas; finds that institutional credits with lower interested rate have probability to generate multiplier effects in the local economies.

The **seventh** section discusses to what extent out-migration for work from the flood affected and sand casted villages of Assam could be considered as a mode of coping and adaptation and the final outcomes observed on wellbeing front.

Section eight following the measure of multidimensional poverty index (MPI) identifies multiple deprivations at the household level in the areas of health, education, and standard of living and compares the deprivation to the average of the state. The concern is to what extent state supports have helped to ameliorate the deprivation level in folds affected villages.

The **ninth section** assess time loss to reconstruction activities, workdays and schooldays because of floods, state supports during the floods and discontents of people if any, there are. The time wasted and the opportunity cost/loss of the time devoted on repeated cleaning, reconstruction and maintenance of the flood affected houses are appear as major concerns affecting human development process.

Flood is an inevitable natural phenomenon, there are losses, and benefits as well. The **tenth section** concludes the study indicating critical considerations to minimise the negative externalities and ensure wellbeing of the people in floods affected areas.

References:

Bandyopadhyay J (2009) *Water, Ecosystems and Society: A Confluence of Disciplines*, Sage, New Delhi

D'Souza R (2006) *Drowned and Dammed--Colonial Capitalism and Flood Control in Eastern India*, New Delhi: Oxford University Press

Dasgupta Amrita, (2007) *Floods and Poverty Traps: Evidence from Bangladesh*, *Economic and Political Weekly*, July 28,

Dixit A (2009) 'Kosi Embankment Breach in Nepal: Need for a Paradigm Shift in Responding to Flood' *Economic and Political Weekly*, Vol. 44 (6), pp 70-78.

Mishra D K (2001) 'Living with Floods: People's Perspectives', Economic and Political Weekly, Vol. 36 (29): 2756-2761

NRMF (2006), 'Study of Siltation of Rivers, its nature, extent and magnitude of problems and their remedial measures in upper catchment of Brahmaputra River in Assam', National Resource Management Foundation, Guwahati

Newman N (1997) Land, Water and Development – Sustainable Management of River Basin System, Rutledge, London, and New York

Udas, B Pranita, A Prakash, Chanda G Goodrich (2018) Gendered Vulnerabilities in Diaras: Struggling with Floods in the Gandak River Basin, Economic and Political Weekly, April, 28

Section 2: Education and Changing Structure of Occupations and Outcomes in Floods Affected Villages

2.1 Floods aggravate ecological crisis along with affecting capabilities of people

People in the north bank districts of Dhemaji, Lakhimpur, Sonitpur and Darrang (detailed household survey however was done in Dhemaji and Lakhimpur districts) indicate destruction of forests and extraction of boulders from rivers on rising intensity of the floods in recent years. Two factors – floods on one hand (if the people fail to adapt because of lack of resources, and support provisioning as well), and erosions and sand deposition, both yielded in effective loss of resources (land) compelling a section of peasant communities to move out and even to forcefully assert their claim over state owned forest lands (we also find indication in Saikia, 2011:1). The data on the encroachment of forest and vanishing forest and wetlands in the state largely reveal this phenomenon. The case of vanishing forests surrounding the city to Guwahati to a great extent can be linked to rural distress in Assam, floods being one of the contributors.

Conversion of forests to agrarian zone and created a vicious cycle of ecological crisis in the state. The present surge of anthropogenic activities (cutting down of forest for livelihood to conversion of land for tea smallholding) along the fragile lower Himalayan zones and forested belts aggravated the crisis of sustainability. Detailed studies and mapping are required to assess the impacts in the microenvironments.

Encroachment of forest area in Assam was 259,700 ha in 2011 (Information given by the Minister of State for Environment and Forest at Rajya Sabha on December 13, 2011. Two years later in February 2013 the figure was increased to 330,400 ha (Lok Sabha question number 397, 22 April 2013). It is 12 per cent of recorded forest in Assam. More recent data of the India State of Forest Report 2021 revealed that during 2019-21, Assam has lost 15,000 ha of its forest. Encroachment can be considered as a better indicator than the change in forest cover to understand crisis of a space. Encroachment data would not only reflect loss of forest cover, but also the livelihood crisis in a locality (Das, 2011); floods and erosions being the determinants to be assumed.

We are aware that the capabilities achieved or possessed by the human being are to a large extent determined by the physical environment people live. This is one part of the explanation (the case of environmental determinism and adaptation). The other part of explanation is that even in the short run the negative externalities created by the degradation of the environment reduce or limit the capabilities already possessed by human being and subsequently affect the quality of life. This aspect is discussed in detail in this section. In this context the need of evaluating the environmental arrangements in a space emerge; how the opportunities are set or made constrained in a new environment and subsequently influence the activities of the people, try to cop, and finally adapt to the changed situation. During the field visit it was observed large scale outmigration of people from flood affected areas to work in lower end jobs outside the state (section VII). Outmigration to lower end jobs is one of the crisis indicators in flood affected areas. People's capability to cop and adapt to the crisis situations is also determined by

provisioning of certain basic services, appropriate regulations, and governance of the State.

There are ample cases that people perish from persistent deprivation and though finally get accustomed to such situations (for instance the case on Matmora in Lakhimpur district) but fail to attain capabilities to access the necessities of life and make a decent living. The life in floods affected areas of the state is so occupied with struggles that there is no space to sense whether the works being done by them are meaningful and have time for leisure or learn (the distressed lower end jobs the flood affected people now perform). The children too, who lost school days because of floods, missed the opportunities to make best use of their capabilities in the long run.

Information on educational attainment level in flood affected villages reveal that educational attainment of the head of the households largely (in 80 percent cases) confined to the high school level (Table 2.1). The proportion of illiterates found to be very high in the districts of Marigaon, Majuli and Goalpara. A tiny section has completed graduation; but there are a few post-graduates and medical graduates.

Considering the level of educational attainment and the dropout rates (27.6 % in 2016-7 to DISE data) in the state, it is difficult to say from the sample survey to what extent floods have affected the access to education or it has been a universal crisis. It is however for sure that with the level of educational attainment in the affected villages and the present level of youth unemployment rate in Assam, it would be difficult to get a decent engagement even for a general graduate or postgraduate (we find out-migrant for work at non-standard jobs of distant states who are post-graduate too). This situation is largely reflected from our analysis of occupational pattern and income in the sampled households.

2.2 The crisis and fallouts: Distressed diversification of occupational activities in the floods affected villages

This report reveals that in the study districts agriculture is prime occupation for just 42 percent of the households; the range varies from 79 percent in Dhemaji to 6 percent in floods affected villages of Sivasagar (Table 2.2). The households though are engaged in agriculture, the yield is minimal, even zero in some households. There are few who are lucky enough to get regular jobs in the organised sector, and their households could survive well amid the crises. The rest are forced to look for opportunities of any form to sustain.

Constructions job (Lakhimpur, Sivasagar, Marigaon and Dhubri; largely facilitated by NREGA), Fishing (Sivasagar), Manufacturing sector jobs (Dhemaji and Lakhimpur households, but in distant locations, outside the state), petty trades (Dhubri, Bongaigaon), emerges as prime activities of the household heads beyond agriculture. These categories of jobs perhaps the first jobs, a person irrespective of skill and educational attainment can enter at ease to make a living.

On the question of attainment of skill field interactions reveal that it is not educational attainment levels, but aptitude to acquire skill and perseverance matter to find and sustain in job, employment, and labour markets in manufacturing sector of distant places. It does

not require much time to get accustomed to a semi-skilled job in a plywood, biscuit, ice factory or even motor parts manufacturing units. This is the reason that the distressed youths, irrespective of just literate to graduate crowd in all forms of jobs and it is difficult to draw a linear linkage on the types of jobs and education attainment levels of the migrant workers in all informal and non-standards jobs across the unorganized and even in organized sectors.

The required skills to work in a plywood factory can be acquired in about 2-3 months' time. Field visit revealed preference of employers for workers from Assam. For instances, in the plywood factories of Perumvavoor, Kerala workers from Assam now account about 80 percent of the total workers. The presence of workers from Assam is also reported in rubber, plastic, and spice factories as well as in non-standard jobs of hotel and hospitality sector. What makes the workers from Assam preferred in non-standard job sectors? The entrepreneurs have likening on their amiable nature, industrious character, efficiency and withstand long hours of work with little resentment.

Field data on place of work reveal that in 29 percent cases of entire sample of the study the heads of the households are now work outside their villages for livelihood (Table 2.3). Many people now forced to move out to distant locations outside the state for work (11 percent of the sample in case of Dhemaji, 14 percent in Lakhimpur). Section VII of this study shall have some detailed discussion on migration and livelihood.

Field level data reveal diversification of occupations, but with poor level of wages and earnings. For example, in the study villages of Dhemaji district monthly return from primary activities is less than Rs. 2250/ a month (the figure that now determines poverty line in the state) in 78 percent households. Overall, the study found that about 40 percent of the households in the study villages return from the main activities is meagre – less than Rs. 2250/ (Table 2.4); compelling the households to diversify the sources of income for survival. The relatively higher figure of maximum earning some of the households in the villages/districts reveal persistent inequality in the floods affected areas. There is scope to address how the inequality has aggravated over the years.

Estimated monetary value of produces (monthly income) from agriculture is less than Rs. 2250/ per month in all the study villages/districts except Morigaon (average Rs. 10734/) and Dhubri (Rs. 4182) Table (2.5). Section III shall have some explanations how the floods affected villages of Mariagon have able to cope with adversities of floods to carry on agriculture activities.

In addition to floods, unremunerative income from agriculture is one of the causes of shift to non-agriculture activities. Average monthly earning from non-agriculture activities in floods affected villages appears to be decent (Table 2.6); but high variation of income (maximum and minimum income) reveals persistent inequality; all workers with differentiated capability not able to ensure decent return from their endeavour or jobs.

It has emerged that many youths now have moved out of the districts to outside the state in search of a decent income. The decision to move outside out is determined by certain factors. One, the jobs that are locally available are intermittent and do not help to derive a decent sustainable income. Moreover, intermittent nature of jobs creates a form of

dependency on the employers. This was revealed by the youths who have migrated to Kerala to work in the plywood factories. There are enough jobs in the factories and the return are decent compared to what the youth get back at home. Uncertainties in the access of jobs now create a form of dependency back home and this appears as a prime factor of massive out-migration of youth from the crisis ridden state.

Two, the composition of the family also acts as determinant in decision to move out. It appears that in migrants' households there are multiple male members and in households with single male member we generally do not find people who have moved out.

The workers gain economically migrating out to distant places for job (Table 2.7). The table also reveal that there is less variations in income earned by the workers migrating out; and a homogenous income is ensured in the jobs involved, unlike the jobs involved back at home.

Altogether 59 percent households in Dhemaji, 40 percent in Lakhimpur, 49 percent in Sivasagar, 19 percent in Goalapra and 15 percent in Majuli have gone for subsidiary activities to supplement household income (Table 2.8). Average earning from subsidiary activities of various forms is though meagre from the intermittent jobs (Table 2.9); provide ample relief to the households working near their homes (Table 2.10).

Subsidiary jobs are mostly construction works generated by NREGP, livestock rearing, and activities generated by SHGs. The SHGs, particularly of women chose varied nature of activities primarily in the farm sector Livestock (piggery, goat and milch animal) and poultry and duck rearing are the commonest activities. Rabi crops cultivation and pisciculture are other farm sector activities preferred by the groups, but requires additional care and efforts, including of land. There are also cases that some of the groups have gone for horticulture, including of ginger and turmeric; for intensive use of land resources however it requires more investments, time, and efforts.

On non-farm sector women centric activities of tailoring and embroideries are also present. In addition, activities of motor parts shop, utensil shops, other petty shops and DTP and cycle repairing are some of the activities people try for livelihood. On the other hand, return from weaving activities cannot be considered remunerative. There are reasons for this. The demand and access to market (the traditional *gamosha*, has disadvantages on price front to machine made ones), product diversification (traditional *chadar mekhala* is woven in most of the household) along with the crisis of yarn availability are deterring factor to place weaving as a remunerative economic activity. It is found that women get involved in weaving only during their leisure time and hence this activity has not emerged as an activity of full-time livelihood avenue. In floods affected villages, and in rural Assam in general, the handloom weaving sector could develop and expand with certain initiatives of real and regulatory provisioning. To drive weaving as a livelihood generating economic activity it requires creation of facilitation centre with comprehensive supports in making provisioning of yarn supply, standardized Jacquard looms with provisioning of regular servicing of looms and market linkages; these are yet to be developed in the setting the rural women now involved and initiatives still are in self-consumption state with occasional market demands.

It has now emerged that livestock rearing has become one of the prime sources to sustain. Livestock rearing (mostly piggery for meat) help to fetch an average annual income of Rs. 15000/ to a household towards raising the household income beyond the critical threshold limit. This activity is primarily done by the women members as subsidiary activity. Intermittent works in the construction sector has also become a source to supplement household income. Construction jobs available in the nearby localities, petty trade, a job of driver and handyman in private transport services, would not derive an average income of more than Rs. 5000 to Rs. 6000/ a month; the earnings in all avenues tend to move towards a uniformity with free flow or shift of people with ease at entry context. It is found that once the threshold income falls from avenues available locally, people would search for jobs outside.

Even though flood, sand and erosion put constraints in the agriculture sector, the head of the households engaged in agriculture would take resort to other activities only in extreme situations. Analysis of household information reveals two forms of adapting situations. First, the head of the household would go for subsidiary activities to supplement household income. Second, the second eligible earning member (generally the son) of the affected household looks for and even moves out to distant places to an alternative livelihood.

This section tried to present an overall picture of the negative externalities generated by floods in villages of Assam. The next section tries to provide detail on the damage done to land and standing crops, and how floods break up the entire livelihood system centred on agriculture. A picture is also generated from the household profiles in the affected villages how people have adapted to the crisis carving their niches to survive. As indicated the nature of the damages and responses of the people varies across the districts in the state. This would call for locality specific supportive measures as well as overall mitigation plans at the state level to ensure that the initiatives of the people (though appears piecemeal) sustain in the long run.

Reference:

- Saikia A (2011) Forest and Ecological History of Assam, 1826-2000, Oxford
- Das K (2011) Constructing Human Security Governance Index for Northeast India, in Amitav Acharya et al (eds) Human Security from Concept to Practice, World Scientific, Singapore

Table 2.1: Level of education attainment of the heads in the surveyed households

| Educational attainment level | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| Illiterate | 26 (11.5) | 20 (8.8) | 54 (41.2) | 18 (12.9) | 61 (45.9) | 2 (1.7) | 28 (30.1) | 7 (14.3) |
| Literate | 15 (6.6) | 48 (21.2) | 7 (5.3) | 4 (2.9) | 5 (3.8) | 1 (0.8) | 3 (2.2) | 8 (16.3) |
| Primary | 22 (9.7) | 33 (14.6) | 11 (8.4) | 9 (6.5) | 12 (9.0) | 1 | 25 (26.9) | 1 (2.0) |
| Middle school | 53 (23.3) | 56 (24.8) | 26 (19.8) | 25 (18) | 20 (15.0) | 33 (28.0) | 16 (17.2) | 8 |
| High school | 48 (21.1) | 49 (21.7) | 17 (13.0) | 58 (41.9) | 17 (12.8) | 29 (24.6) | 5 (5.4) | 7 |
| Secondary | - | 17 (7.5) | 11 (8.4) | 18 (12.9) | 14 (10.5) | 35 (29.7) | 11 (11.8) | 11 (22.4) |
| Technical diploma | - | - | - | - | - | - | - | 4 (8.2) |
| General graduate | 10 (4.4) | 3 (1.3) | 5 (3.8) | 5 (3.6) | 3 (2.3) | 17 (14.4) | 5 | 2 (4.1) |
| Technical graduate | 1 (0.4) | - | - | 1 (0.7) | - | - | - | 1 |
| Postgraduate | 1 (0.4) | - | - | - | 1 (0.8) | - | - | - |
| Medical graduate | - | - | - | 1 | - | - | - | - |
| Total | 227 | 226 | 131 | 139 | 133 | 118 | 93 | 49 |

* Data source: Field work, 2021-22; figures in brackets are in percentage

Table 2.2: Occupations in the study villages

| Occupation Primary | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--------------------------|------------|------------|-----------|-----------|-----------|-----------|-----------|------------|
| Agriculture | 181 (79.7) | 129 (55.3) | 53 (40.5) | 8 (5.8) | 41 (30.8) | 18 (15.3) | 22 (22.7) | 17 (34.7) |
| Agriculture Labour | 2 | | 3 | 3 | | 1 | 1 | 2 |
| Livestock rearing | 1 | | | 7 (5.0) | | | | |
| Poultry | | 1 | 1 | | | | | |
| Fishing | | 7 (3.1) | | 28(20.1) | | | 7 (7.5) | |
| Logging | | | | | 1 (0.8) | 7 | | |
| Mining | | 3 | | | | | | |
| Agri based manufacturing | 1 | 2 | | | | | | |
| Manufacturing | 16 (7.0) | 15 (6.5) | 1 | 3 | 2 | | 3 | |
| Constructions etc | 14 (6.2) | 44 (19.5) | 2 | 48 (34.5) | 22 (16.5) | 27 (22.9) | 4 (4.3) | 3 (6.1) |
| Trade/shops | 4 (1.8) | 1 | 11 | 8 (5.8) | 11 | 43 (36.4) | 9 (9.7) | 22 (44.9) |
| Transports | | 4 (1.8) | 2 | 4 | 1 | 2 | 8 (8.6) | |
| Finances, business | | 16 (7.1) | | | 2 | 2 | 1 | |
| Services | 6 (2.6) | 4 | 8 (6.1) | 3 | 7 (5.3) | 18 (11.0) | 4 | |
| Personal services | | | | | 1 | 6 | 2 | |

| | | | | | | | | |
|---------------------|-----|-----|-----------|-----------|-----------|---------|-----------|----------|
| Remittance, pension | 2 | | 1 | 3 | | 2 | 3 | |
| Carpenter | | 2 | 35 (16.7) | 22 (15.8) | | 2 | | |
| Others | | | | | 42 (31.6) | 2 (1.7) | 29 (31.2) | 5 (10.2) |
| Total | 227 | 225 | 131 | 139 | 133 | 118 | 93 | 49 |

* Data source: Field work, 2021-22; figures in brackets are in percentage

Table 2.3: Place of Work of the heads of the households

| Place of work | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|---------------------|------------|------------|----------|-----------|------------|-----------|-----------|------------|
| Within the village | 188 (82.8) | 146 (64.2) | 121 (94) | 49 (35.3) | 106 (79.8) | 64 (54.2) | 82 (88.2) | 40 (81.6) |
| Within the block | 11 | 45 (19.9) | 7 | 63 (45.3) | 16 (12.0) | 23 (19.5) | 6 (6.5) | 3 |
| Within the district | - | 1 | 1 | 18 (12.9) | - | 1 | 2 | 5 |
| Within the state | 3 | 1 | 1 | 7 (5.0) | 5 | 15 (12.7) | 3 | 1 |
| Outside the state | 24 (10.6) | 32 (14.2) | 1 | 1 | 5 (3.8) | 15 | - | - |
| Total | 227 | 225 | 131 | 139 | 133 | 118 | 93 | 49 |

Table 2.4: Household Income from all primary activities (estimated)

| Monthly income in Rs. | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|-----------------------|------------|------------|-----------|-----------|-----------|---------|-----------|------------|
| Less than 2250 | 177 (78.0) | 120 (53.3) | 50 (38.2) | 18 (12.9) | 31 (23.5) | 6 (5.0) | 22 (23.7) | 16 (32.7) |
| 2250-5000 | 4 | 8 | 18 | 42 | 15 | 12 | 1 | 6 |
| 5000-8250 | 6 | 28 | 41 | 24 | 45 | 15 | 42 | 3 |
| 8250- 9600 | 4 | 19 | 6 | 14 | 4 | - | 5 | - |
| 9600-12000 | 16 | 21 | 7 | 29 | 22 | 27 | 9 | 5 |
| 12000 and more | 20 | 29 | 9 | 12 | 16 | 58 | 14 | 19 |
| Average | 3862 | 6011 | 5636 | 7282 | 7316 | 15875 | 8028 | 9465 |
| Maximum | 57000 | 40000 | 60000 | 34000 | 37000 | 100000 | 35000 | 30000 |
| Minimum | 0 | 0 | 0 | 116 | 1200 | 837 | 583 | 250 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

* Data source: Field work, 2021-22; figures in brackets are in percentage

Table 2.5: Income from Agriculture (primary activity)

| Monthly income in Rs. | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|-----------------------|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Average | 1108 | 2055 | 1240 | 910 | 10734 | 4182 | 1064 | 1225 |
| Maximum | 9333 | 18000 | 5000 | 2500 | 37000 | 7000 | 1500 | 2500 |
| Minimum | 0 | 0 | 125 | 116 | 1200 | 833 | 583 | 250 |
| N | 181 | 129 | 53 | 8 | 41 | 18 | 22 | 17 |

* Data source: Field work, 2021-22

Table 2.6: Income from Non-Agriculture activities – primary activities

| Monthly income in Rs. | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|-----------------------|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Average | 14702 | 14667 | 8092 | 7570 | 8276 | 17980 | 10186 | 13844 |
| Maximum | 75000 | 40000 | 30000 | 34000 | 25000 | 100000 | 35000 | 30000 |
| Minimum | 12000 | 0 | 1000 | 672 | 1500 | 1000 | 5000 | 2500 |
| N | 46 | 96 | 78 | 131 | 67 | 100 | 71 | 32 |

* Data source: Field work, 2021-22

Table 2.7: Income from workers – migrating outside the state

| Monthly income in Rs. | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|-----------------------|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Average | 11988 | 13911 | 60000 | 11000 | 12000 | 16000 | - | - |
| Maximum | 14000 | 18000 | - | - | 16000 | 28000 | - | - |
| Minimum | 1200 | 1350 | - | - | 5000 | 3750 | - | - |
| N | 24 | 32 | 1 | 1 | 5 | 15 | - | - |

* Data source: Field work, 2021-22

Table 2.8: Subsidiary activities in the households

| Occupation Secondary | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--------------------------|------------|-----------|-----------|-----------|----------|--------|-----------|------------|
| Agriculture | 3 | 6 | 17 | 7 | - | 3 | 1 | - |
| Agriculture Labour | | 1 | | 1 | 1 | - | - | - |
| Livestock rearing | 26 | 10 | - | 9 | - | - | - | - |
| Fishing | - | 14 | - | 11 | - | - | - | - |
| Manufacturing | 7 | 1 | - | - | - | - | - | - |
| Constructions etc | 74 | 52 | - | 34 | - | - | 16 | - |
| Trade/shops | 2 | 1 | 1 | 1 | - | 1 | - | - |
| Transports | 3 | - | 1 | - | - | - | - | 1 |
| Finances, business, SHGs | 18 | 5 | - | - | - | - | - | - |
| Services | | | | 1 | | | | |
| Remittance, pension | - | - | - | 1 | - | - | - | - |
| Others | - | - | - | 5 | 1 | | | |
| Total | 134 (59.0) | 90 (40.0) | 19 (14.5) | 68 (48.9) | 2 | 4 | 18 (19.4) | 1 |
| No subsidiary activities | 93 | 135 | 112 | 71 | 131 | 114 | 75 | 48 |

* Data source: Field work, 2021-22, figures in brackets are in percentage

Table 2.9: Income from subsidiary activities

| Monthly income in Rs. | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|-----------------------|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Average | 3518 | 2260 | 1977 | 1944 | 5250 | 4750 | 990 | 5000 |
| Maximum | 16000 | 52000 | 5000 | 23000 | 6500 | 10000 | 8000 | - |
| Minimum | 900 | 500 | 112 | 225 | 4000 | 4000 | 0 | - |

Table 2.10: Place of work subsidiary activities

| Place of work | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--------------------|-----------|-----------|--------|-----------|----------|--------|----------|------------|
| Within the village | 39 (29.1) | 33 | 18 | 54 (79.4) | 1 | 3 | 15 | 1 |
| Within the block | 91 (67.9) | 57 (63.3) | 1 | 14 | 1 | 1 | 3 | - |
| Outside the state | 2 | | | | | | | |

* Data source: Field work, 2021-22; figures in brackets are in percentage

Section 3: Land, Production and Return from Agriculture Activities

Data of the District Census Handbooks, 2011 for Assam, indicate that per rural household availability of cultivable land at the level of development blocks range from 0.20 ha (about 1.5 bigha) to 0.8 ha (6 bigha) (will decline further in the decennial Census of 2021). It can be well assumed that agriculture returns from the smaller plots are not enough to support a rural household, and often reported unremunerative prices of the products have made the situation further constrained (emerge as the reasons for outmigration for work to non-standard jobs outside the state in poor human development context). The Assam Human Development Report, 2014, on the other hand, indicates per capita availability of cultivable land in Assam at 0.09 ha. The Human Development report also states that in Assam 48.5 percent households have no cultivable land; but 99 percent households of the state have homestead land. This report from the sample survey tries to have information on the average size of agriculture land and homestead land in the study villages of the state; and to plan what possibilities can the expanding economy offer in smaller size of holdings with appropriate policy and regulatory supports. The concern, however, is that the externalities generated by floods, sand and erosion make the situation further constrained.

3.1 Evidence from the field: Size of landholding – agriculture land, return from winter paddy, impacts of floods, sand, and erosion

Tables at appendix 3.6, 3.7, 3.8, 3.9 3.10 and 3.11; reveal some attributes of the outcomes caused by floods on agriculture in the study villages.

In the flood affected surveyed villages of Dhemaji district (227 households in 15 villages) average possession of agriculture land per household is estimated at 5.7 bigha. There were a few households with no agriculture land; but altogether 60 percent households have more than 4 bigha of land (Table 3.7); optimum enough to ensure food from internal production had there been no negative impact of floods and sand deposition.

All the households (227 households in Dhemaji district) reported damages caused by floods in agriculture operations; and sand casting in agriculture fields of 136 (60 percent) households. The outcome is that average productivity of winter paddy is meagre at 92 kg/bigha (697kg/ha) (Table 3.12), much lower than the district average of 174kg/bigha (1302kg/ha of the winter Sali paddy). Average productivity of winter paddy of Sali in the state however was much higher at 2205kg/ha in 2018-19; indicates the floods affected areas losses productivity by at least 70 percent to the potential.

The survey also found, among the 227 sample households, 9 households have lost 20 bigha of agriculture land to riverbank erosion (Table 3.11).

In the thinly populated district of Dhemaji, the households have relatively higher size of landholding; average size of landholding in Assam, the study re-confirms, declines from western Assam districts to eastern Assam districts.

In the flood affected surveyed villages of Lakhimpur district (225 households in 15 villages) average possession of agriculture land per household is estimated at 4.8 bigha. There were about 8 percent households with no agriculture land; but altogether 41 percent households have more than 4 bigha of land (Table 3.7); as stated could be optimum enough to ensure food from internal production in ideal condition. Considering the prime crop of winter paddy, in the study villages of Lakhimpur district, only 10 percent households found engaged in winter paddy cultivation with an estimated average productivity of mere 594kg/hectare. In this district 95 percent study households are floods affected and 20 percent are prone to sand deposition (Table 3.10), and 26 percent households of the sample have lost on an average 4.3 bigha of land to riverbank erosion.

In the flood affected surveyed villages of Majuli district (131 households in 10 villages) average possession of agriculture land per household is estimated at 3.5 bigha. There were about 50 percent households with no agriculture land; but altogether 32 percent households have more than 4 bigha of land (Table 3.7). Average yield of winter paddy, though about 30 percent households of the sample are involved in winter paddy cultivation, is estimated at 2152kg/ha; matches average productivity of the state. In this district all the sample households are floods affected, but not affected the damage caused by sand deposition (Table 3.10). Riverbank erosion has affected 23 percent households of the sample, and households have lost on an average 7.4 bigha of land to riverbank erosion.

Average size of agriculture plots in Sibsagar study villages is estimated at 3.9 bigha, Morigaon 1.5 bigha, Dhubri 2 bigha, Goalpara 1 bigha and Bongaongaon 3.3 bigha (Table 3.7); obviously put constraints on the farm households to make a living. Table 2.5 shows that almost cent percent study villages of the districts are floods affected and 43 percent villages face sand casting in their agriculture fields cause by high intensity of floods. Moreover, 20 percent surveyed households have lost their land to riverbank erosion – average lost being on higher side in Morigaon (7.8 bigha per household) Majuli (7.4 bigha per household). Among the districts Morigaon (56 percent households faced agony of erosion), Bongaigaon (55 percent), Goalpara (23 percent) Sibsagar (19 percent), Lakhimpur (19 percent) are worst sufferers (Table 3.11)

Return from winter paddy is found to be meagre at 938kg/ha in the surveyed households of Dhubri village; return is zero in Bongaigaon village and, study villages of Goalpara have not gone for winter paddy cultivation (Table 3.12); revealing futility of cultivation during the monsoon season. The point thus derived is that, in case not affected by sand deposition, the villages with recurrent floods must utilise their land taking the advantages beneficial floods of alluvial deposit and concentrate on cultivating crops during off-monsoon season. The farmers will gain if they go for high valued crops in the smallholdings; also require less water consumption.

3.2 Agricultural Practices: Coping and adaptation of the farmers in new environment

The derived return from agriculture (winter paddy) in floods affected and sand deposited agriculture fields is distressingly low, even though land possession is not meagre in households of some of the districts of Eastern Assam. It is thus obvious that the floods affected villages concentrating on seasonal winter paddy cultivation cannot ensure food availability and overall wellbeing of the households, and the average income derived from

agriculture, does not suffice to lift a family beyond the poverty line figure of rural India. Agriculture income now constitutes less than 30 percent of the total household income in more than 90 percent of the households in the sampled villages.

The types of crops cultivated in the study villages of some of the study districts now show a distinctive form of crop combinations, and intensity as well to cope and adapt to the new environment.

This study records, the following forms of crop combinations in the study villages

| | Winter Paddy | Summer Paddy | Autumn Paddy | Mustard | Sugarcane | Black dal | Maize | Jute | Peanut |
|------------|--------------|--------------|--------------|---------|-----------|-----------|-------|------|--------|
| Dhemaji | Y | | | | | | | | |
| Lakhimpur | Y | Y | Y | | | | | | |
| Majuli | Y | Y | Y | Y | Y | Y | | | |
| Sibasagar | Y | | Y | Y | | | | | |
| Morigaon | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Dhubri | Y | Y | | | | | Y | | |
| Goalpara | | Y | | | | | | Y | |
| Bongaigaon | Y | | | | | | | | |

In addition to these crops, in study villages, households found cultivating wheat, cumin seeds and sesam to limited extent.

3.3 Crop diversification and intensity in Floods affected villages

The flood affected and sand casted villages of Dhemaji and Bongaigaon, found concentrating only on winter paddy; even though the return is meagre. On the other hand, Lakhimpur floods affected villages have not gone beyond with the three seasonal varieties of paddy.

It is also observed that farmers in the floods affected, and sand casted villages still put effort to till and cultivate; now there is clear shift towards use of tractors replacing the ploughs. Table 3.12 present the extent of tractor used to till the land. It is found that two-third of the farm households use tractors exclusively to till their fields, and 87 percent agriculture area of Dhemaji district uses tractors exclusively or use both tractors and plough, to prepare the land. In the process average expenses to prepare per bigha of land come to Rs. 480/ and maximum to a maximum of Rs. 3000/.

Farmers in sand deposited plots do not put effort to remove the sand because they are aware of futility to remove the heaps of a few meters high and not worth the effort. Still the farmers till the land, use tractors even though the return is meagre. In an abundant labour supply context, the opportunity cost of not ploughing the land is still high in the flood affected villages. As reported, tilling the degraded land raises probability to reclaim the land as repeated waves of floods would deposit alluvial or finer soils over the sandy soil, and the mechanical mixing reduces the sand density.

The uncertainty introduced by floods may compel farmers to refrain from using inputs such as capital and fertilisers. Fertiliser consumption found to be very low in Dhemaji districts with

application of just about 4 kg per hectare compared to the state average of 73 kg/ha during 2018-19 (Government of Assam, 2019). This survey too found minimal no use of fertiliser by the flood affected households, with exception of Dhubri district to an extent (Table 3.12).

In addition to paddy households in district of Majuli have seen cultivating mustard, black dal and sugarcane; Sibasagar villages have gone for mustard, some households of Goalpara villages do Jute, and Dhubri households have gone for maize. Cropping pattern however in floods affected villages of Morigaon district has emerged as distinct.

3.4 Examples of adaptation: the Morigaon case

Cropping pattern in the floods affected study villages of Morigaon district show a distinctive form of combinations, and intensity as well. Leaving aside Jute, cultivation of seven dominant crops in the villages are concentrated in eight months of the year, September to April with astounding cropping intensity of minimum 300 (three crops in a single plot) even in 7- 8 months of feasible agricultural operational during the year. Paddy (winter, summer, and autumn) though cultivated by some households at present appears to be not the significant crops in the floods affected villages of Morigaon. Along with jute, important crops cultivated in Morigaon district are mustard, black dal, maize, peanut, sugarcane; and to an extent are wheat, cumin seed and seasm.

Average productivity of summer paddy, in the few sample households of Morigaon villages however had reached 3408kg/ha (state average being 2975 kg/ha in 2017-18); and autumn paddy at 1470 kg/ha (state average 1468kg/ha).

Maize at present has growing importance in economy of Assam, and farmers show preference of maize over autumn paddy. In Assam area under Maize was 23,700 ha in 2012-13 and produced 21.3 thousand tones with productivity level of 897kg/ha. Maize cultivation now has seen significant expansion in area and productivity growth. Operational area under Maize in the state was 32,264 ha in 2018-19 (estimated at 36636 ha in 2019-20), produced 105 thousand tonnes (128 thousand tonnes in 2019-20) with productivity of 3254kg/ha (3495 kg/ha, DES, Assam).

The significance of Maize in the economy of Assam is that this crop in addition to human consumption is used to meet the demand of poultry feeds and fodder for the livestock. The crop now has a well-established supply chain to market and many agencies are now supplying the corn seeds and procuring the products and thus ensuring decent assured return to the farmers.

Productivity of Maize (4155 kg/ha) in flood affected villages of Morigaon district is estimated to be higher than the state average. Maize cultivation is concentrated in the months of November to February and economic return is an average of Rs. 22000/ per bigha to a maximum of Rs. 40,000/ per bigha, exclusive of the labour costs (Table 3.1). Intensity of hired labour use (per bigha 0.2 person or about 1.5 person per hectare; labour use, however, can be considered optimum from livelihood generation perspective.

On the other hand, average productivity of Maize (1375kg/ha or 183 kg/bigha) in few households Dhubri floods affected villages, with maximum yield of 1500kg/ha found to be

much lower, even though intensity of fertiliser use (177kg/bigha) and labour use (6.7 kg/bigha) was higher than Morigaon (Table 3.12).

Table 3.1: Outcome of Maize cultivation in Morigaon

| Maize | Size of agriculture plots | Fertiliser used in kg/bigha | Labour used in no/bigha | Average input cost/bigha – excluding labour | Production kg/bigha | Price per quintal in Rs. | Return per bigha | Maize production kg/ha |
|---------|---------------------------|-----------------------------|-------------------------|---|---------------------|--------------------------|------------------|------------------------|
| Average | 8.1 | 5.7 | 0.5 | 400 | 596 | 4000 | 22160 | 4475 |
| Maximum | 23 | 6.7 | 3 | | 800 | 5000 | 40000 | 5988 |
| Minimum | 2 | 0 | 0 | | 150 | - | - | 1122 |

* Source: Field survey 2021-22

The farmers, during the field visit reported market price of maize at Rs 1600 to 1700 per mound (Rs. 4000 to Rs. 4250/ per quintal). Intensive Maize cultivation has not only brought buyers to the villages, but assured return has also encouraged certain entrepreneur farmers to place machinery for primary processing of the harvest and do the packaging for the market. It is seen that many businesses house places agent in the villages, give advance money and procure the products after the harvest. The product is also sold in local retail markets.

The rapid expansion of area of Maize in the state reflects significance and remunerative nature of this crop. If planned, no part of this crop gets wasted; cobs and stalks are used as feed and fodder and can be preserved for months following measures prescribed by the agriculture scientists. The significance thus is that in any form of eventuality (floods etc), Maize and its by-products could ensure assured supply chains meet the shortage of feeds and fodder required for livestock rearing in the state in addition to ensuring cash inflow to the farmers. These propositions leave a task to have an assessment on probability of ensuring internal self-sufficiency in feed and fodder production in the state and to reduce the shocks emerging from eventualities in floods affected areas.

Productivity of Mustard (859 kg/ha) in flood affected villages of Morigaon district is estimated to be higher than the state average (643 kg in 2018-19). Mustard occupies the field in the months of October to February and economic return is an average of Rs. 5000/ per bigha to a maximum of Rs. 6,000/ per bigha, exclusive of the labour costs (Table 3.2). The farmers found not using hired labour in general and fertiliser use also found to be minimum.

Table 3.2: Outcome of Mustard cultivation

| Morigaon | Size of agriculture plots | Fertiliser used in kg/bigha | Labour used in no/bigha | Average input cost/bigha – excluding labour | Production kg/bigha | Price per quintal in Rs. | Return per bigha in Rs | Mustard production kg/ha |
|----------|---------------------------|-----------------------------|-------------------------|---|---------------------|--------------------------|------------------------|--------------------------|
| Average | 8.3 | 4.2 | 0.3 | 400 | 115 | 4000 | 4960 | 859 |
| Maximum | 25 | 12 | 4 | | 140 | 4250 | 5950 | 1048 |
| Minimum | 4 | 0 | 0 | | 66.5 | - | - | 499 |

* Source: Field survey 2021-22

| Majuli | Size of agriculture plots | Fertiliser used in kg/bigha | Labour used in no/bigha | Average input cost/bigha – excluding labour | Production kg/bigha | Price per quintal in Rs. | Return per bigha in Rs | Mustard production kg/ha |
|---------------|---------------------------|-----------------------------|-------------------------|---|---------------------|--------------------------|------------------------|--------------------------|
| Average | 5 | 3 | 0.3 | 290 | 85 | 6500 | 5525 | 641 |
| Maximum | 12 | 20 | 2 | 300 | 224 | | | 1680 |
| Minimum | 1 | 0 | 0 | 180 | 58 | | | 641 |

* Source: Field survey 2021-22

The farmers of Majuli and Sibsagar also found growing mustard with average productivity reaching 641kg/ha in Majuli and 1033kg/ha in Sibsagar villages (Table 3.12).

Productivity of Peanut (1266 kg/ha) in flood affected villages of Morigaon district is estimated to be lower than the average of certain peanut producing states of India (3500 kg). Peanut occupies the field in the months of October to January and economic return is an average of Rs. 7900/ per bigha to a maximum of Rs. 12,500/ per bigha, exclusive of the labour costs (Table 3.3). The farmers found using hired labour one hired labour for a bigha of cultivation and used fertiliser on an average of 6 kg per bigha. In recent years, along with Maize, peanuts have seen deep penetration into the farmlands of Assam, including the floods affected area, purely driven by market factors. Farmers in flood affected areas welcome floods for alluvial to be deposited in the fields, suitable for peanut cultivations. Peanuts cultivation, however, could be located only in Morigaon study villages, from the entire floods affected villages randomly selected for the study.

Table 3.3: Outcome of Peanut cultivation

| Peanut /Morigaon | Size of agriculture plots | Fertiliser used in kg/bigha | Labour used in no/bigha | Average input cost/bigha – excluding labour | Production kg/bigha | Price per quintal in Rs. | Return per bigha | Peanut production kg/ha |
|------------------|---------------------------|-----------------------------|-------------------------|---|---------------------|--------------------------|------------------|-------------------------|
| Average | 8.3 | 7 | 0.2 | 400 | 168 | 5000 | 8400 | 1266 |
| Maximum | 25 | 50 | 4 | | 200 | 6250 | 12500 | 1497 |
| Minimum | 1 | 2.4 | 0 | | 120 | - | 6000 | 898 |

* Source: Field survey 2021-22

Cultivation of black gram was found in the villages of Majuli and Morigaon. Productivity (1012kg/ha in Morigaon, and 1537 kg/ha in Majuli villages) estimated found to be higher than the country average of 533 kg/ha. Price reported for Black gram in Majuli was Rs. 5000/ per quintal.

Table 3.4: Outcome of Black gram cultivation

| Black Gram | Size of agriculture plots | Fertiliser used in kg/bigha | Labour used in no/bigha | Average input cost/bigha – excluding labour | Production kg/bigha | Price per quintal in Rs. | Return per bigha | Black dal production kg/ha |
|------------|---------------------------|-----------------------------|-------------------------|---|---------------------|--------------------------|------------------|----------------------------|
| Average | 6.5 | 3.9 | 0.2 | 400 | 135 | 7500 | 10,125 | 1012 |
| Maximum | 23 | 20 | 2 | | 160 | 8750 | 14,000 | 1200 |
| Minimum | 1 | 1 | 0 | | 93 | - | 6975 | 697 |

* Source: Field survey 2021-22

Jute cultivation, on the other hand found at Morigaon and Goalpara districts. Productivity of Jute (1560kg/ha in Morigaon and 720 kg/ha in Goalpara), however found to be lower than the state average of 2084 kg/ha in 2019-20 in Assam (Table 3.5 and 3.12).

Table 3.5: Outcome of Jute cultivation

| Jute | Size of agriculture plots | Fertiliser used in kg/bigha | Labour used in no/bigha | Average input cost/bigha – excluding labour | Production kg/bigha | Price per quintal in Rs. | Return per bigha | Jute production kg/ha |
|---------|---------------------------|-----------------------------|-------------------------|---|---------------------|--------------------------|------------------|-----------------------|
| Average | 7.4 | 8.7 | 0.1 | 400 | 208 | 4875 | 10140 | 1560 |
| Maximum | 14 | 50 | 3 | | 240 | 5500 | 13200 | 1800 |
| Minimum | 2 | 3.8 | 0 | | 192 | | 9360 | 1440 |

* Source: Field survey 2021-22

Analysis on land availability, agriculture practices and returns in floods affected villages reveal the following points

Average size of land holding, primarily agriculture land has become meagre with rising population pressure; floods and sand deposition have made the situation further constrained with unfeasible agriculture operations and return in most of the study districts/villages. For instances, of the total available land of 1145 bigha for agriculture in the 15 study villages of Dhemaji district, the entire lands get affected by floods and 54.7 percent land are casted by sand deposition and productivity of crops falls below the optimum and desired level.

The derived return from agriculture in floods and sand affected households is distressingly low, particularly in Dhemaji and Lakhimpur villages, even though land possession is not meagre (average 0.9 hectare per household in Dhemaji and 0.75 hectare in Lakhimpur villages). The return from agriculture however, as indicated earlier is, much better in some villages of Marigaon. Still, low maxima and low deviations in return from winter paddy (the prime crop) reveal that the households are not better off, and the average income derived from agriculture, does not suffice to a lift a family beyond the poverty line figure.

Per rural household availability of cultivable land to the 2011 population in Assam was 0.5 ha; and considering 69.4 percent rural people/households involved in agriculture to the NSSO round of 2009-10; average availability of cultivable land comes to mere 0.71 ha in Assam;

the figure convincingly has gone down at present. To the poverty line figure of present, an agriculture dependent household must earn Rs. 27000/ per year from his tiny plot of 0.5 or 0.7 ha to be called non-poor. The agricultural income is barely enough to be economically viable as reflated by our income tables presented in section II. It thus will call for an altogether different framework to raise the income of the farm households.

3.5 Land improvement measures: Coping and adaptation of the farmers. Is it rational to use/invest labour in degraded paddy field?

We were interested to understand how farm households cope with the situation of land degradation caused by floods and sand deposition. In changing environmental conditions small-scale farmers with little capital will not be able to pursue new strategies that will be required to adapt to the changes (Mendelsohn and Diner, 1999), but adaptation significantly reduce some of the damages caused (Rosenaweig and Parry, 1994). We find evidence on this aspect. Farmers with resources, on the other hand, would adapt if the benefits exceed the costs of adaptations.

We find adoption of land protection measures in some households (Dhemaji 9 percent households; Marigaon 69 percent; Dhubri 78 percent, Goalpara 33 percent and Sibsagar 7 percent), in the forms of efforts to protect their homesteads from floods by raising embankment and raising the plinths of the households. Contrary to the scale of efforts to protect their homestead; effort to protect the agriculture fields by raising embankments is minimal as farmers are aware of futility of the efforts (Table 3.15). The priority or importance of protecting the shelter is always there; as livelihood can be sourced from any avenues, even by taking recourse to outmigration.

The study finds that the Dhemaji households (average Rs. 16,325/, maximum of Rs. 120,000), Majuli households (average Rs. 48,000/, maximum Rs. 700,000/), Dhubri households (average Rs. 22417, and maximum of Rs. 100,000; and Goalpara households spent (average Rs. 21000; and maximum of Rs. 150,000) to protect or raise platforms of their floods affected homesteads.

In addition to adoption of land protection, efforts to remove sand from homestead is also found in Majuli (case of 10 percent households) and Marigaon (case of 27 percent households). In Dhemaji we however found that about 7 percent of households put efforts to remove sand from their agriculture field and put efforts to make provisioning of irrigation (Table 3.16).

Soil Scientists reveal that paddy cultivation is possible on silted land, even with high proportion of sand, if the water supply is assured throughout the growing period, as coarse texture of soil prevents water and nutrients retaining capacity. This was revealed by our interactions with soil scientists. The study found some households in Dhemaji and Majuli have made provisioning of irrigation in their agriculture fields and gone for application of use of fertilizers.

The return from the efforts would, however, be meagre unless the nutritional deficiencies are met by application of appropriate doses of fertilisers. The study villages have no facility for irrigation (except a few villages of Dhemaji, Table 3.16), but the farmers in some villages

now have started utilising their land taking advantage of the relatively long monsoon period from June to October. The adaptation is also by planting certain HYV seeds, having shorter ripening period than the traditional varieties; means that the paddy gets mature before the withdrawal of monsoon. This way the farmers have able to get some return (average 607 kg of paddy per hectare in our sample in Dhemaji district, for instance), which is less than one third of the production than the state average. The workforce in the villages having no alternatives finds this adaptation to some extent relieving.

We note further that, except manpower, other inputs in agriculture are not used in the study area. The uncertainty introduced by floods may compel farmers to refrain from using inputs such as capital and fertilisers. Fertiliser consumption found to be negligible, except in the villages of Marigaon (25kg/ha) and Dhubri (86kg/ha); considering the summer paddy component compared to the state average of 68 kg/ha during 2019-20 (Government of Assam, 2020).

Average cost of irrigation provisioning estimated at Rs. 15,000/ per household in Dhemaji villages (maximum of Rs. 40,000/) and Rs. 4250/ in Majuli villages.

Conversion of homestead and agriculture land for alternative use is also visible in Dhemaji district. It is found that about 10 percent households have spent about on an average Rs. 27,000/ to a maximum of Rs. 65,000/ for land conversation. Possibilities and effort to reclaim the damaged land by various measures are visible at household level to convert the sandy land for mulberry plantations and pisciculture. There is however scope to do a cost benefit analysis of conversion of degraded land to mulberry plantations and pisciculture. Pisciculture however may not be remunerative in the ponds dug on acidic soil (low pH value as revealed by our soil tests) and will require application of significant amount of liming to culture fish. There is possibility to converge the ongoing flagship programmes of government of India to people's initiatives, but these are not reflected in the initiatives of the district administration or of the panchayati raj institutions.

Some initiatives are seen in the flood and sand deposited villages to adopt horticulture. Potato, cabbages, pumpkin, tomato, brinjal, bean are promoted or cultivated to an extent, but significant success was not visible during the field visit. In some village farmers were motivated by some institutions and organisations to go for lentil and mustard cultivations during the *Ravi* season. The North East Regional Institute of Water and Land Management, Krishi Vigyan Kendra, Dhemaji and Rural Volunteers Centre had (August 2009-June 2012) completed a joint project on sustainable livelihood security (live better with flood) with a budget of Rs. 290.6 lakh, covering 38 villages and 3052 households. The approach of the project found to be holistic-with suggested innovative livelihood strategy through farm mechanisation, restructuring of cropping pattern, sericulture, horticulture, livestock, pisciculture, development of irrigation and entrepreneurship development in the non-farm sector (Action for Food Production, 2012).

It can be inferred that the institutions have perceived the constraints the villages are now facing to ensure livelihood. It is also important to capture responsiveness of affected people in such initiatives and to what extent such supports suffice the need of the affected households. The resources generated by the above mentioned three institutions cannot be considered adequate to anticipate a change in this economy. In this context it is important to know how the State converge its development initiatives in the crisis ridden rural economy.

Farmers put efforts to possible extent to derive returns; still the extent of the damages done to the paddy fields, and poor agriculture outcome forcing the people to look for other alternatives. The support of the State is found to be negligible and long run prospects for decent livelihood look grim in this degraded environment. Effort of the people to reclaim the damaged land is just to ensure household food security to the maximum possible extent by utilising the unpaid surplus family labour.

Most of the farmers are poor and do not have the resources for land improvement measures, except the manpower and an amount of Rs. 300-400 to plough a bigha of land with tractor – which is cheaper than use bullocks. Other explanation is that farmers' motivation to invest in the poorly textured flood ravaged area is little. Still. The villages of Dhemaji and Majuli saw use of family and hired as well to clear the land and in land conversion measures (Table 3.16). It can be also said that labour effort is perhaps the only feasible input available in floods affected areas, the uncertainty induced by floods compel farmers to refrain from using inputs such as capital and fertilisers.

Adaptation involves a change in agriculture practices in response to the changes in environmental conditions. It includes changes in management practices such as timing of sowing, intensification of inputs and changes in crop mix. Agronomic studies address adaptation by stimulating changes in the growth parameters of various crops according to the latest scientific advantages. The reflections, as discussed, we found in floods affected villages of Morigaon.

The poorly diversified economy of the district offers minimum opportunities in the non-farm sectors and out migration for jobs is becoming a big phenomenon in the villages of the study area.

It has appeared that floods and sand deposition have dampened the land market for economic activities. Field data reveal limited incidences of land transactions; sale and mortgaged and leasing out and leasing in as well for agriculture operation or any other economic activities (Table 3.9).

Analysis on land, production and return from agriculture activities, though reveal crisis in the floods affected and sand casted villages, we could read the opportunities too. The villages of Marigaon show sheer example of adaptation. In addition, an analysis on farm-based activities of the villages would reveal to what extent the crisis faced can be ameliorated.

Reference:

Mendelshon, R and W D Nordhaus (1996) The Impact of Global Warming on Agriculture: Reply, *The American Economic Review*, Vol. 86 (5):1312-1315

Rosenzweig, Cynthia and M L Perry (1994) Potential Impact of Climate Change on World Food Supply, *Nature* 367: 133-38

Table 3.6: Households by size class of land holding in flood affected villages

| Size class of possession in bigha | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|-----------------------------------|------------|-----------|-----------|-----------|----------|--------|----------|------------|
| No Land | 2 | 1 | 0 | 1 | 2 | 2 | 0 | 3 |
| Upto 1 bigha | 4 | 20 (8.9) | 33 (25.2) | 17 | 80 | 42 | 55 | 7 |
| 1.01 to 2 bigha | 9 | 30 (13.3) | 24 (18.3) | 14 | 19 | 25 | 12 | 9 |
| 2.01 to 4 bigha | 40 (17.6) | 71 (31.6) | 20 (15.3) | 52 | 8 | 32 | 14 | 17 |
| 4.01 to 8 bigha | 109 (48.0) | 50 (22.2) | 28 (21.3) | 33 | 14 | 12 | 7 | 8 |
| 8.01 to 12 bigha | 52 (22.9) | 38 (16.9) | 18(13.8) | 12 | 3 | 2 | 2 | 3 |
| More than 12 bigha | 11 (4.8) | 15 (6.7) | 8 (6.1) | 10 | 6 | 3 | - | 2 |
| Average (bigha) | 6.7 | 5.5 | 4.9 | 5 | 2.7 | 2.9 | 2 | 3.8 |
| Maximum (bigha) | 30 | 22 | 30 | 23.5 | 34 | 30 | 10 | 15 |
| Minimum (bigha) | 0 | 0 | 0.5 | 0 | 0 | 0 | 0.5 | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

* Data source: Fieldwork, 2021-22; figures in bracket are in percentage

Table 3.7: Agricultural land by size class of holding in flood affected villages

| Size class of possession in bigha | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|-----------------------------------|---------|-----------|--------|-----------|----------|--------|----------|------------|
| No Agricultural Land | 8 | 17 | 66 | 23 | 110 | 41 | - | 12 |
| Upto 1 bigha | 3 | 12 | 2 | 12 | - | 21 | 64 | 1 |
| 1.01 to 2 bigha | 19 | 40 | 3 | 22 | 4 | 24 | 8 | 8 |
| 2.01 to 4 bigha | 61 | 64 | 6 | 43 | 4 | 20 | 7 | 17 |
| 4.01 to 8 bigha | 97 | 50 | 23 | 23 | 10 | 8 | 8 | 7 |
| 8.01 to 12 bigha | 32 | 33 | 13 | 9 | 3 | 1 | 6 | 3 |
| More than 12 bigha | 7 | 9 | 7 | 7 | 5 | 3 | - | 1 |
| Average (bigha) | 5.7 | 4.8 | 3.5 | 3.9 | 1.5 | 2.0 | 1.0 | 3.3 |
| Maximum (bigha) | 29 | 20 | 27 | 22.5 | 31 | 29.5 | 8 | 14.5 |
| Minimum (bigha) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

* Data source: Fieldwork, 2021-22; figures in bracket are in percentage

Table 3.8: Homestead land by size class in flood affected villages

| Size class of possession in bigha | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|-----------------------------------|---------|-----------|--------|-----------|----------|--------|----------|------------|
| No homestead | 1 | 7 | - | - | 3 | - | - | 4 |
| Less than 0.5 bigha | 69 | 109 | 10 | 1 | 47 | 35 | 20 | 28 |
| 0.5 to 1 bigha | 113 | 102 | 66 | 125 | 45 | 79 | 64 | 13 |
| 1 -2 bigha | 38 | 7 | 42 | 7 | 20 | 4 | 7 | 3 |
| More than 2 bigha | 6 | - | 13 | 6 | 17 | - | 2 | 1 |
| Average (bigha) | 1.0 | 0.7 | 1.4 | 1.1 | 1.2 | 0.9 | 1 | 0.55 |
| Maximum (bigha) | 4.3 | 2 | 6 | 12 | 7 | 2 | 4 | 3 |
| Minimum (bigha) | 0 | 0 | 0.5 | 0 | 0 | 0.5 | 0.5 | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

* Data source: Fieldwork, 2021-22; figures in bracket are in percentage

Table 3.9: Land rental market in flood affected villages

| Households | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|------------------|---------|-----------|---------|-----------|-----------|---------|----------|------------|
| Leasing out land | 2 (9) | 2 (5) | 4 (28) | 3 (24) | 4 (52) | 14 (25) | 3 (8) | 5 (34) |
| Leasing in land | 9 (20) | 3 (5) | 17 (82) | 29 (171) | 11 (91.5) | 8 (13) | 13 (52) | - |
| Mortgaged land | 2 (5) | 2 (7) | 3 (7) | 1 (1) | 7 (27) | - | 1 (4) | 2 (11) |
| Sold land | 1 (5) | - | 1 (2) | - | - | - | 0 | 12 (17.5) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

* Data source: Fieldwork, 2021-22; figures in bracket are total area involved in bigha

Table 3.10: Agricultura land affected by floods and sand deposition

| Households | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|-----------------|---------|------------|--------|-----------|----------|--------|----------|------------|
| Floods affected | 226 | 213 (94.7) | 131 | 138 | 119 | 114 | 90 | 42 |
| Sand casted | 136 | 47 (20.9) | 0 | 70 | 107 | 16 | 69 | 34 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

* Data source: Fieldwork, 2021-22; figures in bracket are in percentage

Table 3.11: Land lost to riverbank erosion

| Households | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|--------------------|---------|-----------|---------|-----------|----------|--------|----------|------------|
| Upto 1 bigha | 1 | 7 (6) | - | 1 | 4 | 1 | | 19 |
| 1- 2 bigha | 5 | 18 (27.5) | 3 | 3 | 8 | 2 | 7 | 1 |
| 2- 4 bigha | 3 | 8 (33.5) | 3 | 11 | 16 | 1 | 4 | 3 |
| 4- 8 bigha | | 20 (123) | 14 (85) | 5 | 12 | 1 | 5 | 2 |
| 8-12 bigha | | 6 (65) | 8 | 5 | 12 | | 2 | 1 |
| More than 12 bigha | | - | 2 | 2 | 22 | | 3 | 1 |
| Average | 2.2 | 4.3 | 7.4 | | 7.8 | 14 | 1.9 | |
| Maximum | 3 | | | | 80 | | 60 | |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

* Data source: Fieldwork, 2021-22; figures in bracket are land involved in bigha

Table 3.12: Winter Paddy

| Winter Paddy | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|--------------------------|-----------|-----------|-----------|-----------|----------|--------|----------|------------|
| No cultivation | 11 | 202 | 94 | 49 | 129 | 117 | 93 | 25 |
| Upto 1 bigha | 1 | 2 | 1 | 17 (18.9) | - | - | - | |
| 1.01 to 2 bigha | 21 (9.3) | 9 | - | 23 (25.6) | 1 | - | - | 21 (87.5) |
| 2.01 to 4 bigha | 71 (31.3) | 10 (43.5) | 13 (35.1) | 29 (32.2) | 1 | - | - | 1 |
| 4.01 to 8 bigha | 98 (43.2) | 2 | 18 (48.6) | 12 (13.3) | - | - | - | 1 |
| 8.01 to 12 bigha | 22 | - | 5 | 6 | - | - | - | 1 |
| More than 12 bigha | 3 | - | - | 3 | 1 | 1 | - | - |
| Average yield kg/hectare | 697 | 594 | 2152 | 1516 | 3443 | 938 | - | 0 |
| Maximum yield kg/ha | 4000 | 750 | 3750 | 4312 | 3742 | - | - | 0 |
| Minimum yield kg/ha) | 0 | 0 | 1500 | 0 | 1497 | - | - | 0 |
| N | 227 | 23 | 37 | 90 | 3 | 1 | 93 | 24 |

* Data source: Fieldwork, 2021-22; figures in bracket are in percentage

| Winter Paddy | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|---|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Mean area cultivated in bigha | 5.1 | 2.7 | 5.6 | 3.8 | 6 | 20 | - | 1.2 |
| Max area cultivated | 22 | 8 | 10 | 24 | 13 | - | - | 5 |
| Min area cultivated | 0 | 1 | 1 | 0.5 | 2 | - | - | 0.5 |
| Mean area irrigated | 2.0 | 1.5 | 1.5 | 0 | 0 | 0 | - | 0 |
| Max area irrigated | 22 | 3.5 | 9 | 0 | 0 | - | - | 0 |
| Min area irrigated | 0 | 0 | 0 | 0 | 0 | - | - | 0 |
| % Area tilled by plough | 6.6 | 0 | 0 | 1.1 | 0 | - | - | 89.5 |
| % Area tilled by tractor | 63.4 | 52.2 | 92.8 | 92.2 | 100 | 100 | - | - |
| % Area tilled by plough & tractor | 23.8 | 43.5 | 0 | 3.3 | 0 | - | - | - |
| Average area ploughed by tractor in bigha | 4.9 | 2.2 | 5.2 | 3.5 | 6 | 2.1 | - | 1.1 |
| Average tilling cost bigha in Rs. | 466 | 900 | 280 | 596 | 347 | 350 | - | 350 |
| Fertiliser used kg/bigha | 0.0 | 45 | 5.5 | 0 | 10 | 200 | | 2.5 |
| Labour used erson/bigha | 0.34 | 0 | 0.3 | 0.15 | 0 | | - | 0 |
| N | 227 | 225 | 131 | 139 | 3 | 118 | 93 | 49 |

| Summer Paddy | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|-----------------------------|---------|-----------|--------|-----------|----------|--------|----------|------------|
| No cultivation | 227 | 171 | 126 | 227 | 127 | 41 | 85 | 49 |
| Upto 1 bigha | | - | - | | - | 24 | 2 | |
| 1.01 to 2 bigha | | 5 | 1 | | 1 | 30 | 3 | |
| 2.01 to 4 bigha | | 12 | - | | - | 18 | 3 | |
| 4.01 to 8 bigha | | 22 | 4 | | 4 | 4 | - | |
| 8.01 to 12 bigha | | 8 | - | | - | 1 | - | |
| More than 12 bigha | | 7 | - | | - | - | - | |
| Average yield kg/hectare | | 1338 | 3467 | | 3408 | 2694 | 3078 | |
| Maximum yield kg/ha | | 2750 | 4500 | | 4500 | 7500 | 3375 | |
| Minimum yield kg/ha) | | 0 | 1200 | | 1050 | 1050 | 2500 | |
| N | 0 | 54 | 5 | 0 | 5 | 77 | 8 | 0 |

* Data source: Fieldwork, 2021-22; figures in bracket are in percentage

| Summer Paddy - Irrigation | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|--|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Mean area cultivated in bigha | X | 6.6 | 5.2 | X | 2 | 2.2 | 2.1 | X |
| Max area cultivated | | 15 | 7 | | 2 | 12 | 3 | |
| Min area cultivated | | 1.5 | 2 | | 2 | 1 | 1 | |
| Mean area irrigated | | 0 | 3.4 | | 0 | 2.2 | 0 | |
| Max area irrigated | | 0 | 6 | | | 12 | 0 | |
| Min area irrigated | | 0 | 0 | | | 0 | 0 | |
| % Area tilled by plough | | 29.6 | 0 | | | - | - | |
| % Area tilled by tractor | | 33.3 | 92.3 | | 100 | 100 | 100 | |
| % Area tilled by plough & tractor | | 35.2 | 7.7 | | | - | - | |
| Average area ploughed by tractor in bigha | | 5.3 | 4.8 | | 2 | 2.2 | 2.1 | |
| Average tilling cost bigha in Rs. | | 669 | 276 | | 400 | 346 | 375 | |
| Fertiliser used kg/bigha | | 0.3 | 3.3 | | 25 | 86 | 0 | |
| Labour used person/bigha | | 0.1 | 0.25 | | 0 | 9 | 8 | |
| N | 227 | 54 | 5 | 0 | 1 | 77 | 8 | 49 |

| Autumn Paddy | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|--------------------------|---------|-----------|--------|-----------|----------|--------|----------|------------|
| No cultivation | No | - | | No | | No | No | No |
| Upto 1 bigha | | - | - | | | | | |
| 1.01 to 2 bigha | | 12 | - | 11 | 1 | | | |
| 2.01 to 4 bigha | | 35 | 12 | 14 | 3 | | | |
| 4.01 to 8 bigha | | 29 | 15 | 4 | | | | |
| 8.01 to 12 bigha | | 7 | 5 | | 1 | | | |
| More than 12 bigha | | - | - | | | | | |
| Average yield kg/hectare | | 1410 | 1272 | 2279 | 1470 | | | |
| Maximum yield kg/ha | | 2250 | 3000 | 3600 | 2091 | | | |
| Minimum yield kg/ha) | | 0 | 600 | 0 | 749 | | | |
| N | | 83 | 32 | 29 | 5 | | | |

* Data source: Fieldwork, 2021-22; figures in bracket are in percentage

| Autumn Paddy - Irrigation | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|---|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Mean area cultivated in bigha | | 4.6 | 5.8 | 3.1 | 4.4 | | | |
| Max area cultivated | | 11 | 10 | 7.5 | 10 | | | |
| Min area cultivated | | 1.5 | 3 | 1.1 | 2 | | | |
| Mean area irrigated | | 0 | 1.8 | 0.5 | 0 | | | |
| Max area irrigated | | 0 | 9.0 | 3.0 | 0 | | | |
| Min area irrigated | | 0 | 0 | 0 | 0 | | | |
| % Area tilled by plough | | 0 | - | | 0 | | | |
| % Area tilled by tractor | | 100 | 78.1 | 61.3 | 100 | | | |
| % Area tilled by plough & tractor | | | 21.9 | | | | | |
| Average area ploughed by tractor in bigha | | 4.6 | 5.4 | 1.9 | 4.4 | | | |
| Average tilling cost bigha in Rs. | | 634 | 1631 | 512 | 350 | | | |
| Fertiliser used kg/bigha | | 37 | 5.5 | 0 | 4 | | | |
| Labour used person/bigha | | 0 | 0.3 | 1 | 0 | | | |
| N | 227 | 83 | 32 | 29 | 5 | 118 | 93 | 49 |

| | Mustard | | | Sugarcane | | Black Gram | | Maize | | Jute | | Peanut |
|--------------------------|---------|-----------|----------|-----------|----------|------------|----------|----------|--------|----------|----------|----------|
| | Majuli | Sibasagar | Morigaon | Majuli | Morigaon | Majuli | Morigaon | Morigaon | Dhubri | Morigaon | Goalpara | Morigaon |
| No cultivation | | | | - | | | | | | | | |
| Upto 1 bigha | 3 | 1 | | - | - | 1 | 1 | - | 2 | - | - | |
| 1.01 to 2 bigha | 3 | 1 | | - | 1 | - | 3 | 2 | 1 | 4 | - | 4 |
| 2.01 to 4 bigha | 16 | 3 | 3 | - | 2 | 6 | 3 | 2 | | 6 | 2 | |
| 4.01 to 8 bigha | 24 | 1 | 3 | 1 | - | 9 | 1 | 3 | | 2 | - | 2 |
| 8.01 to 12 bigha | 4 | 1 | 2 | 1 | - | 2 | 1 | 1 | | - | - | 2 |
| More than 12 bigha | - | | 1 | 1 | - | - | 2 | 3 | | 2 | - | 1 |
| Average area | 5 | 5.7 | 8.3 | 8.3 | 2.2 | 5.2 | 6.1 | 8.1 | 1.3 | 4.6 | 4 | 3 |
| Maximum area | 12 | 15 | 25 | 10 | 3 | 10 | 23 | 23 | 2 | 14 | 4 | 8.3 |
| Minimum area | 1 | 1 | 4 | 6 | 1 | 1 | 1 | 2 | 1 | 2 | 4 | 25 |
| Average yield kg/hectare | 641 | 1033 | 859 | 8400 | 14050 | 1537 | 1012 | 4475 | 1375 | 1560 | 720 | 1 |
| Maximum yield kg/ha | 1680 | 1600 | 1048 | 10500 | 14979 | 1800 | 1200 | 5988 | 1500 | 1800 | 935 | 1266 |
| Minimum yield kg/ha) | 436 | 500 | 499 | 5250 | 8982 | 600 | 697 | 1122 | 1125 | 1440 | 500 | 1497 |
| Fertiliser used kg/bigha | 3 | 0 | 4.2 | 49.5 | 17 | 3.1 | 4.4 | 5.7 | 24 | 8.6 | 0 | 898 |
| Labour used/bigha | 0.3 | 0.3 | 0.3 | 1.5 | 3.4 | 0.2 | 0.2 | 0.2 | 6.7 | 0.3 | 0.5 | 7 |
| N | 50 | 7 | 9 | 3 | 3 | 18 | 11 | 11 | 3 | 13 | 2 | 13 |

Table 3.13: Land Protection/Improvement Measures Undertaken by Households for Homesteads

| | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| Households took measures for protection, embankment etc. | 20 (8.9) | Nil | 90 (68.7) | 10 (7.2) | 27 (20.5) | 92 (78.0) | 31 (33.3) | Nil |
| Average expenses in Rs. | 16,325 | - | 48711 | - | 5737 | 22417 | 21064 | - |
| Maximum | 120,000 | - | 700000 | - | 35000 | 100000 | 150000 | - |
| Minimum | 3,000 | - | 1500 | - | 0 | 1000 | 5000 | - |
| Removal of sandy layers | 2 | - | 14 (10.7) | 3 (2.1) | 35 (26.5) | - | 4 (4.3) | - |
| Average expenses | 33,000 | - | 2157 | - | 3050 | - | 4875 | - |
| Maximum | 42,000 | - | 5000 | - | 7000 | - | 5500 | - |
| Minimum | 22,000 | - | 500 | - | 350 | - | 4000 | - |
| Irrigation provisioning | 3 | - | 2 | - | - | - | - | - |
| Average expenses in Rs. | 15000 | - | 4250 | - | - | - | - | - |
| Maximum | 41000 | - | 8000 | - | - | - | - | - |
| Minimum | 2000 | - | 3500 | - | - | - | - | - |
| Additional fertilisers | 16 (7.0) | - | - | - | - | - | - | - |
| Average expenses in Rs. | 2445 | - | - | - | - | - | - | - |
| Maximum | 18000 | - | - | - | - | - | - | - |
| Minimum | 500 | - | - | - | - | - | - | - |
| Land conversion | 22 (9.7) | - | - | - | - | - | - | - |
| Average expenses in Rs. | 27000 | - | - | - | - | - | - | - |
| Maximum | 65000 | - | - | - | - | - | - | - |
| Minimum | 2000 | - | - | - | - | - | - | - |
| Family labour involved in no of households | 25 (11.0) | - | 72 (55.0) | 1 | 3 | 1 | - | - |
| Average | 1.5 | - | 2 | 1 | 2 | 15 | - | - |
| Maximum | 3 | - | 3 | 1 | 2 | 15 | - | - |
| Minimum | 1 | - | 1 | 1 | 2 | 15 | - | - |
| Labour involved – hired in no. | 17 (7.5) | - | - | - | - | 2 | - | - |
| Average expenses | 5 | - | - | - | - | 15 | - | - |
| Maximum | 15 | - | - | - | - | 30 | - | - |
| Minimum | 2 | - | - | - | - | 20 | - | - |

* Data source: Fieldwork, 2021-22; figures in bracket are in percentage

Table 3.14: Land Protection/Improvement Measures Undertaken by Households for Homesteads

| Land Improvement Measures | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|--|----------------|------------------|---------------|------------------|-----------------|---------------|-----------------|-------------------|
| Measures for protection, embankment etc. | 14 (6.2) | Nil | 3 (2.3) | 4 (2.9) | 5 (3.8) | Nil | - | Nil |
| Average expenses in Rs. | 76428 | - | 4833 | - | 2890 | - | - | - |
| Maximum | 320,000 | - | 7500 | - | 5500 | - | - | - |
| Minimum | 4,000 | - | 0 | - | 450 | - | - | - |
| Removal of sandy layers | 15 (6.6) | - | - | 1 | 2 | - | 1 | - |
| Average expenses in Rs. | 124,666 | - | - | - | 4250 | - | 3000 | - |
| Maximum | 31,000 | - | - | - | 5500 | - | - | - |
| Minimum | 5,000 | - | - | - | 3000 | - | - | - |
| Irrigation provisioning | 15 (6.6) | - | 7 | - | - | - | - | - |
| Average expenses in Rs. | 16867 | - | 16428 | - | - | - | - | - |
| Maximum | 95000 | - | 50000 | - | - | - | - | - |
| Minimum | 4000 | - | 5000 | - | - | - | - | - |
| Additional fertilisers | 19 (8.3) | - | 1 | - | - | - | - | - |
| Average expenses in Rs. | 7615 | - | 1500 | - | - | - | - | - |
| Maximum | 20000 | - | - | - | - | - | - | - |
| Minimum | 2500 | - | - | - | - | - | - | - |
| Land conversion | 22 (9.7) | - | - | - | - | - | - | - |
| Average expenses in Rs. | 113272 | - | - | - | - | - | - | - |
| Maximum | 240000 | - | - | - | - | - | - | - |
| Minimum | 12000 | - | - | - | - | - | - | - |
| Labour involved – family | 13 (5.7) | - | 2 | - | - | - | - | - |
| Average expenses in Rs. | 2.1 | - | 1 | - | - | - | - | - |
| Maximum | 3 | - | - | - | - | - | - | - |
| Minimum | 1 | - | - | - | - | - | - | - |
| Labour involved – hired | 15 (6.6) | - | 5 | - | - | - | - | - |
| Average expenses in Rs. | 18.4 | - | 2.2 | - | - | - | - | - |
| Maximum | 25 | - | 6 | - | - | - | - | - |
| Minimum | 10 | - | 1 | - | - | - | - | - |

* Data source: Fieldwork, 2021-22; figures in bracket are in percentage

Table 3.15: Land Protection/Improvement Measures Undertaken by Households for Homesteads

| | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| Households took measures for protection, embankment etc. | 20 (8.9) | Nil | 90 (68.7) | 10 (7.2) | 27 (20.5) | 92 (78.0) | 31 (33.3) | Nil |
| Average expenses in Rs. | 16,325 | - | 48711 | - | 5737 | 22417 | 21064 | - |
| Maximum | 120,000 | - | 700000 | - | 35000 | 100000 | 150000 | - |
| Minimum | 3,000 | - | 1500 | - | 0 | 1000 | 5000 | - |
| Removal of sandy layers | 2 | - | 14 (10.7) | 3 (2.1) | 35 (26.5) | - | 4 (4.3) | - |
| Average expenses | 33,000 | - | 2157 | - | 3050 | - | 4875 | - |
| Maximum | 42,000 | - | 5000 | - | 7000 | - | 5500 | - |
| Minimum | 22,000 | - | 500 | - | 350 | - | 4000 | - |
| Irrigation provisioning | 3 | - | 2 | - | - | - | - | - |
| Average expenses in Rs. | 15000 | - | 4250 | - | - | - | - | - |
| Maximum | 41000 | - | 8000 | - | - | - | - | - |
| Minimum | 2000 | - | 3500 | - | - | - | - | - |
| Additional fertilisers | 16 (7.0) | - | - | - | - | - | - | - |
| Average expenses in Rs. | 2445 | - | - | - | - | - | - | - |
| Maximum | 18000 | - | - | - | - | - | - | - |
| Minimum | 500 | - | - | - | - | - | - | - |
| Land conversion | 22 (9.7) | - | - | - | - | - | - | - |
| Average expenses in Rs. | 27000 | - | - | - | - | - | - | - |
| Maximum | 65000 | - | - | - | - | - | - | - |
| Minimum | 2000 | - | - | - | - | - | - | - |
| Family labour involved in no of households | 25 (11.0) | - | 72 (55.0) | 1 | 3 | 1 | - | - |
| Average | 1.5 | - | 2 | 1 | 2 | 15 | - | - |
| Maximum | 3 | - | 3 | 1 | 2 | 15 | - | - |
| Minimum | 1 | - | 1 | 1 | 2 | 15 | - | - |
| Labour involved – hired in no. | 17 (7.5) | - | - | - | - | 2 | - | - |
| Average expenses | 5 | - | - | - | - | 15 | - | - |
| Maximum | 15 | - | - | - | - | 30 | - | - |
| Minimum | 2 | - | - | - | - | 20 | - | - |

* Data source: Fieldwork, 2021-22; figures in bracket are in percentage

Table 3.16: Land Protection/Improvement Measures Undertaken by Households for agriculture fields

| Land Improvement Measures | Dhemaji | Lakhimpur | Majuli | Sibasagar | Morigaon | Dhubri | Goalpara | Bongaigaon |
|--|----------------|------------------|---------------|------------------|-----------------|---------------|-----------------|-------------------|
| Measures for protection, embankment etc. | 14 (6.2) | Nil | 3 (2.3) | 4 (2.9) | 5 (3.8) | Nil | - | Nil |
| Average expenses in Rs. | 76428 | - | 4833 | - | 2890 | - | - | - |
| Maximum | 320,000 | - | 7500 | - | 5500 | - | - | - |
| Minimum | 4,000 | - | 0 | - | 450 | - | - | - |
| Removal of sandy layers | 15 (6.6) | - | - | 1 | 2 | - | 1 | - |
| Average expenses in Rs. | 124,666 | - | - | - | 4250 | - | 3000 | - |
| Maximum | 31,000 | - | - | - | 5500 | - | - | - |
| Minimum | 5,000 | - | - | - | 3000 | - | - | - |
| Irrigation provisioning | 15 (6.6) | - | 7 | - | - | - | - | - |
| Average expenses in Rs. | 16867 | - | 16428 | - | - | - | - | - |
| Maximum | 95000 | - | 50000 | - | - | - | - | - |
| Minimum | 4000 | - | 5000 | - | - | - | - | - |
| Additional fertilisers | 19 (8.3) | - | 1 | - | - | - | - | - |
| Average expenses in Rs. | 7615 | - | 1500 | - | - | - | - | - |
| Maximum | 20000 | - | - | - | - | - | - | - |
| Minimum | 2500 | - | - | - | - | - | - | - |
| Land conversion | 22 (9.7) | - | - | - | - | - | - | - |
| Average expenses in Rs. | 113272 | - | - | - | - | - | - | - |
| Maximum | 240000 | - | - | - | - | - | - | - |
| Minimum | 12000 | - | - | - | - | - | - | - |
| Labour involved – family | 13 (5.7) | - | 2 | - | - | - | - | - |
| Average expenses in Rs. | 2.1 | - | 1 | - | - | - | - | - |
| Maximum | 3 | - | - | - | - | - | - | - |
| Minimum | 1 | - | - | - | - | - | - | - |
| Labour involved – hired | 15 (6.6) | - | 5 | - | - | - | - | - |
| Average expenses in Rs. | 18.4 | - | 2.2 | - | - | - | - | - |
| Maximum | 25 | - | 6 | - | - | - | - | - |
| Minimum | 10 | - | 1 | - | - | - | - | - |

* Data source: Fieldwork, 2021-22; figures in bracket are in percentage

Section 4: Homestead and Farm Based Activities: How the state could raise carrying capacity?

4.1 Effective use of homesteads and smaller plots: possibilities

The concern is how people trapped in poverty in rural areas, and rural out-migrants in urban ghettos could be accommodated with effective use of local resources. Concern is how we would plan our physical resources and manpower in resource constraints situation?

Table 3.8 of previous section indicates that most of the households in the study villages have homestead land, the average ranging from 0.5 bigha to 1.4 bigha in the study districts. The tasks at present are to effectively plan the smaller plots of two bighas (all the study districts have high maximum size of minimum to bigha of homestead to maximum of 12 bigha; table 3.8) or even half a bigha of homestead land for economic activities and ensure decent and sustainable livelihood opportunity. We have successful examples of tea smallholding in the state; but there is scope to look beyond with exotic and diversified products, very specific to the state's ecology and economy.

In this context it is important to have certain development models and exercise based on what people traditionally have been doing and assess what forms of institutional support the state needs to provision. How the smallholding farming be made efficient and viable. It requires consolidation, through the mode of collective efficiency. Collective efficiency would see individual enterprises to grow and consolidate as part of interrelated production system; based on interdependency and mutual adaptation leading to formation of production cluster. Here efficiency is achieved being placed in the cluster and distribution of benefits depend on its link to rest of the economy – input as well as output; how the state would facilitate it with an acceptable marketing model.

The homesteads and small farms matter, they exist in large numbers, and if effectively managed under appropriate regulatory domain of the state, the small farms would reduce poverty and inequality; the data drawn from floods affected villages indicate. On efficiency measure on the homestead-based initiatives the need to go for the indicators of engagement, household food and nutritional security, some marketable surplus round the year and ability to contribute a vibrant rural non-farm economy in overall context of land and capital scarcity. Concern is also to make the small initiatives resilient to market shocks (through infrastructure provisioning and regulations) and natural calamities (adaptability process). There is need to reach a point that opportunity costs of leaving smallholdings would be high.

The concern is how we will view the smallholdings and the homestead land in resource constraints situation. Field evidence thus reveal that an effectively planed small plot of even one or half a bigha of homestead land for economic activities could ensure decent and sustainable livelihood opportunity.

4.2 Evidence of farm-based activities in homestead and small plots

Pisciculture

The floods affected villages of Dhemaji and Lakhimpur have some presence of pisciculture activity; the intensity of pisciculture however found to be high in Dhemaji (Table 4.1). In many floods affected villages of Dhemaji and Lakhimpur, the farmers have converted the sand deposited plots (primarily in Dhemaji) and waterlogged plots (in Lakhimpur) to ponds. The process involves costs in development. In addition, there are operational costs; average operational costs per bigha estimated to be higher in Lakhimpur villages (Rs. 9100/ with maximum of Rs. 34,000/bigha; largely to induce intensity of the activity with expectation of a better return. As paddy cultivation is not feasible in sandy and waterlogged plots, the farmers make protection measures (*bund*) higher enough to prevent entry of floods water and siltation. In the process the average annual productivity of a pond of 1.5 bigha is estimated at about 250 kg and market price per kg hover at around Rs. 180. It thus estimated that a household or fish farmer could earn an amount good minimum from a bigha of land to push a household above the poverty line, even after compensating the input and maintenance costs. One of the concerns is that most of the ponds are get affected by recurrent floods; and many ponds of Dhemaji get shallower or even vanished by sand deposition.

The average size of ponds made in Lakhimpur study villages found to be higher at 4.7 bigha; the reason being the conversion of land to pisciculture is planned and thus intentional; an adaptation approach to cope with the floods induced land degradation (waterlogging of paddy fields). The return per household in the process is much higher and able to compensate the loss of forced quitting from agriculture

Livestock rearing – Piggery and Goat rearing

Field survey found significant presence of livestock rearing activities, particularly pig rearing for meat in the flood affected villages of Dhemaji and Lakhimpur district (table 4.4), rearing on an average of three pigs by a household. A few households found with rearing of a dozen of pigs. Average annual net return per pig is estimated at about Rs. 9000/ and even higher depending on how the pig is fed; considerable enough to raise the income level of the farm households and meet contingencies from the return. Pig rearing in floods affected villages of Dhemaji and Lakhimpur now has emerged as adaptation process; farmers read the rising demand at the local market well. Few households however failed to gain desired return from their initiatives, largely because of floods.

Goat rearing for meat is common in most of the district of the survey, but not with the same intensity as piggery. Still, estimates show that a household could gain an average of Rs. 15000/ to Rs. 20,000/ from a goat, with little maintenance costs. Households having goats found to keep 2-5 goats in their possession; derive some supplementary income for their households.

Milch cow

Presence of milch cow is common in rural households of Assam. In the floods affected villages of Marigaon, Sibsagar, Majuli, Goalpara and Dhubri, this study could find presence of milch cow to an extent (Table 4.4). Average annual return from milch cow however meagre, just to ensure some household requirement and bring some cash in need. A few households however found having intensified rearing with cross breed variety and able to derive a decent income (average annual net return being Rs. 64,000/ in Lakhimpur village households).

Poultry rearing though is not common in Assam households, the survey could capture intense commercial rearing in some households in Dhemaji, Lakhimpur and Marigaon for meat; and Majuli for eggs and meet (Table 4.4). Duck rearing is emerged as rarest phenomenon but captured in one of the households of Majuli. Estimate reveal that a household with average rearing of 240 chicks could earn to an average of Rs. 54000-60000/ in a cycle of 6 to 8 weeks; leaving a net income of Rs. 15000 to Rs. 20000/ after omitting the operations costs amount to on an average of 60 percent. The intensity of rearing leads variation in earning.

Areca nut

Areca nut is an integral crop in the society and economy in Assam. In the floods affected villages of Dhemaji households found to be cultivating areca nut on an average 1.1 bigha of land; average annual return estimated at Rs. 58,000/ per cultivating households. There is minimal operational cost, production on an average could be about 40,000 units (or 480 to 500 pon) in a bigha having 180-200 betel nut trees. Areca nut cultivation is highly profitable in ideal conditions, having high market demand across the country. It is however found that heavy siltation and recurrent floods have done serious damage to areca nut plantations.

Sericulture

A few households in floods affected villages found engaged in **sericulture** – non-mulberry silk (*muga*) rearing. Yearly return emerges as decent in the rearing households, though rearing needs efforts and there is constraint to avail the quality seeds. Recurrent floods and heavy siltation in plantation areas cause severe problems for the silk rearers.

There is need to see the of smallholding and homestead land as a driver of rural development. Mapping the rich diversity of production of homesteads is essential; and homestead based or smallholding economy in agriculture land constraint situation could be an ideal model of development with creation of an efficient marketing network (discussed in section V).

Intercropping and cropping intensity, in smallholdings and homesteads is high; thus, able to derive sources of income and cash inflow from multiple sources throughout the year. The smallholdings and homesteads require extension supports in rational input use to derive the maximum return, which can be supported by technology led precision farming emerging at present. The economic activities as found in the study villages and discussed

have high demand in the market. In addition to these the households produce diverse exotic vegetables, though in small scale and there is heterogeneity because of traditional seeds and ecological conditions. People however value the products, which are by default organic. The concern at present is how the smallholdings and homesteads in specific ecological setting could be managed to the vagaries of monsoon and other ecological crises – as discussed floods and sand.

On planning front two key role of the smallholdings and homestead could be considered. One, development role, how the smallholdings and homesteads can take advantage of the market, the local as well as the niche market. Two, there is social contribution, supports the state by absorbing the labour force and reduces the burden of the state (the way the out-migrant workers reduce burden of the state; though with un-freedom at work).

Considering the two roles as mentioned above; the state could just concentrate on some real and regulatory supports to drive the rural economy; to be discussed in the concluding section.

Table 4.1: Farm Activities - Pisciculture

| Pisciculture | Area of pond in bigha | Operational costs in Rs. /bigha | Production in kg/bigha | Marketed in kg/bigha | Average price/kg | Area affected by floods | N |
|--------------|-----------------------|---------------------------------|------------------------|----------------------|------------------|-------------------------|----|
| Dhemaji | | | | | | No affect | 2 |
| Average | 1.4 | 5000 | 260 | 213 | 204 | Infrequent floods | - |
| Maximum | 5 | 12000 | 700 | 600 | 220 | Recurrent floods | 10 |
| Minimum | 0.7 | 0 | 200 | 150 | 180 | Sand deposition | 5 |
| N | 17/227 | | | | | Erosion | - |
| Lakhimpur | | | | | | No affect | - |
| Average | 4.7 | 9142 | 207 | 189 | 185 | Infrequent floods | 3 |
| Maximum | 14 | 34071 | 355 | 324 | 188 | Recurrent floods | 7 |
| Minimum | 1 | 1400 | 95 | 80 | 182 | Sand deposition | - |
| N | 10/225 | | | | | Erosion | - |
| Dhubri | | | | | | No affect | - |
| Average | 1.6 | 0 | 172 | 153 | 200 | Infrequent floods | - |
| Maximum | 16 | 0 | 500 | 500 | 200 | Recurrent floods | 71 |
| Minimum | 0.5 | 0 | 50 | 25 | 200 | Sand deposition | - |
| N | 71/118 | | | | | Erosion | - |
| Marigaon | | | | | | | |
| Average | 1.5 | 0 | 266 | 200 | 200 | To an extent | 1 |
| N | 1/132 | | | | | | |

* Source of data: Field work 2021-22

Table 4.2: Farm Activities – Sericulture

| Sericulture | Area of pond in bigha | Operational costs in Rs. /bigha | Production of cocoon number in | Marketed in kg/bigha | Return in Rs. | Damages |
|-------------------|-----------------------|---------------------------------|--------------------------------|----------------------|---------------|-----------------------------------|
| Dhemaji Average | 1 | 5000 | 8000 | 7500 | 37,500/ | Heavy siltation in planation area |
| N | 1 | | | | | |
| Lakhimpur/Average | 2 | 0 | 12000 | 10000 | 50,000/ | Damages done by recurrent floods |
| N | 1 | | | | | |

* Source of data: Field work 2021-22

Table 4.3: Farm Activities – Araca nut

| Areca nut /Dhemaji | Area in bigha | Average operational cost/bigha | Production in pon/bigha – one pon-80 unit | Annual return @Rs. 120 per pon | |
|---------------------------|---------------|--------------------------------|---|--------------------------------|-------------------------------|
| Average | 1.1 | 1193 | 485 | 58,200 | No flood affect – 6 |
| Maximum | 5 | 4800 | 900 | 172,000 | Recurrent floods - 2 |
| Minimum | 0.25 | 0.2 | 180 | 864 | Heavy deposition of silt - 22 |
| N | 30 | | | | |
| Lakhimpur | | | | | |
| Average | 0.5 | 333 | 360 | 36000 | Recurrent floods - 3 |
| Maximum | 0.5 | 450 | 450 | 45000 | |
| Minimum | 0.5 | 200 | 280 | 28000 | |
| N | 3 | | | | |

** Source of data: Field work 2021-22*

Table 4.4: Livestock rearing in floods affected villages

| Dhemaji district | Piggery | Maintenance costs in Rs. year/unit | Average Kg of meat sold | Average net return/per unit/year |
|--------------------|---------|------------------------------------|-------------------------|----------------------------------|
| Average | 2.8 | 2068 | 94 | 14880 |
| Maximum | 12 | 9500 | 320 | 56000 |
| Minimum | 1 | 167 | 6 | 0 |
| N | 63/227 | 63 | 63 | 63 |
| Lakhimpur district | | | | |
| Average | 3.1 | 2800 | 83 | 9040 |
| Maximum | 8 | 8566 | 420 | 31500 |
| Minimum | 2 | 616 | 0 | 1575 |
| N | 33/225 | 33 | 33 | 22 |

** Source of data: Field work 2021-22*

| Dhemaji | Milch cow | Maintenance costs in Rs. year/unit | Average litre sold annually | Average net return/per unit/year |
|--------------------|-----------|------------------------------------|-----------------------------|----------------------------------|
| Average | 3 | 3000 | 300 | 12000 |
| Maximum | - | - | - | - |
| Minimum | - | - | - | - |
| N | 1 | 1 | 1 | 1 |
| Lakhimpur district | | | | |
| Average | 3 | 5600 | 1600 | 64000 |
| Maximum | - | | | |
| Minimum | - | | | |
| N | 1 | | | |
| Marigaon district | | | | |
| Average | 3.4 | NA | 40 | 3360 |
| Maximum | 7 | | | |
| Minimum | 1 | | | |
| N | 29 | | | |
| Sibsagar district | | | | |
| Average | 5.4 | | 40 | 1816 |
| Maximum | 30 | | 105 | 21000 |
| Minimum | 1 | | 0 | 0 |
| N | 73 | | 16 | 16 |
| Majuli | | | | |
| Average | 4.5 | | Domestic consumption | |
| Maximum | 12 | | | |
| Minimum | 1 | | | |
| N | 33 | | | |
| Bongaigaon | | | | |
| Average | 3.25 | | Domestic consumption | |
| Maximum | 7 | | | |
| Minimum | 2 | | | |
| N | 4 | | | |
| Goalpara | | | | |
| Average | 2.6 | | Domestic consumption | |
| Maximum | 6 | | | |
| Minimum | 1 | | | |
| N | 17 | | | |
| Dhubri | | | | |
| Average | 1.7 | | Domestic consumption | |
| Maximum | 6 | | | |
| Minimum | 1 | | | |
| N | 44 | | | |

| Dhemaji district | Goatary | Maintenance costs in Rs. year/unit | Average Kg of meat sold | Average net return/per unit/year |
|--------------------|---------|------------------------------------|-------------------------|----------------------------------|
| Average | 5.4 | 1467 | 32 | 15900 |
| Maximum | 6 | 2700 | 45 | 20000 |
| Minimum | 4 | 50 | 24 | 12000 |
| N | 5 | | | |
| Lakhimpur district | | | | |
| Average | 5 | 500 | 39.5 | 19750 |
| Maximum | 5 | 500 | 42 | 21000 |
| Minimum | 5 | 500 | 37 | 18500 |
| N | 2 | 2 | 2 | 2 |
| Majuli | | | | |
| Average | 3.6 | Nil | | |
| Maximum | 7 | | | |
| Minimum | 1 | | | |
| N | 17 | | | |
| Sibsagar | | | | |
| Average | 4.9 | Nil | | |
| Maximum | 7 | | | |
| Minimum | 1 | | | |
| N | 19 | | | |
| Goalpara | | | | |
| Average | 1.9 | Nil | | |
| Maximum | 4 | | | |
| Minimum | 1 | | | |
| N | 14 | | | |
| Marigaon | | | | |
| Average | 3.9 | Nil | | |
| Maximum | 8 | | | |
| Minimum | 2 | | | |
| N | 15 | | | |
| Bongaigaon | | | | |
| Average | 3 | | | |
| Maximum | 4 | | | |
| Minimum | 2 | | | |
| N | 2 | | | |
| Dhubri | | | | |
| Average | 1.9 | | | |

| | | | | |
|---------|---|--|--|--|
| Maximum | 4 | | | |
| Minimum | 1 | | | |
| N | 8 | | | |

| Dhemaji district | Poultry | Maintenance costs in Rs. for a round of 6-8 weeks | Average Kg of meat sold | Average net return/per unit/6-8 weeks |
|--------------------|---------|---|-------------------------|---------------------------------------|
| Average | 240 | 32400 | 1.5 kg/ @Rs.150 | 54000 |
| Maximum | 1000 | 140,000 | @ Rs. 160/ | 240000 |
| Minimum | 50 | 6375 | | 11250 |
| N | 5 | | | 4 |
| Lakhimpur district | | | | |
| Average | 200 | 27000 | 1.5 kg/@rs. 150/ | 45000/ |
| Maximum | | | | |
| Minimum | | | | |
| N | 1 | | | |

Section 5: Developing market as an institution to ensure best return for the floods affected households

The study in earlier sections presented the initiatives of the rural households to produce and derive the maximum benefits from whatever the land they possess in the constrained situation for survival. Access to a right and remunerative market is the prime determinant that would ensure a fair return to the farmers to the efforts made and generate positive multiplier effect in the rural economy. It is observed that often the farmers do not able to get a remunerative return, making their initiatives in farm sector unattractive.

Tripathi et al (2007) finds that producer's share is lowest (38 per cent) if the product is disposed through layers of intermediaries – where village level collectors, traders, wholesalers, and retailers take their respective share. This mode of marketing however is efficient on the ground of final disposition of the products compared to the modes of (II) Sale of the products at local markets by the producers (from where the agents and other retailers procure), (III) Selling through the commission agents at large markets and (IV) selling at local markets from where the small traders procure directly.

This study posed seven patterns of marketing modes and tried to capture the responses from the people in the study areas. I. Agents collect from the home of producers, II. Producer sales directly to consumers at local hat, III. Producer sales directly to consumers at nearby urban centers, IV. Sale to intermediaries at local hat, V. Sale to intermediaries at nearby urban centers; VI. Do household vending, VII. Sale at government procurement centers.

Table 5.1: The mode of sale of produces in floods affected households

| | Agents collect from home | Sale directly to consumers at local hat | Sale directly to consumers at nearby urban centres | Sale to intermediaries at local hat | Sale to intermediaries at nearby urban centres | Do home vending | Sale at govt. procurement centres |
|-------------|--------------------------|---|--|-------------------------------------|--|-----------------|-----------------------------------|
| Areca nut | Y | - | - | - | - | - | - |
| Muga Cocoon | Y | - | - | - | - | - | - |
| Fish | Y | Y | - | - | - | - | - |
| Pig | Y | - | - | - | - | - | - |
| Poultry | Y | - | - | - | - | - | - |
| Goat | Y | - | - | - | - | - | - |
| Paddy | Y | Y | - | - | - | Y | - |
| Mustard | Y | Y | - | - | - | - | - |
| Black dal | Y | Y | - | Y | - | - | - |
| Jute | Y | Y | - | Y | - | - | - |
| Potato | Y | Y | - | - | - | - | - |
| Black cumin | Y | Y | - | - | - | - | - |
| Corn | Y | Y | - | Y | - | - | - |
| Peanut | Y | Y | - | Y | - | - | - |
| Colocasia | Y | Y | - | Y | - | - | - |
| Pumpkin | Y | Y | - | Y | - | - | - |

* Source: Field work 2021-22

It is found that in case of all products the collectors - traders/traders' agent collect the products from the farmers home/villages (Table 5.1). Except, Areca nut, muga cocoon,

pig, poultry, goat, farmers also take the products to the local huts, sale either directly to local traders or handover to the intermediaries at local huts. Only in case of paddy some cases of household vending were found; this mode is indication of sheer crisis to dispose the products for little cash with virtually no bargaining power.

Two situations are observed at present. One, crisis of livelihood overall in the country context sees penetration of traders/agents to procure products even from the remotest corners of the state. The petty traders in this way try to earn a survival income by re-selling pigs, goats for pork and mutton. Two, the agents who collect the products having good market demands are also engaged by certain corporate houses or large business firms, particularly to procure the emerging products of the villages– maize and peanuts and even jute, areca nut and non-mulberry cocoons providing an advance to produce.

Overall, there could be substantial gain among the intermediaries and the large firms. In such context it is hard to believe that price factor would act as a prime driver to usher in activities in farm sector in the remote floods affected areas and overall development of the economy. The entire phenomenon of cultivation or any form of commercial cultivations initiated by the small farmers in the floods' affected areas are driven by the need to earn some additional cash for survival.

The state through has established institutional provisioning of market (regulated markets); the locations are not convenient for the farmers; nor there are networks to reach. The prices indicated and offered by the regulated markets though appears to be high, because of certain locality specific factors, which may include road connectivity and infrastructures, in addition to presence of intermediaries at multiple layers which prevent a farmer to reach and yield the benefits of regulated markets. The prime factor however is also the insignificant quantity of the total produces, the need of immediate cash; the mode best suited for the farmers to dispose the products to the local agents.

Market is there, the task is to ensure fair share for the producers and generate strong multiplier effects in the local economy. The right models of marketing would be, to have interlinked and regulated collection centers at different levels of settlements hierarchy. Development and strengthening of markets with an institutional at different levels of settlement hierarchies is essential; because for a small farmer or producer, the travel costs and opportunity costs of time spent to sale a small quantity in distant market is too high; this is the reasons in many cases farmers throw their products to certain agents and collectors. Lack of such structure has been acting as disincentives to entrepreneurial activities in rural areas as well as has made the agriculture sector unremunerative. Marigaon example sets that farmer would go for intense activities in crisis if markets in whatever forms give incentive. It may be noted that developments of rural road infrastructure now to have eased out the situation to give market as shape of institution.

To ensure sustainability of the small individual initiatives the needs are to make the small individual efforts part of a collective production and marketing system; give it a form of collective effort and collective efficiency. The success of any production cluster is depended on how the cluster is structured, regulated, and linked with the rest of the economy with appropriate regulatory support and infrastructure provisioning by the state. Concern is also to make the small initiatives resilient to the market shocks, natural calamities, and pandemics. Considering the present crisis of unemployment and poverty,

the need is to reach a point, at which the opportunity costs of leaving the small initiatives would be high. The prime point is how the disadvantage of not having larger plots of land can be compensated well with high valued products and remunerative returns.

The components of input supply, procurement and distribution systems also need to be well designed at decentralised level to create an effective supply and value addition chain. Data reveals that though the public procurement system of the regulated markets of Assam ensures remunerative prices for the products of farmers; what lack timely repayment, non-procurement, or inflexibility to procure in smaller quantities. A look at the quantity procured by the regulated markets reveals insignificant volume, though the procurement prices are apparently higher; thus, do not reflect possibility to drive a local economy. In addition, it is important for the state marketing boards of the region to have provisions to buy the products in the times of excess production; store and release the products in the market, considering shelf life of the respective products and thus ensure fair returns to the farmers.

Reference:

Tripathi, A K (2007) Production and marketing of selected high value crops in Meghalaya, Division of Agriculture Economics, ICAR, NEH Region, Umium

Table 5.2: Mode of marketing of agriculture and farms products

| | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|---|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Betelnut | | | | | | | - | |
| Average production | 14 | 973 | - | - | - | - | - | - |
| Average quantity marketed | 13 | 883 | - | - | - | - | - | - |
| N | 31 | 3 | - | - | - | - | - | - |
| Sale mode | | | - | - | - | - | - | - |
| 1. Agents collect from home | 31 | 3 | - | - | - | - | - | - |
| 2. Sale directly to consumers at local hat | - | - | - | - | - | - | - | - |
| 3. Sale directly to consumers at nearby urban centres | - | - | - | - | - | - | - | - |
| 4. Sale to intermediaries at local hat | - | - | - | - | - | - | - | - |
| 5. Sale to intermediaries at nearby urban centres | - | - | - | - | - | - | - | - |
| 6. Do household vending | - | - | - | - | - | - | - | - |
| 7. Sale at government procurement centres | - | - | - | - | - | - | - | - |
| Fish | | | - | - | - | - | - | - |
| Average production in kg | 3.82 | 1140 | - | - | - | - | - | - |
| Average quantity marketed in kg | 3.17 | 1050 | - | - | - | - | - | - |
| N | 14 | 8 | - | - | - | - | - | - |
| Sale mode - 1 | 14 | 7 | - | - | - | - | - | - |
| Sale mode - 2 | | 1 | - | - | - | - | - | - |
| Pig | | | - | - | - | - | - | - |
| Average production in kg | 84.4 | - | - | - | - | - | - | - |
| Average quantity marketed in kg | 84.3 | - | - | - | - | - | - | - |
| N | 45 | - | - | - | - | - | - | - |
| Sale mode - 1 | 45 | - | - | - | - | - | - | - |
| Poultry | | | - | - | - | - | - | - |
| Average production in kg | 183 | 570 | - | - | - | - | - | - |
| Average quantity marketed in kg | 175 | 570 | - | - | - | - | - | - |
| N | 11 | 1 | - | - | - | - | - | - |
| Sale mode - 1 | 1 | N/A | - | - | - | - | - | - |

| | | | | | | | | |
|---------------------------------|------|-------|-------|-------|-------|-----|-------|----|
| Goat | | | - | - | | - | - | - |
| Average production in kg | 32 | 39.5 | - | - | - | - | - | - |
| Average quantity marketed in kg | 32 | 39.5 | - | - | - | - | - | - |
| N | 1 | 2 | - | - | - | - | - | - |
| Sale mode - 1 | 1 | 1 | - | - | - | - | - | - |
| Muga Cocoon | | | - | - | | - | - | - |
| Average production – unit | 8000 | 12000 | - | - | - | - | - | - |
| Average quantity marketed unit | 7500 | 10000 | - | - | - | - | - | - |
| N | 1 | 1 | - | - | - | - | - | - |
| Sale mode 1 | 1 | 1 | - | - | - | - | - | - |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |
| Mustard | | | | | | | - | - |
| Average production – unit | | | 11.01 | | | | 7.33 | - |
| Average quantity marketed unit | | | 10.90 | | | | 5.66 | - |
| N | | | 48 | | | | 3 | - |
| Sale mode 1 | | | 48 | | | | - | - |
| Sale mode- 2 | | | - | | | | 3 | - |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |
| Paddy | | | | | | | | |
| Average production – unit | - | - | 34.72 | 15.37 | 83.25 | - | 13.13 | - |
| Average quantity marketed unit | - | - | 32.46 | 14.01 | 64.50 | - | 10.33 | - |
| N | - | - | 66 | 8 | 8 | - | 13 | - |
| Sale mode 1 | - | - | 61 | 8 | 6 | - | - | - |
| Sale mode 2 | - | - | 3 | - | 1 | - | 13 | - |
| Sale mode 6 | - | - | 2 | - | 1 | - | - | - |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |
| Black Dal | | | | | | | | |
| Average production – unit | | | 22.28 | | 46.7 | | 4.7 | - |
| Average quantity marketed unit | | | 20.28 | | 46.2 | | 4.1 | - |
| N | | | 7 | | 10 | | 7 | - |
| Sale mode 1 | | | 7 | | 7 | | - | - |
| Sale mode 2 | | | - | | 3 | | 7 | - |

| | | | | | | | | |
|--------------------------------|-----|-----|-------|-----|-------|-----|------|----|
| Sale mode 4 | | | | | - | | - | - |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |
| Jute | | | | | | | | |
| Average production – unit | - | - | - | - | 44.3 | - | 20.4 | - |
| Average quantity marketed unit | - | - | - | - | 44.3 | - | 20.4 | - |
| N | - | - | - | - | 13 | - | 3 | - |
| Sale mode 1 | - | - | - | - | 6 | - | - | - |
| Sale mode 2 | - | - | - | - | 4 | - | 3 | - |
| Sale mode 4 | - | - | - | - | 3 | - | | |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |
| Potato | | | | | | | | |
| Average production – unit | - | - | 96.66 | - | - | - | - | - |
| Average quantity marketed unit | - | - | 80 | - | - | - | - | - |
| N | - | - | 3 | - | - | - | - | - |
| Sale mode 1 | - | - | 3 | - | - | - | - | - |
| Sale mode 2 | - | - | - | - | - | - | - | - |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |
| Black Cumin | | | | | | | | |
| Average production – unit | - | - | - | - | 50 | - | - | - |
| Average quantity marketed unit | - | - | - | - | 48 | - | - | - |
| N | - | - | - | - | 2 | - | - | - |
| Sale mode 1 | - | - | - | - | 2 | - | - | - |
| Sale mode 2 | - | - | - | - | - | - | - | - |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |
| Corn | | | | | | | | |
| Average production – unit | - | - | - | - | 47 | - | - | - |
| Average quantity marketed unit | - | - | - | - | 31.50 | - | - | - |
| N | - | - | - | - | 16 | - | - | - |
| Sale mode 1 | - | - | - | - | 8 | - | - | - |
| Sale mode 2 | - | - | - | - | 4 | - | - | - |
| Sale mode 4 | - | - | - | - | 4 | - | - | - |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |
| | | | | | | | | |

| | | | | | | | | |
|--------------------------------|-----|-----|-----|-------|-------|-----|----|----|
| Peanut | | | | | | | | |
| Average production – unit | - | - | - | - | 51.90 | - | - | - |
| Average quantity marketed unit | - | - | - | - | 48.64 | - | - | - |
| N | - | - | - | - | 11 | - | - | - |
| Sale mode 1 | - | - | - | - | 6 | - | - | - |
| Sale mode 2 | - | - | - | - | 1 | - | - | - |
| Sale mode 4 | - | - | - | - | 4 | - | - | - |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |
| Colocasia | | | | | | | | |
| Average production – unit | - | - | - | 20 | - | - | - | - |
| Average quantity marketed unit | - | - | - | 18 | - | - | - | - |
| N | - | - | - | 1 | - | - | - | - |
| Sale mode 1 | - | - | - | - | - | - | - | - |
| Sale mode 2 | - | - | - | 1 | - | - | - | - |
| Sale mode 4 | - | - | - | - | - | - | - | - |
| N | - | - | - | - | - | - | - | - |
| Pumkin | | | | | | | | |
| Average production – unit | - | - | - | 78.25 | - | - | - | - |
| Average quantity marketed unit | - | - | - | 78.25 | - | - | - | - |
| N | - | - | - | 4 | - | - | - | - |
| Sale mode 1 | - | - | - | 2 | - | - | - | - |
| Sale mode 2 | - | - | - | - | - | - | - | - |
| Sale mode 3 | - | - | - | 2 | - | - | - | - |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

Section 6: Credits for Consumption and Development Activities

6.1 Credits for coping in floods affected areas

The study finds that a significant proportion of households in the study villages have gone for loans, largely for consumption and miscellaneous purpose (Table 6.1). Loans to procure productive purposes such as agriculture implements though is visible primarily in Lakhimpur district (case of 50 percent of the households who have gone for loans). Households were also recorded across the districts who have gone for loans to procure agriculture implements. Some households have taken loan to meet educational needs and medical treatments. It is however found that no households have taken loan for land improvement measures, reflecting futility to invest in floods affected and sand deposited areas.

The average burden of loan in the process however is not low as reflected from the survey. Average amount of loan of a household varies from Rs. 18,500/ in Dhemaji to Rs. 117,000/ in Majuli villages. Some households have taken large loan for some unrevealed purpose. Data reveal that SHGs and microfinance institutions are the prime sources of loan in the study villages. Some households have able to gain loans from commercial banks; but moneylenders presence is also there in the villages.

6.2 Source of credits

Microfinance through SHGs is now considered as one of the important and effective mechanisms for poverty alleviation. The scheme encourages primarily women to come forward, avail the opportunity and start economic initiatives towards supplementing household income. The process has certain positive fallouts – from raising confidences of the women from underprivileged sections of the society with little or no assets, to initiate economic activities and to bringing about innumerable outcomes on their home and village fronts; all require a measure. It is presumed that financial services now available in every corner of the state would provide an opportunity to create and manage resources in the floods areas and generate employment. The system has made loans available for the people; and it is up to the people how they use the provisioning towards enhancing livelihood opportunities, increase income level, and ameliorate poverty. The nature of consumptions as revealed from the field data reveal there are lots of concerns to address.

Relatively large loans availed by the households reveal, in addition to the perceived needs, people have capability to repay. The capability may have derived from the remittances of out-migrants family members for work. The burden of interest in the process however is not low, a rate to two percent per month in most cases, which even goes up to three percent, puts huge burden of interest at the end of the year. For instance, a SHGs/JLG which seeks loan from a microfinance institution gets or provided Rs. 10,000/ for each member; the interest rate is 2 percent, and the 12-month repayment may end up paying Rs. 1520/ as an interest for the Rs. 10,000/ loan for the year. The amount paid as interest by all the people of a SHG as interest is not a small, which limit the multiplier effect of development of a tiny rural area/village.

The survey found there are households who have gone for second or multiple loans – not necessarily from the same sources. One phenomenon is that women focus or put priority on repayment in anticipation of keeping the door open for subsequent loans: the objectives or purpose though not the same.

It is reflected that through the system of JLG, the MFIs focuses to ensure repayment of loan. In India amount of outstanding loan per SHG is very high at Rs. 1.71 lakh as on March 2019 (Status of Micro Finance in India, 2018-19, NABARD). The amount of outstanding loan for women SHGs is higher at Rs. 1.77 lakh per SHG. In Assam as of March 2019 altogether 90218 SHGs owe Rs. 69028.05 lakh to the financial institutions, outstanding liability coming to Rs. 0.75 lakh per SHG.

The point of discussion is whether the JLG is a better mode of operation to ensure repayment of loan. The process however involves transaction costs with involvement of MFIs and the operational groups pay higher interest rates to avail the loan. This erodes a share of income or profit earn by the members. There is an obvious trade off, but need is to have detailed analysis to what extent the interest amount saved has the probability to drive the local economic growth.

Table 6.1: Mobilisation of Credits for Economic Activities

| | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--------------------------------------|-----------|-----------|-----------|-----------|----------|-----------|-----------|------------|
| No of households taken credit | 74 (32.6) | 67 (29.8) | 19 (14.5) | 30 (21.6) | 10 (7.6) | 27 (22.9) | 22 (23.7) | 26 (53.1) |
| Average in Rs. | 18527 | 19776 | 116947 | 37467 | 56300 | 36629 | 57090 | 55384 |
| Maximum | 40000 | 30000 | 700000 | 50000 | 200000 | 150000 | 300000 | 100000 |
| Minimum | 2000 | 10000 | 2000 | 15000 | 3000 | 9000 | 10000 | 10000 |
| Purpose | | | | | | | | |
| Land conservation/improvement | - | - | | 1 | - | - | 1 | - |
| Investments in Agri inputs | 7 (9.3) | 33 (49.3) | 5 (26.3) | 6 | 1 | 1 | 1 | 4 |
| To clear sand deposits | - | - | - | - | - | - | - | - |
| Household consumption needs | 32 (42.7) | 13 (19.4) | 1 | 0 | 2 | 19 (70.4) | 3 | - |
| Medical Treatment | 3 | 5 (7.5) | 1 | 1 | 2 | | 2 | 11 (42.3) |
| Educational Needs | 6 (8.0) | 2 (3.0) | 1 | - | - | - | - | 7 |
| Others | 26 (34.7) | 14 (20.9) | 10 (52.6) | 22 (73.3) | 5 | 7 (25.9) | 15 (68.2) | 3 |
| Source | | | | | | | | |
| Bank | 0 | 0 | 8 (42.1) | 2 | 1 | 6 | 2 | 8 |
| Cooperative society | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 |
| Micro-finance | 46 (60.0) | 50 (74.6) | 9 | 27 (90.0) | 8 | 6 | 15 (68.2) | 6 |
| SHGs | 28 (37.3) | 17 | 0 | 0 | 0 | 10 (37.0) | 3 | 5 |
| Moneylenders | 1 | - | - | - | - | - | - | 4 |
| Friends and relatives | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 3 |
| Others | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Years since loan taken | | | | | | | | |
| 2022 | 0 | 1 | 0 | 2 | 0 | 3 | 0 | 0 |
| 2021 | 29 | 6 | 6 | 3 | 3 | 17 | 6 | 1 |
| 2020 | 40 | 44 | 6 | 6 | 2 | 6 | 9 | 2 |
| 2019 | 6 | 16 | 3 | 12 | 2 | 0 | 5 | 20 |
| Before 2019 | 0 | 0 | 2 | 1 | 2 | 1 | 2 | 3 |
| Period/term of loan | | | | | | | | |
| Less than a year | 1 | - | 1 | 0 | 5 | | 7 | |
| 1 year | 10 | - | 4 | 7 | 4 | 7 | 12 | |
| 2 years | 62 | 63 (94.0) | 5 | 7 | 0 | 4 | 0 | |
| 3 years | 1 | 4 | - | 0 | 0 | 2 | 1 | |
| More than n3 years | 0 | 0 | 1 | 0 | 0 | 0 | 0 | |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

Section 7: Out-Migration for Job from Floods affected Villages and the Outcomes

7.1 Out-migration for jobs as a mode of coping

Out-migration for work from the flood affected and sand casted villages of Assam now has become a common but significant phenomenon. The migrated people now even find jobs at distant places- in plywood and rubber factories of Kerala, industrial jobs in Gujarat and security services jobs in Tamil Nadu etc. This study could locate the places of Kerala, Tamil Nādu, Delhi, Maharashtra as destinations for work. The places of destination in more than 75 percent cases are outside the states in the country.

Insufficient return from non-agriculture job/activities available locally is emerged as the prime cause of out-migration for job (Table 7.1). This reason however compounds the reasons of non-remunerative agriculture either because of yield factor in floods affected villages or price factor in existing institutional setting of market, or both. Interested in services sector jobs and to have a job in urban areas are also captured as reasons among a section.

Interaction with the workers revealed incentives to move to the farthest distance and adaptation in the new environment and earning. Abundance of jobs and regular flow of income has attracted many youths of the state to move out to distant places. The movement to the distant states reveals constraints of the state to absorb workers in its non-farm sector.

The magnitude of out-migration for work is found to be very high in the villages of Dhemaji (outmigrants for work were found in 29.5 % homes of the total households visited), Lakhimpur (29.3%) and Dhubri (36.4%) (Table 7.1); the proportion is significantly higher compared to the rest of the country; out-migration for employment on average is about 9 percent in the overall context of the country (Government of India, 2011). Crisis is so apparent that some households have multiple members who have move out from work; opportunity costs being at home is high, nullifying even the social costs of migration.

Interaction with the migrant workers revealed that they enjoy their jobs, employment, and labour market security outside the state. Jobs back at home are intermittent, and state supported programme like MGNREGA only creates dependency syndrome. This study though finds that about 55 percent households have received work to an extent under the MGNREGA, households receiving support is being on higher side in Sibasagar villages (83 percent), Majuli (75 percent) and Dhemaji 65 percent; Table 8.1 in section VIII)) The jobs the out-migrants do in distant places are unregulated, and the minimum wages and other pecuniary and non-pecuniary benefits are not ensured. The workers however enjoy their acceptance in industry and societies as they are not looked down as migrant workers. They are happy to earn a decent amount through their hard work and support their families back at home.

7.2 Earning and remittances

Field data reveal that average monthly earning of the out-migrants varies from a minimum of Rs. 6500/ of the Marigaon out-migrants to the maximum of Rs. 15,707/ of Lakhimpur out-migrants (Table 7.1). The data thus reveal higher earning of the migrant workers than the average income earned from agriculture and non-agricultural job back at home (Tables 2.5 and 2.6). The table 2.7 includes earning of the migrants who have moved outside the state, and table 7.1 includes earning of all the out-migrants for work.

The workers remit a good amount of earning – the average remittance being from a minimum of Rs. 3692/ in case of Goalpara migrant workers, to the maximum of Rs. 9440/ in case of Dhemaji workers. The variation in remittance varies in the source districts because of two reasons – the destinations of work and the nature of work done. The money remitted in addition to fulfilling the basic households needs, priority is there to spend on house renovation and construction of a new house (Table 7.1)

The workers are not willing to settle outside permanently, put efforts to save some money and start a new endeavour in Assam. Electronic transfers of money to home and cellular phone services have made their life convenient and keep them in constant touch with their families. The study finds that the peak of the movement for work, was in the year before the pandemic lockdown (2019); even after that year – people have move out for job irrespective of the regulatory constraints of the state on movements.

The endeavour and struggles made by the youths in the distant land open ups few significant issues for the state of Assam. The state had enjoyed enough provisions in industrial subsidies and concessions but has failed to create enough sustainable industrial jobs since 1997s. There is depletion of forest resources, which had compelled the Supreme Court to impose ban on timber felling way back in 1996. The consequences of closure of hundreds of sawmills and wood factories in the state are well known. There are numerous examples how the state has failed to address sustainable use of our own resources. The state fails to save the paddy fields from the negative externalities of flood and sand and resource-based jobs sectors through effective working plans. The struggles made by our out migrants in the lower end or non-standard job markets outside the state are indicative of poor governance on environmental and economic fronts.

This section raises a question – is out-migration for work a way out to raise accommodative capacity of the state? This is assumed from two perspectives. One, out-migration releases the burden of people and demand of goods and services associated with; and two, the remittances made by the out-migrants for work induce multiplier effects in the economy. One of the prime outcomes is that regular nature of work and earning provides a worker ample economic freedom to plan the life of his own as well as for other household members. This economic freedom however comes at certain costs may be measureable on economic terms, risks, and insecurities of life; but the economic freedom gained by the workers may outweigh the costs.

Inquisitiveness arises how the workers from Northeast region travel, and chose to work in distant places of Tamil Nadu, Kerala, Gujarat, Karnataka, Delhi, and many other pockets of the country. PLFS (2017-18; April –June 2018) data show that average wage rate of male casual workers in some states of the country is much higher than the state (for

instance wage of male casual workers in Kerala is 142% higher than that of Assam). Considering the point that more than 30 percent wage differences is necessary to drive migration for work (Mansoor and Quillin 2006). Data of PLFS (2017-18; April –June 2018) show that except Kerala no other states of the country male casual workers have 30 percent wage differences than the states of the region barring Assam. Data however show that in the states of Tamil Nadu, Delhi, Goa and Telengana, wage differences of male casual workers is more than 30 percent compared to Assam. The average wage rate of male casual workers of the country as a whole was about 18 percent higher than the wage rate of Assam. This is one of the reasons that among the out-migrants for works from the region workers from Assam dominate (Government of Kerala, 2013).

The data thus reveals that wage rates are not high in many destination states compared to hill states of the Northeast region. Interaction with the workers however revealed that the prime driver is not the wage, but needs of a regular job, not an intermittent job, and in this pursuit the workers put effort to carve their niches in distant locations. Workers reveal that it is easy to get involved a lower end job (non-standard job) at the destinations outside the region they have chosen. The process, however, involves three factors – one must take effort to reach the destination (undertake the long train journey in an unreserved compartment with anxieties of uncertainties in an unknown world), requires recommendation of fellow workers, and willingness to accept a wage determined by the employers.

The study reveals that it is not collective or individual bargaining that determines the wages of the migrant workers; workers in distress are compelled to accept a wage which may or may not be decent enough in relative situations of regularity provisions and measures adopted by the state and tiresomeness of the work involved. The workers however act rationally and explore scope for skill acquisition and upward mobility, and thus to ensure job and labour market security.

Field interactions reveal that it is not educational attainment levels, but aptitude to acquire skill and perseverance matter to sustain in job, employment, and labour markets. It does not require much time to get accustomed to a semi-skilled job in a plywood, biscuit, ice factory or even motor parts manufacturing units. This is the reason that the distressed youths, irrespective of their educational qualification - just literate to graduate crowd in all forms of jobs and it is difficult to draw a linear linkage on the types of jobs and education attainment levels of the migrant workers in all informal and non-standards jobs across the unorganized and even in organized sectors. The required skills to work in a plywood factory can be acquired in about 2-3 months' time. Field interaction show that apart from individual initiatives, passages for the workers are created by friends and relatives. The labour contractors play a decisive role to ensure entry of fellow workers from their native places.

Question arises why the country at present sees geographical differences in supply and demand of labour force. The state of Assam is now a labour supply state and the destinations states of Maharashtra, Delhi, Karnataka, Gujarat, and Tamil Nadu have gained significantly from FDI as the data reflect (these five states account for 80% of total FDI in India during 2019-20). The jobs in Kerala are driven by the remittance of its Diaspora, who have made investment in industrial sector in the state. Moreover, high human development, as well as low birth rate in states of Kerala and Goa has created a

vacuum in labour supply in nonstandard jobs. The message of availability of jobs in the labour shortage locations reached the distressed youths in the villages of Assam. The youths who visit their home in festivals and other occasions, create some impact of their acquired wellbeing; they make the passage for their friends and relatives to the locations of the country where they have made their hold.

The outward movement for work has surely taken the form of submission to the coercive labour market; and though unskilled, the workers find it easy to entre certain categories of jobs yielding relatively better wages and income.

7.3 Continuity and wellbeing

Migrant workers plan to work for a shorter period in their destinations – which may vary from 2-3 years to 10-15 years. Their only concern is to remit money to their home and save for a better future. Immediate needs in addition to meeting the day to day expenses, including the expenses on education of their children are to construct/renovate their house and long term plan is to set up avenues for self-employment at their native places. Perception and plans of the workers reveal to start self-employment initiatives; reflects desire for freedom at work from the constraints and unfreedom of casual works in distant places. It also indicates that economic independence of the workers is closely associated with inherent unfreedom associated with casual and even regular salaried jobs.

There is push from places of origin, but the pull is weak

Unregulated and market clearing wages, living conditions of the workers – at the workplaces and rental accommodations, through there are abundance of lower end jobs reveal weak pull in the places of destinations. The present crisis of migrant workers amid the Covid-19 lockdown is true reflection of weak pull, where the employers as well as the state fail to ensure basic back up provisioning and securities to survive even for one month. The pull at the destinations is considered weak if the earning fails to ensure minimum basic needs for decent living and conditions at work.

It is clear that the migrant workers enjoy short term economic independence in the pursuit of having a space of freedom. Some of the questions overall may emerge - what would be the nature of the flow in future; what we can assume and forecast. What would be the probable impact on social and economic fronts at the places of origin under certain probable scenario? We may have several permutation and combinations. One, the present scenario as we have discussed; two, sudden macro-economic and sectoral shocks in the places of destinations (similar to the Covid 19 lockdown) and situation will remain the same in places of origin; three, avenues will get saturated or decline in the places of destinations and situation will not improve at places of origin; four, temporary avenues will be created through state run programme and five, sustainable avenues will be crated with comprehensive physical resources and manpower planning.

7.4 How the state sees the developments

The prime concern is how the state would regulate the workspace of the self-employed. There are evidence on failure to create and sustain the existing opportunities. There are

many examples the self-employed across agriculture and farm sectors, vending and petty business and transport services sectors are pushed to precarious situations.

The present situation needs to have discussion on accommodativeness of agriculture and farm sector; and the non-farm sectors as well; how we would make the jobs available in the state sustainable with right regulatory measures.

Reference

Government of Kerala (2013) Report Domestic Migrant Labour

Monsoor A and B Quillin (2006), Migration and Remittance, World Bank

Table 7.1: Reasons for out-migration for job, destinations, and outcomes

| Migration | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--|-----------|-----------|----------|-----------|-----------|-----------|-----------|------------|
| Households with one out-migrant person | 62 (27.3) | 66 (29.3) | 4 (3.1) | 15 (10.8) | 15 (11.3) | 43 (36.4) | 13 (14) | 10 (20.4) |
| Two and more | 5 (2.2) | - | - | 2 | - | - | - | - |
| Reason for migration | | | | | | | | |
| Return from agriculture does not suffice | 6 | 1 | - | 2 | 4 (26.7) | - | - | 2 (20.0) |
| Insufficient returns from non-agriculture jobs available locally | 44 (65.7) | 25 (37.9) | - | 4 (26.7) | 7 (46.7) | 25 (58.1) | 11 (33.3) | 2 |
| Lack of resources for self-employment initiatives | 10 (14.9) | 39 (59.1) | 1 | 9 (60.0) | 1 | 5 (11.6) | - | 1 |
| Interested in services sector job | 4 | - | 3 (75.0) | - | 1 | 13 (30.2) | - | 2 |
| Interested in urban areas job | 2 | - | - | 2 | 2 | - | 2 | 1 |
| Others | 1 | 1 | - | - | - | - | - | 1 |
| Time since | | | | | | | | |
| 2022 | - | - | - | 2 | - | - | - | - |
| 2021 | 14 | - | - | 7 | - | 21 | 2 | 2 |
| 2020 | 16 | 5 | - | 2 | - | 7 | 2 | - |
| 2019 | 28 | 37 | - | - | 4 | 5 | 8 | - |
| 2018 | 5 | 18 | 1 | 3 | 2 | 2 | - | 2 |
| 2017 and earlier | 4 | 6 | 3 | 2 | 10 | 8 | 1 | 5 |
| Place of destination | | | | | | | | |
| Withing the district of residence | - | - | - | - | - | - | - | - |
| Outside the district | 7 | - | 2 | 8 | 5 | 24 | 7 | 6 |
| Outside the state | 60 | 66 | 2 | 9 | 9 | 18 | 6 | 4 |
| Monthly earning in Rs. | | | | | | | | |
| Average | 14732 | 15707 | 14250 | 9133 | 12466 | 14866 | 10692 | 14700 |
| Maximum | 90000 | 125000 | 25000 | 18000 | 25000 | 60000 | 20000 | 30000 |
| Minimum | 8000 | 8500 | 14000 | 3000 | 10000 | 6000 | 1000 | 3000 |
| Remittance | | | | | | | | |
| Average | 9440 | 5813 | 6500 | 24000 | 6133 | - | 3692 | 5600 |
| Maximum | 80000 | 0 | 10000 | 15000 | 12000 | - | 10000 | 10000 |
| Minimum | 0 | 3000 | 6000 | 0 | 1000 | - | 0 | 0 |

| Remittance used for | | | | | | | | |
|---|-----------|-----------|----------|-----|-----------|-----|----------|----|
| Basic household consumption | 2 | 1 | 3 (75.0) | 12 | 13 (86.7) | - | 1 | 3 |
| House renovation | 45 (72.6) | 54 (81.8) | - | - | - | - | 6 (46.1) | 2 |
| House construction | 18 (29.0) | 10 (15.1) | 1 | - | 1 | - | 1 | - |
| Purchase of personal vehicle | - | 1 | - | - | - | - | - | - |
| Purchase of commercial vehicle | - | - | - | - | - | - | - | - |
| Support given for self-employment | - | - | - | 3 | - | - | - | 1 |
| Investment in agriculture/farm activities | - | - | - | - | - | - | - | 1 |
| No remittance | 1 | - | - | - | - | - | - | - |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

Section 8: Amenities, Deprivation and State Supports

8.1 Basic household amenities and level of deprivation

The global Multidimensional Poverty Index (MPI) identifies multiple deprivations at the household level in health, education, and standard of living. Following the measures of MPI this study tried to capture the deprivation levels of six indicators of standard of living dimensions in the floods affected households and compare how the deprivation level varies to the average of the state.

This study assesses availability of electricity, sanitary toilets, safe drinking water supply, housing conditions, safe cooking fuel and availability of certain basic assets in the floods affected households. The study however tried to get some inference on educational attainment level (proportion of households with six years of schooling) and cases of morbidity and mortality in the floods affected households. This study has not attempted to construct the MPI.

Housing conditions

The study records about 25 percent houses in floods affected villages are dilapidated; Sibsagar villages (56 percent), Lakhimpur (35 percent) and Dhemaji (26 percent) have very high proportion of dilapidated homes. The figures are much higher than the average figure of 11 percent of the state (Census of India, 2011). Moreover, this study records 64 percent households in the flood affected villages have mud floor. Relatively higher proportion of non-mud floor houses in the districts of Lakhimpur, Majuli and Sibsagar is however because of certain cultural or traditional factors to go for bamboo or wood-based floor. The proportion of houses with mud floor in rural Assam to the 2011 Census overall was also high at 86 percent.

The mud floor can be considered as an unsafe and unhygienic indicator of development. Proportion of rural households with mud floors in the districts of Assam shows positive association with chronic asthma among rural population and of rural females (Annual Health Survey of Assam, 2010-11; RGI and Census Commissioner of India). We have district wise information on prevalence of chronic asthma and correlating these data with proportion of mud floored households we get positive association.

Temporary materials used for wall (case of 78 percent households in the sample) also is an indicator of crisis in floods affected villages; indicating disincentive to invest.

Among the structural components of housing – roofs show better indication with 68 percent households in the sample having galvanised sheets as roof. There are certain explanations on roofs showing better indication compared to other structural indicators in housing. There is scope to assume that people in constraint financial situation prioritise for a safe roof over their heads! People prioritise on roofs with limited available resources and then think of having permanent structure of wall and floor. This can be inferred from the Census data. Moreover, there could be few factors have contributed the shift to use of GI sheets in the households, more particularly in the rural households. This is cost effective in

the long run, available with variations in quality and affordable on price front. These sheets are also received under certain state supported programme.

The components which have attracted damages most in a household are the house and livestock. Average reported damage per household in the affected villages though appear to be meagre which range from a few thousands to about 20,000/ in the study villages, high maximum figures reveal the damages are not insignificant (Table 8.3).

Amenities

Temporal data on electricity connections show some improvement in the state. In Assam during 2011 altogether 78.5 percent villages have electricity connections (Government of Assam, 2011), but few proportions (28.4 percent) of rural households had electricity connections, which had raised the affordability issue. This study finds 92 percent households in floods affected areas now have electricity connection.

Use of clean fuel for cooking, that is LPG was found altogether in 52 percent households in the study villages; a much higher figures to 19.2 percent in 2011 (rural 10 percent and urban 68.3 percent).

Access to safe drinking water and sanitary toilets are prime concerns in floods affected villages. This study records sanitary toilets in 62 percent households; Dhubri (91 percent), Dhemaji (76 percent), Majuli (69 percent), Goalpara (65 percent) villages showing higher proportion of sanitary toilets in the households than the average of the sample. In 2011, Census data revealed presence of sanitary toilets in 20 percent rural households of the state.

Water sourced from taps, wells, tube/bore wells, hand pumps are in general considered as safe sources for drinking purpose. Water sourced from spring, river, canal, tank, and lake are not considered as safe sources. Census of 2011 had come out with more stringent criteria to define and capture safe sources of drinking water. Segregation and classification of sources of taps and wells as treated and untreated tap waters and covered and uncovered wells capture a realistic scenario of on drinking water safety.

In context of availability of safe drinking water temporal data shows a reverse scenario. There is decline of proportion of households in Assam with access to safe drinking water from 85 percent in 2001 to 70 percent in 2011. The trend is the same for the country as a whole. The treated sources reveal that very few proportion of households (11 percent in total and 32 percent in urban) has access to safe sources of drinking water compared to country average (32 percent in total and 62 percent in urban) One reason for this is because of the stringent classification.

This study finds that 71 percent household source drinking water from tube well or dug well; and 7 percent households have access to piped water supply. Altogether 22 percent households have drinking water from unprotected water sources in the flood affected villages (Table 8.1).

Households having drinking water from unprotected sources is very high in the villages of districts of Dhubri (97 percent), Majuli (53 percent) and Lakhimpur (10 percent).

Altogether 30 percent households in the floods affected villages had TV, 3.6 percent had radio, 74 percent had telephone or handset, 82 percent had bicycle, 26 percent had two-wheeler, and 3 percent had four-wheeler (table 8.1).

The state needs to traverse many hurdles to ensure decent housing and basic amenities to a significant section of people; the analysis reveal crisis in floods affected villages. The state is aware of the situation, and this can be inferred from the ongoing programme and policies of the state. The interventions however look insufficient. It can be said that interventions at least in case of basic housing, drinking water and sanitary toilets cannot be postponed or lingered. Coming to the context of clean energy- for cooking and lighting of the homes the state in near future could face a daunting task in a resource constraint situation-financial as well as scarce commodity front. The issue is that majority of the households in the state are still not capable to afford these services at prevailing market price and lack of effective demand now may have put the state in an advantageous situation. Options are available only in innovations in alternative and renewable energy, but these are yet to be cost-effective at the present level of technology.

Overall, it has emerged that impact of poor housing conditions and lack of basic amenities would continue to haunt the children. Research indicates that bad housing increases the risk of severe ill health by 25 percent during childhood and early childhood. Moreover, there is a greater chance of suffering mental health problems and problems with behaviour lower educational attainment, greater likelihood of unemployment, and poverty. Data in our context generates enough issues which can be addressed through primary studies.

8.2 Morbidity and mortality

Table 8.2 captures varied forms of morbidity present in the floods affected villages. The nature of morbidity reported found not to be uncommon in the study villages. There are however sporadic cases of morbidity related to water borne vector in the villages. Some of the surveyed households reported incidences of death in past one year; but the cause of death related to floods reported only a few households.

The survey captures about 32 percent of the households receiving some sort of free or subsidised health care support from the state. Households of Majuli (79 percent), Dhemaji (51 percent), Bongaigaon (45 percent) and Marigaon (35 percent) emerges as prime beneficiaries. Supports under ICDS programme availed by about 18 percent households; households of Dhemaji (42 percent) and Sibsagar (30 percent) are reached to maximum extent.

8.3 State supports to ease the deficiency

The sample survey reflects that about 16 percent households have received homes under PMAY; the proportion of households receiving housing support of the state is relatively on higher side in the districts of Dhubri (24.6 percent) and Lakhimpur (22.7 percent). The proportion of households (53 percent) receiving toilets in the sample villages are however

on higher side. Moreover, 81 percent of the total households have received supports from the state to have electricity connections.

This survey finds that about 81 percent households have received supports from the state to have electricity connections. Some assistance for flood damages is reportedly received by 24 percent households; households of Sibsagar (89 percent), Marigaon (63 percent) and Majuli (28 percent) have able to avail the benefits most.

Old age/widow pensions have reached about 24 percent households in the sample floods affected villages. It is observed that the proportion of beneficiaries more or less are uniformly distributed across the study districts (Table 8.4). Subsidised ration has reached 82 percent households; the supports of food grains are found to be uniformly distributed across the state.

State supports in the forms of electricity connections, old age, and widow pensions, PDS supports appears to be universal in nature. Concentration on housing programme, maintenance of drinking water sources, would help to ease the crisis to a great extent.

Meagre income (primarily from agriculture) in the floods affected households, if the income from diversified sources is not considered would keep a significant proportion of the households in the study areas under poverty (discussed in section I). The data on amenities to indicate deprivation of a significant section of people and had there been no state support (though coverage is not complete) the deprivation figures would have been much higher. The damage done to housing as revealed, the figures of damage reported including the loss of livestock (consider as source of livelihood or nutritional security at least on home front) aggravated the crisis. There is however reflection of minimisation of damages with preparedness in context of repeated floods.

Still, floods along with leaving the trail of damages, food crisis put the burden of reconstruction activities, workdays and schooldays loss. All these have made situations further complex to ensure wellbeing of the people in floods affected areas.

Table 8.1: Amenities available in the households of floods affected villages

| Cooking fuel | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--------------------------------------|-------------|------------|------------|-----------|------------|-----------|-----------|------------|
| Dung/firewood/charcoal/coal/Kerosene | 111(48.89) | 178(79.11) | 28(21.37) | 96(69.06) | 27 (20.45) | 68(57.62) | 25(26.88) | 8(16.32) |
| LPG | 116 (51.10) | 47(20.88) | 103(78.62) | 43(30.93) | 105(79.54) | 50(42.37) | 68(73.11) | 41(83.67) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Drinking water | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|-----------------------|------------|------------|-----------|-----------|-----------|------------|----------|------------|
| Piped supply | 33 (14.5) | 16 (7.1) | 4 (3.1) | 12(8.6) | 12 | 2 (1.7) | 1 | 3 |
| Dug/tube well | 181 (79.7) | 186 (82.2) | 58 (44.3) | 114(82.) | 107(81.6) | 1 | 90 | 44(89.4) |
| Open source | 13 (5.7) | 23 (10.2) | 69 (52.7) | 13 (9.4) | 12 | 115 (97.5) | 2 | 2 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Toilets | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|----------------|------------|------------|-----------|-----------|-----------|------------|-----------|------------|
| Sanitary | 172 (75.8) | 130 (57.8) | 90 (68.7) | 50 (36) | 57 (43.2) | 108 (91.5) | 60 (64.5) | 14 (28.6) |
| Non-sanitary | 55 (24.2) | 95 (42.2) | 41 (31.3) | 89 (64) | 75 (56.8) | 10 (8.5) | 33 (35.5) | 35 (71.4) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Electricity connections | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--------------------------------|------------|-----------|-------------|------------|----------|------------|-----------|------------|
| Yes | 219 (96.5) | 189 (84) | 131 (100.0) | 128 (92.1) | 99 (75) | 116 (98.3) | 90 (96.8) | 45 (91.8) |
| No | 8 (3.5) | 36 (16) | 0 | 11 (7.9) | 33 (25) | 2 (1.7) | 3 (3.2) | 4 (8.2) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Housing conditions - Roof | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|----------------------------------|------------|------------|------------|------------|-----------|-----------|-----------|------------|
| Thatch or temporary materials | 9 (4) | 23 (10.2) | 12 (9.2) | 129 (92.8) | 80 (60.6) | 3 (2.5) | 33 (35.5) | 29 (59.2) |
| GI sheets | 217 (95.6) | 201 (89.3) | 119 (90.8) | 6 (4.3) | 52 (39.4) | 83 (70.3) | 57 (61.3) | 19 (38.8) |
| RCC | 1 (4) | 1 (0.4) | 0 | 4 (2.9) | 0 | 32 (27.1) | 3 (3.2) | 1 (2.0) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Housing conditions -Wall | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|---------------------------------|----------|------------|------------|-----------|------------|-----------|-----------|------------|
| Temporary/rudimentary materials | 218 (96) | 184 (81.8) | 106 (80.9) | 132 (95) | 108 (81.8) | 29 (24.6) | 48 (51.6) | 43 (87.8) |
| Permanent | 9 (4) | 41 (18.2) | 25 (19.1) | 7 (5) | 24 (18.2) | 89 (75.4) | 45 (48.4) | 6 (12.8) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Housing conditions- Floor | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|----------------------------------|------------|------------|-----------|-----------|------------|-----------|-----------|------------|
| Mud | 195 (85.9) | 115 (51.1) | 69 (52.7) | 52 (37.4) | 104 (78.8) | 73 (61.9) | 58 (62.4) | 45 (91.8) |
| Other materials | 32 (14.1) | 110 (48.9) | 62 (47.3) | 87 (62.6) | 28 (21.2) | 45 (38.1) | 35 (37.6) | 4 (8.2) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Housing Conditions - overall | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|-------------------------------------|------------|------------|-----------|-----------|------------|-----------|-----------|------------|
| Dilapidated | 60 (26.4) | 78 (34.7) | 8 (6.1) | 78 (56.1) | 17 (12.9) | 4 (3.4) | 12 (12.9) | 17 (34.7) |
| Liveable | 166 (73.1) | 141 (62.7) | 99 (75.6) | 60 (43.2) | 113 (85.6) | 86 (72.9) | 65 (69.9) | 28 (57.1) |
| Good | 1 (0.1) | 6 (2.7) | 24 (18.3) | 1 (0.7) | 2 (1.5) | 28 (23.7) | 16 (17.2) | 4 (8.2) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Assets possessed by households in number | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|---|------------|-----------|------------|------------|------------|----------|-----------|------------|
| Radio | 20 (8.8) | 1 (0.4) | 1 (8) | 3(2.2) | 1 (8) | 0 | 0 | 15 (30.6) |
| TV | 91(40.1) | 19 (16.1) | 59(45) | 48 (34.5) | 37 (28) | 19(16.1) | 46 (49.5) | 16 (32.7) |
| Telephone/handset | 214 (94.3) | 51(22.7) | 115 (87.8) | 130 (93.5) | 114 (86.4) | 92 (78) | 84 (90.3) | 16 (32.7) |
| Computer | 1(0.4) | 3(1.3) | 0 | 2 (1.4) | 2 (1.5) | 1(0.8) | 0 | 3 (6.1) |
| Fridge | 3 (1.3) | 3 (1.3) | 2 (1.5) | 6 (4.3) | 3 (2.3) | 17(14.4) | 3 (3.4) | 2(4.1) |
| Bicycle | 215(94.7) | 208(92.4) | 105(80.2) | 102 (73.4) | 91 (68.9) | 71(60.2) | 70 (75.3) | 38(77.6) |
| Two-wheeler | 50(2.02) | 42(18.7) | 38(29) | 30 (21.6) | 31 (23.5) | 51(43.2) | 28 (30.1) | 15 (30.6) |
| Four-six wheelers | 4 (1.8) | 2(0.9) | 3 (2.3) | 5(3.6) | 5(3.8) | 6 (5.1) | 8 (8.6) | 2(4.1) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

Table 8.2: Nature of Morbidity, and Deaths in Floods affected Households

| Morbidity | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|-------------------------------|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Households reported morbidity | | | | | | | | |
| Types of morbidity | | | | | - | 1 | - | - |
| 1 Blood Pressure | 2 | 2 | - | - | - | - | 4 | - |
| 2 High/Low Pressure | 1 | 5 | - | 9 | 4 | 1 | 1 | - |
| 3 Kidney Problem | 1 | 1 | - | 1 | - | - | - | - |
| 4 Diabetes | 2 | - | 1 | - | 2 | 9 | - | - |
| 5 Typhoid | - | - | - | - | - | 1 | - | - |
| 6 Body Pain | 1 | - | 16 | 1 | 1 | - | 2 | - |
| 7 Cancer | 1 | 5 | - | - | - | - | - | 1 |
| 8 Headache | 1 | - | - | - | - | - | - | - |
| 9 heart diseases | 2 | - | - | 2 | - | - | 2 | 1 |
| 10 Liver Diseases | 2 | - | - | 1 | - | - | - | - |
| 11 Tumor | 1 | - | 1 | - | 1 | - | - | - |
| 12 Arthritis | - | 2 | - | - | - | - | - | 1 |
| 13 Asthma | 1 | - | - | - | 2 | - | 1 | 1 |
| 14 Covid | - | - | - | - | - | - | - | 4 |
| 15 Fever | - | - | - | 1 | 1 | - | - | - |
| 16 Gall Bladder | - | - | 1 | - | 3 | - | 1 | 8 |
| 17 Infection | - | - | 1 | 9 | 5 | - | 7 | 1 |
| 18 Tuberculosis | - | - | 2 | 2 | 1 | - | 2 | 2 |
| 19 Piles | - | - | - | - | - | - | 1 | 1 |
| 20 Paralysis | - | - | 1 | 2 | 2 | - | 1 | - |
| 21 Anemia | 1 | 9 | - | - | - | - | 2 | - |
| 22 Jaundice | 2 | 1 | - | 1 | - | - | - | - |
| 23 Nerve Problem | - | 1 | 1 | - | - | - | - | - |
| 24 Thyroid | - | - | 2 | - | - | - | - | - |
| 25 Diarrhea | 1 | 1 | - | - | 2 | - | - | - |
| 26 Loss of Eyesight | - | - | - | - | 3 | - | - | - |
| 27 Gastritis | - | - | - | 10 | - | - | - | - |
| 28 Uric Acid | - | - | - | 1 | - | - | - | - |

| | | | | | | | | |
|---|----|----|---|----|----|----|-----|----|
| No. of Households reported death | 8 | 4 | | 6 | 6 | 2 | 4 | 6 |
| Average age of death | 53 | 53 | - | 56 | 51 | 73 | 51. | 43 |
| Reasons of death | | | | | | | | |
| 1 Anemia | 1 | - | - | - | - | - | - | - |
| 2 Asthma | 1 | - | - | - | 2 | - | - | - |
| 3 Blood Pressure | - | 2 | - | - | - | - | - | - |
| 4 Cancer | - | - | - | - | 2 | 1 | 1 | 1 |
| 5 Diarrhea | 1 | - | - | - | - | - | - | - |
| 6 heart diseases | - | - | - | | | - | 2 | - |
| 7 High/Low Pressure | 2 | 1 | - | | - | - | - | - |
| 8 Jaundice | 2 | - | - | | - | - | - | - |
| 9 Kidney Problem | - | 1 | - | | 1 | - | - | 1 |
| 10 Childbirth | 1 | - | - | - | - | - | - | - |
| 11 Gall Bladder | - | - | - | - | - | - | 1 | - |
| 12 Covid | - | - | | - | - | - | - | 1 |
| 13 Tuber Culosis | - | - | - | | - | 1 | - | 2 |
| 14 Infection | - | - | - | 1 | - | - | - | - |
| 15 Paralysis | - | - | - | 2 | - | - | - | - |
| 16 Accident | | | | 2 | - | | | 1 |
| 17 Flood | | | | 1 | 1 | | | |

Table 8.3: Loss of Assets due to floods

| Livestock loss in number during last year per household | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Average | 12 | 0 | 8 | 5 | 12 | 0 | 0. | 2 |
| Maximum | 80 | 0 | 4 | 30 | 4 | 0 | 2 | 8 |
| Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Approximate house damage costs during last year in Rs. | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|---|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Average | 6659 | 833 | 1718 | 7329 | 1920 | 11110 | 4902 | 19939 |
| Maximum | 220000 | 7500 | 8000 | 80000 | 20000 | 20000 | 23000 | 20000 |
| Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Moveable assets lost during last year of floods by type | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Average | 61 | 0 | 0 | 0 | 0 | 0 | 0 | 3612 |
| Maximum | 5000 | 0 | 0 | 0 | 0 | 0 | 0 | 18000 |
| Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

Table 8.4: Number of Households availed benefits under government support programme

| Support programmes | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|-------------------------------------|------------|------------|------------|------------|------------|-----------|------------|------------|
| MGNREGA | 148(65.19) | 32 (14.22) | 99(75.57) | 116(83.45) | 66 (50) | 71(60.16) | 44 (47.31) | 29(59.18) |
| Housing – PMAY | 24(10.6) | 51(22.7) | 9(6.9) | 22 (15.8) | 18(13.6) | 29(24.6) | 16 (17.2) | 3 (6.1) |
| Sanitary Toilets | 168 (74) | 118 (52.4) | 43(32.8) | 79 (56.8) | 47 (35.6) | 91 (77.1) | 36 (38.7) | 5(10.2) |
| ICDS – Child Development supports | 95 (41.9) | 28 (12.4) | 7 (5.3) | 42 (30.21) | 3 (2.3) | 3 (2.5) | 19(20.4) | 5 (10.2) |
| NRHM | 117 (51.5) | 12 (5.3) | 104(79.38) | 14 (10.1) | 46 (34.84) | 7(5.9) | 29 (31.2) | 22 (44.9) |
| Support under Educational programme | 118 (52) | 160 (71.1) | 30 (22.9) | 78 (56.1) | 19 (14.4) | 1 (0.8) | 21 (22.6) | 7 (14.3) |
| Mid Day meal | 115 (50.7) | 160 (71.1) | 17 (13) | 81(58.3) | 28 (21.2) | 43 (36.4) | 25 (26.9) | 8 (16.3) |
| Old age pensions, widow pension | 63 (27.8) | 47 (20.9) | 56 (42.7) | 30(21.58) | 37 (28) | 11 (9.3) | 20 (21.5) | 0 |
| Subsidized Ration/PDS | 202 (89) | 158 (70.2) | 119 (90.8) | 126 (90.6) | 114 (86.4) | 93 (78.8) | 84 (90.3) | 12 (24.5) |
| Electricity | 218 (96) | 199(88.4) | 127 (96.9) | 63 (45.3) | 95 (72) | 90(76.3) | 89 (95.7) | 10 (20.4) |
| Flood damage related assistance | 11 (4.8) | 0 | 37 (28.2) | 124 (89.2) | 83 (62.9) | 2 (1.7) | 7 (7.5) | 5 (10.2) |
| Total households | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

Section 9: Reconstruction Activities, State Supports and People's Discontents

9.1 Reconstruction activities during the post flood period and the opportunity costs

The time wasted and the opportunity cost/loss of the time devoted on repeated cleaning, reconstruction and maintenance of the flood affected houses in general are not measured and addressed by flood damage literatures. Moreover, there is loss of school days by the children because of floods. It affects the process of capability development of the children. Flood thus creates an uneven playing field for children of flood affected areas as compared to the children from the areas free from floods.

Field survey for this study estimates the number of days at least a member in a household loss to reconstruct and clean their homes and days forced the prime earner to remain absent from work and school. District wise losses of person days are indicated in Table 9.1. It emerges that a household in flood affected villages of Assam is compelled spent on an average 46 days to clean and re-construct homes during a year. This average figure is found to be 110 days in Lakhimpur district to a minimum of 8 days among the sample households of Dhubri district.

The average estimated loss of workdays in the floods affected villages per household (of the main earning member) is 65 days and more importantly 69 days of schooling is lost by a child during the year. Such losses have serious implications, from economic loss (opportunity costs) to knowledge/capability development/attainment of the people.

Spatial variations of the days lost in all spheres indicate more damage in the north bank districts of Dhemaji and Lakhimpur. In addition to these districts, south bank districts of Marigaon and Sibsagar also indicate high intensity of damage. Average workdays lost is as high as 129 days per person in Lakhimpur and 118 days in Dhemaji during a year. These two districts also show maximum number of schooldays lost (Lakhimpur 143 days and Dhemaji 123 days).

People in flood affected villages try to adapt to the adversities in various ways. As discussed earlier these take forms by putting effort to compensate the loss or derive maximum possible returns by shifting the cropping pattern and seasons (in case of farm households), as well as finding new sources of livelihood (once the land gets degraded by floods and/or agriculture becomes unremunerative because of market factor). On the part of the State, efforts are seen to minimise the sufferings with support measures provided in various forms. The affected people could receive supports in whatever forms may be available, cope, or finally adapt to the adversities, but at the present nature of intervention it is apparent that floods, sand, and erosion finally leave effects on the capabilities possessed (a resourceful farmer turns daily wage earner even at distant places) or to be attained by the affected people (a bright student drops out of school).

9.2 Supports received during the floods from the state

State support to cope with the crisis is significant and thus requires measure. The welfare programme and provisioning, which are universal in nature in the state, as discussed in section VIII no doubt help to ameliorate condition of a household under persistent crisis; but devastating floods could break the resilience people develop and build with the state support. To address immediate crisis the state needs to come out with specific support and relief measures which would help to get some temporary relief and gradually stand on their own and with the programme specific supports.

Altogether 29 percent households in the sample reported that the supports received at home in terms of food items are adequate. Adequacy in distribution of food items at home front is found to be higher in Dhubri (80 percent households reported), Majuli (46 percent) and Goalpara districts (41 percent). Altogether percent 55 percent households reported inadequacy of food support and 15.5 percent households had received no support of food grain supply during the crisis (Table 9.2).

Food items are restricted to rice, rice puff, lentil, salt and mustard oil. Depending on the number of members in the households the amount of rice could vary in between 10 kg to 60 kg and lentil one to 4 kg, with a half to one litre of mustard oil and one kg of salt. Rice puff, cooking oil and salt are however not part of the list of the relief item as reported in all households. Villagers report three issues related to the food relief. One, the items never reach on time; two, the quantity is insufficient and three, quality of foods items distributed are inferior.

Few additional issues emerge on the nature of relief received by the people. It appears that the administration plans the same patterns and approach in relief distribution throughout the state for flood affected people. What are the rational or restrictions of selecting or limiting relief to certain items? Does the administration take into account the opinion and repeated grievances of the people on the issues related to food items distribution?

The pattern and list of relief items though overall is the same, people in some villages reported receiving items such as mosquito nets, blankets, polythene sheets and tarpaulins from the state administrations. The point is from where these additional relief materials come; these provisioning could be under different programme heads of the State and distributed as flood relief. Such approach reveals reading on the requirements from the perspective of affected people during the time of disasters.

Few voluntary organisations and NGOs are however has started to perceive the need of the people at the time of the disasters in different ways. In addition to the stipulated food items for a family, the relief box also includes – utensils, cloths, candle and matchbox, polythene sheets etc. The list of distributed items of an NGO includes a bottle of phenol, soap, detergent cake, sanitary napkin from women, groundnut, biscuits etc. These items are unusual in a relief list, but extremely important in the crisis. The more important is that such issues are perceived well by few organisations.

Adequacy of drinking water provisioning is a major problem, both at home and at relief camps. Inadequacy (reported by 22 percent households) or no provisioning of water

(77percent households) during the floods, remains a critical concern in the floods affected households of the state. The survey revealed in case of an insignificant proportion of households provisioning of drinking water is made by the state departments.

In case of toilets, less than one percent households reported state provisioning of toilets in relief camps. Provisioning of shelter though received by 6 percent households during the floods, the supports reported largely inadequate. Supports received on transportation of affected people to work and school is also virtually absent. It thus appears that the support received by the affected households during the floods centred on distribution of food items. The supports mode appears to be insensitive on gender aspects; as women suffer most due to lack of potable water, sanitation, and shelter.

9.3 Discontents over state supports

The causes of discontents among people are largely centred on inadequacy of the quantity, inferior quality, and untimely distributions of the food materials. The study found that to 57 percent households promptness of relief measures is slow or very slow; and 37 percent households reporting the promptness average in nature (Table 9.3). It is however found that in major floods affected districts of the state – Dhubri (79 percent), Marigaon (56 percent), Majuli (43 percent) and Lakhimpur (41 percent), people are not at all dissatisfied regarding promptness of relief measure of the state. Regarding promptness of rescue operations 33 percent households satisfied with state’s prompt action; and rest expressed unhappiness terming state’s action as slow. Householding expressing satisfactions over promptness of rescue operations found to be relatively higher in Dhemaji (45 percent), Majuli (54 percent), Marigaon (56 percent) and in Lakhimpur district (41 percent).

Few issues emerge for discussion in the context of responsiveness for rescue. It may be that state does not perceive or feel the need of rescue operations on all occasions and consider that people can take care of their own by adapting to the situation after receiving the early warnings. Moreover, the manpower available with State Disaster Relief Force (SDRF) or National Disaster Relief Force (NDRF) may not be enough to take care of vast pockets of flood affected areas. At present NRDF has 12 battalions and each battalion consists of 1149 personals. As reported the 1st battalion which serves the 5 north eastern states of Arunachal Pradesh, Assam, Mizoram, Nagaland and Tripura.

A meagre 7 percent households were in opinion that there is improvement in state’s support measure during the floods; and 42 percent households said there is no improvement. The rest of the households could not comment on the improvement measures. About 20 percent households believed that in recent times there is decline in floods related deaths in the state, because of state action; this fact is declined by about 30 percent households in the sample and the rest could not have opinion on this.

Some of the demands of the affected people are re-construction of the embankments, allotment of home under the IAY, compensation of the deceased under the insurance scheme, free distribution of seeds, and initiate all re-construction activities and waiving of tuition and examination fees of the students. Some of these issues on reconstruction and recovery are indicated in the National Policy on Disaster Management, 2009.

Overall, there are gaps in relief and rescue measures of the state administration; often are not adequate and appropriate from the perspectives of the flood affected people. In this context how the state would consider its preparedness as well as of the people. Certain positive fallouts arising from adoption of measures like early warning system is expected. The expected benefits of the EWS, however, depend on preparation and adoption of certain action plans and subsequent interventions in relief and rescue measures. There are however two issues inherent in such outcomes. One, the state is constrained by resources to make enough provisioning. Hence, there is need to assess the resources available with the state as well as plan of the administration to make the provisioning. Two, the magnitude of flood damage and human loss data would reflect the effectiveness of rescue operations, which perhaps revealing better outcomes at present.

9.4 Critical points for discussion and intervention

Food being one of the necessities of life, needs foremost intervention in terms of relief in any disasters faced by the human being. The issues associated with distribution of this necessity may lead to conflicts and tensions in our society in any circumstances. This is perhaps because of two interrelated factors – that supply of food made available is limited to the need of the people in affected areas or supply in such situations often fails to assess the current need of that society and secondly, the depleting social capital (Putnam, 1993) hinders a fair distribution where caste, ethnicity or kinship find priority.

In a catastrophic situation it is difficult (or there is no time) to have an initial estimate of the urgent needs of the people and because of this there may be always a scope for distributive inequity leading to aggravation of tensions. This is however cannot be justified in our cases of regular returns of floods havocs in the state. Still, in both the situations – regular events or catastrophe, adoption of some monitoring tools helps to maintain the fairness in distribution of benefits and prevent crisis or conflict. Aid in terms of food or money is of extreme necessity in such a situation because natural catastrophe affects livelihood opportunities at least temporarily limiting purchasing power of the people.

It is important to monitor the relief interventions and the impact in regular and timely intervals that helps to capture the negative trends and rectify these with appropriate measures. A pragmatic approach in such context is to reduce the size of the allocation gap in terms of aid. This requires an overall need base assessment of the areas of interventions. The need base assessment is further required so that it helps to identify the actual demand supply gap in the society and so it does not destabilize the normal wage system in the local economy.

Bush (1998) addressed challenges to measure the impacts of relief distribution that the intervention should not lead to such situation that some people make windfall gain out of this and others nothing out of such huge intervening efforts. In such situation how the local people respond to the equity questions is significant. These could be some issues requiring exploration understanding and capturing the prevailing social context, administrative and institutional.

There are numbers of institutions and organisations working (regular and sporadic too) in flood affected areas. The interventions of the organisations range from relief measures to

provide support in livelihood reconstruction. This study was not planned to review the approaches of the organisations, but to appreciate the supports made to mitigate the crisis.

Evidence found voluntary organisations have helped in raising a high platform and construction of tube wells. However, the rising level of water and heavy siltation now has made the platforms ineffective. Moreover, the water from tube wells contains high iron, needs to be filtered to make it potable. In Dhemaji some voluntary organisations have constructed few toilets and tube wells in our study villages. The most observable initiatives, apart from distribution of relief of food items, cloths, and medicines, are provisioning of granaries and safe drinking water sources. There are incidences found that some VOs support to raise the height of existing tube wells; the cost is not significant, but the outcomes are to ensure potable water once the flood water level rises. Since flood is an annual phenomenon the effort to construct at least one tube well in each village in the area is considered as a good move. People, particularly women consider the raised tube well as big relief.

People have reported that there is no initiative from the part of the state administration to restore and creation of additional/alternative livelihood opportunities (or resource planning) in the flood affected areas. This issue however find space in the Section 8 and 9; National Policy on Disaster Management, Government of India, 2009. The issue is also that affected people can express their agony but cannot wait for reliefs and other supports to arrive. They put their own efforts to cope and finally to adapt to the crisis. Supports on some forms however help to facilitate their adaptation efforts.

People are on the opinion that the amount the State spend on flood relief measures, repair of the embankments, rehabilitation of the people- all could have been spent for effective planning and adoption of measures to minimise the negative impact of the floods (reported in villages of Dhemaji). It thus requires initiatives from the part of the State to plan for resources and sustain the livelihood system in the flood affected localities and the supports cannot confined to ad-hoc distribution of relief items. The outcome of non-initiatives is serious. As indicated in an earlier section, there is massive out-migration of the young generation from the villages in search of jobs. Absence of such plans lead to distressed form of diversification of occupations in flood affected rural areas of the state. It appears that state supported livelihood planning in the flood affected villages is to an extent is limited only to MGNREGA; which supports work for a few days only.

Flood in Assam is an inevitable natural phenomenon, there are losses, and benefits as well. The **tenth section** concludes the study indicating critical considerations to minimise the negative externalities and ensure wellbeing of the people in floods affected areas.

Reference

Bush K (1998) A Measure of Peace: Peace and Conflict Impact Assessment of Development Projects in Conflict Zones, IDRC, Ottawa, Peace Building and Reconstruction Programme Initiatives and the Evaluation Unit (Working Paper no. 1)

Putnam, R (1993) *Making Democracy Work*, Civic Traditions in Modern Italy, Princeton University Press, Princeton

Table 9.1: Reconstruction activities after the floods

| Days required in of cleaning/repair homes - last flood | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|---|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Average | 72 | 110 | 17 | 9 | 19 | 8 | 16 | 26 |
| Maximum | 140 | 160 | 37 | 90 | 90 | 15 | 30 | 160 |
| Minimum | 0 | 22 | 0 | 0 | 0 | 0 | 5 | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Workdays lost during the last flood | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Average | 118 | 129 | 21 | 23 | 29 | 12 | 36 | 30 |
| Maximum | 150 | 155 | 30 | 60 | 90 | 25 | 60 | 360 |
| Minimum | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Schooldays lost during the last flood | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--|---------|-----------|--------|-----------|----------|--------|----------|------------|
| Average | 123 | 143 | 14 | 10 | 41 | 12 | 41 | 36 |
| Maximum | 160 | 160 | 30 | 70 | 90 | 25 | 60 | 90 |
| Minimum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

Table 9.2: State supports received during the floods

| Adequacy of support – Food items | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|---|------------|-----------|-----------|------------|------------|-----------|-----------|------------|
| Home | | | | | | | | |
| Adequate | 52 (22.9) | 48 (21.3) | 60 (45.8) | 14 (10.1) | 8 (6.1) | 95 (80.5) | 38 (40.9) | 7 (14.3) |
| Inadequate | 161 (70.9) | 144 (64) | 67 (51.1) | 108 (77.7) | 105(79.5) | 8 (6.8) | 28 (30.1) | 0 |
| No support received | 14 (6.2) | 33 (14.7) | 4 (3.1) | 17(12.2) | 19 (14.4) | 15 (12.7) | 27 (29) | 42 (85.7) |
| Relief camp | | | | | | | | |
| Adequate | 15 (6.6) | 0 | 39 (29.8) | 17 (12.2) | 3 (2.3) | 0 | 0 | 33 (67.3) |
| Inadequate | 41 (18.1) | 0 | 22 (16.8) | 15 (10.8) | 5 (3.8) | 0 | 0 | 3(6.1) |
| No support received | 171 (75.3) | 225 | 70 (53.4) | 107(77) | 124 (93.9) | 118 | 93 | 13 (26.5) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Adequacy of support – Drinking water | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|---|------------|-----------|------------|------------|----------|------------|-----------|------------|
| Home | | | | | | | | |
| Adequate | 0 | 0 | 6 (4.6) | 2 (1.4) | 4 (3) | 2 (1.7) | 0 | 4 (8.2) |
| Inadequate | 125 (55.1) | 0 | 75 (57.3) | 6 (4.3) | 29 (22) | 2(1.7) | 8 (8.6) | 2 (4.1) |
| No support received | 102 (44.9) | 225 | 50 (38.2) | 131 (94.2) | 99 (75) | 114 (96.5) | 85 (91.4) | 43 (87.8) |
| Relief camp | | | | | | | | |
| Adequate | 15 (6.6) | 0 | 3(2.3) | 3 (2.2) | 0 | 0 | 0 | 4 (8.2) |
| Inadequate | 0 | 0 | 3 (2.3) | 18 (12.9) | 4 (3) | 0 | 0 | 23 (46.9) |
| No support received | 212 (93.4) | 225 | 125 (95.4) | 118 (84.9) | 128 (97) | 118 | 93 | 22 (44.9) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Adequacy of support – Provisioning of Toilets | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--|-----------|-----------|------------|------------|------------|------------|-----------|------------|
| Home | | | | | | | | |
| Adequate | 0 | 0 | 8 (6.10) | 0 | 0 | 0 | 0 | 1 (2) |
| Inadequate | 0 | 0 | 54 (41.2) | 4 (2.9) | 23 (17.4) | 2 (1.7) | 11 (11.8) | 0 |
| No support received | 227 | 225 | 69 (52.7) | 135 (97.1) | 109 (82.6) | 116 (98.3) | 82 (88.2) | 48 (98) |
| Relief camp | | | | | | | | |
| Adequate | 15 (6.6) | 0 | 0 | 1(0.7) | 0 | 0 | 0 | 1(2) |
| Inadequate | 0 | 0 | 2(1.5) | 24 (17.3) | 4(3) | 0 | 0 | 20(40.8) |
| No support received | 212(93.4) | 225 | 129 (98.5) | 114 (82) | 128 (97) | 118 | 93 | 28 (57.1) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Adequacy of support – Shelter | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--------------------------------------|------------|-----------|------------|------------|------------|-----------|-----------|------------|
| Home | | | | | | | | |
| Adequate | 0 | 0 | 5 (3.8) | 0 | 7 (5.3) | 0 | 0 | 1 (2.0) |
| Inadequate | 0 | 0 | 43 (32.8) | 3(2.2) | 6 (4.5) | 2 (1.7) | 1(1.1) | 0 |
| No support received | 227 | 225 | 83 (63.4) | 136 (97.8) | 119 (90.2) | 116(98.3) | 92 (98.9) | 48 (98) |
| Relief camp | | | | | | | | |
| Adequate | 15 (6.6) | 0 | 0 | 7 (5) | 0 | 0 | 0 | 0 |
| Inadequate | 0 | 0 | 2 (1.5) | 13 (9.4) | 3 (2.3) | 0 | 0 | 20 (40.8) |
| No support received | 212 (93.4) | 225 | 129 (98.5) | 119 (85.6) | 129 (97.7) | 118 | 93 | 29 (59.2) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Adequacy of Support – Transportation | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|---|---------|-----------|--------|------------|------------|-----------|-----------|------------|
| Home | | | | | | | | |
| Adequate | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 (2) |
| Inadequate | 0 | 0 | 0 | 4 (2.9) | 4(3) | 2 (1.7) | 1 (1.1) | 0 |
| No support received | 227 | 225 | 131 | 135 (97.1) | 128 (97) | 116(98.3) | 92 (98.9) | 48 (98) |
| Relief camp | | | | | | | | |
| Adequate | 0 | 0 | 0 | 1 (7) | 0 | 0 | 0 | 1(2) |
| Inadequate | 0 | 0 | 0 | 2 (1.4) | 1(0.8) | 0 | 0 | 0 |
| No support received | 227 | 225 | 131 | 136 (97.8) | 131 (99.2) | 118 | 93 | 48 (98) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Adequacy of Support - related to women | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|---|---------|-----------|------------|------------|------------|------------|----------|------------|
| Home | | | | | | | | |
| Adequate | 0 | 0 | 0 | 0 | 0 | 1 (0.8) | 0 | 0 |
| Inadequate | 0 | 0 | 1 (0.8) | 3 (2.2) | 5 (3.8) | 0 | 0 | 0 |
| No support received | 227 | 225 | 130 (99.2) | 136 (97.8) | 127 (96.2) | 117 (99.2) | 93 | 49 |
| Relief camp | | | | | | | | |
| Adequate | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Inadequate | 0 | 0 | 0 | 1(0.7) | 0 | 0 | 0 | 1 (2) |
| No support received | 227 | 225 | 131 | 138(99.3) | 132 | 118 | 93 | 48(98) |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

Table 9.3: Relief – State and institutional supports in ameliorate the crisis

| Promptness of state rescue operations | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--|-------------|-------------|------------|------------|------------|------------|------------|------------|
| Very prompt | 0 | 0 | 1(0.8%) | 0 | 0 | 0 | 0 | 0 |
| Prompt | 14(6.2%) | 0 | 10 (7.6%) | 10 (7.2%) | 1 (0.8%) | 0 | 0 | 0 |
| Neither prompt nor slow | 89(39.2%) | 93(41.3%) | 61 (46.6%) | 3 (2.2%) | 73 (55.3%) | 0 | 10 (10.8%) | 0 |
| Slow | 113 (49.8%) | 114 (50.7%) | 24 (18.3%) | 19 (13.7%) | 26 (19.7%) | 25(21.2%) | 3 (3.2%) | 0 |
| Very slow | 11(4.8%) | 18(8%) | 35 (26.7%) | 107 (77%) | 32 (24.2%) | 93 (78.8%) | 80 (86%) | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Promptness of Relief measures | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|--------------------------------------|-------------|------------|------------|------------|------------|------------|------------|------------|
| Very prompt | 0 | 0 | 2 (1.5%) | 0 | 0 | 0 | 0 | 0 |
| Prompt | 0 | 0 | 8(6.1%) | 13 (9.4%) | 1 (0.8%) | 0 | 0 | 0 |
| Neither prompt nor slow | 82 (36.1%) | 93 (41.3%) | 56 (42.7%) | 2 (1.4%) | 74 (56.1%) | 93(78.8%) | 10 (10.8%) | 0 |
| Slow | 132 (58.1%) | 114 (50.7) | 34 (26%) | 73 (52.5%) | 41 (31.1%) | 25 (21.2%) | 21 (22.6%) | 0 |
| Very slow | 13 (5.7%) | 18 (8) | 31(23.7%) | 51 (36.7%) | 16 (12.1%) | 0 | 62(66.7%) | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Improvement of relief related measures in recent years | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|---|------------|-------------|----------|------------|-------------|------------|-----------|------------|
| Yes | 2 | 8 | 17 (13%) | 25 (18%) | 20 (15.2%) | 0 | 1 | 0 |
| No | 52 (23.1%) | 9 | 97(74%) | 86 (61.9%) | 107 (81.1%) | 25 (21.2%) | 90(96.8%) | 0 |
| NA | 171 (76%) | 208 (92.4%) | 17 (13%) | 28 (20.1%) | 5(3.8%) | 93 (78.8%) | 2 | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

| Decline of death and damages in recent years | Dhemaji | Lakhimpur | Majuli | Sibasagar | Marigaon | Dhubri | Goalpara | Bongaigaon |
|---|-------------|------------|------------|-------------|------------|------------|------------|------------|
| Yes | 0 | 2 (9%) | 92 (70.2%) | 0 | 66 (50%) | 0 | 53 (57%) | 0 |
| No | 117 (51.5%) | 52 (23.1%) | 27 (20.6%) | 26 (18.7%) | 48 (36.4%) | 25 (21.2%) | 33 (35.5%) | 0 |
| NA | 110 (48.5%) | 171 (76%) | 12 (9.2%) | 113 (81.3%) | 18 (13.6) | 93 (78.8%) | 7 | 0 |
| N | 227 | 225 | 131 | 139 | 132 | 118 | 93 | 49 |

- Source of data: Field work 2021-22

Section 10: Conclusion and Policy Options

10.1 Living with floods

In floodplains across the world, farmers have been using floods as a traditional way to upgrade soil quality because floods enable silt deposition. Our field interactions too reveal that in some pockets of the state the peasantry welcome floods for this reason, but what is not welcomed the uncertainties caused in the forms of repeated high waves and sand. There are opinions that flood in many usual pockets now has become unpredictable in nature (this is not only because of breaching of the embankments), brings multiple forms of negative externalities, induce more damage than upgrading soil quality.

There are responses that flood water nourishes agriculture fields, and application of fertiliser is not necessary in such contexts (for instance the case of Borpothar village of Lahorighat block, Rupahikash village in Darrang etc). Villagers in general expect better outturn in the year after silt deposition. There are also opinions that silt enriches agriculture fields, but the waterlog problem created by the standing embankment in their villages inhibits agriculture operation.

Overall, two differentiated circumstances from soil nourishment perspective are observed. High incidences of reported sand deposition indicate the changed ecology in many locations and subsequently people's non-appreciation for floodwaters. The concern now is to ameliorate the order and minimise the effect of floods and sand.

Insights drawn from the field tell that the approaches need to be concentrated on controlling riverbank erosion and land degradation (sand deposition) - these two factors rob and displace people from their prime sources of livelihood; considered as prime stressors by the affected people. We have enough indication that no amount of provisioning would be adequate if our land resources get depleted or degraded beyond a critical point; and in many parts of the state, it has crossed the critical limit, and at presentation situation outmigration for work from specific locations is the only way out for survival.

Present forms of structural approaches of the State are just to confine water within the rivers through construction of embankments and check riverbank erosions. On the other hand, people's confidence on embankment continues to be very high, and the likening of the State as well for these two populist structural approaches.

The structural approaches (which is not inexpensive) are now also need to be complemented by certain approaches on non-structural fronts, and the State ideally should blend both the approaches, may be in mutually exclusive locations to mitigate the crisis. The approaches adopted in the state suffer from resource and cost constraints, effectiveness as well as on governance fronts; thus, require clear synoptic plans if the state goes for structural approaches.

10.2 Monitoring of sand deposition and other environmental parameters

The issues of floods and erosion are perceived well by the State and well discussed in political and policy fronts. There is however little discussion and debates on the issue of sand deposition and irreversibility of damage caused by sand. This is not that the issue is not reported by newspapers and researchers. The *Krishi Vigyan Kendra* of Assam Agriculture University, Dhemaji indicated that massive deforestation in the hills of Arunachal Pradesh has caused large sediments inflow with flood water to the plain areas of Dhemaji district causing huge devastation by way of sand deposition (KVK, Dhemaji; AAU accessed web on November 8, 2012).

It is unworkable to remove heaps of sand from agriculture fields, and from the riverbeds. Moreover, the efforts would go futile because of repeated havoc of high floods. It calls for regulation of anthropogenic activities in the upstream valleys of hills states surrounding Assam. The concern is how the neighbouring hill states recognise the importance of sustainable land uses in the upstream.

Scientific and Technical Advisory Panel of GEF (2006) says about huge externalities of unsustainable production choices of people in certain ecological setting. Land use choices and other economic practices in an upstream valley could cause irreversible damages to land and flooding in a downhill valley.

Since the damage caused by flood and erosion is enormous and sand damage is near irreversible, the only option in policy context is to stop further expansion of the damages. Monitoring and intervention for this requires specific information. The issue of monitoring in intra-administrative space as well as inter-administrative spaces call for measurement of soil loss with the help of GIS database.

In context of Assam there is possibility to use secondary and primary economic database as well as remote sensing database to acquire time series information on land use changes, loss of vegetation cover, soil loss and associated anthropogenic factors to establish the images of vegetation and soil loss in the upstream valleys.

It is the time that the State authority develops a mechanism to keep a track of the environmental indicators at regular time series interval. The indicators to assess the crisis could be - the nature and magnitude of floods (high water run-off), erosion, sand deposition, forest cover loss or encroachment of forest, drinking water availability etc. These indicators may explain a large part of crisis at present in rural households of Assam and interventions on wellbeing would largely centre on these indicators.

Intensity of sand deposition cannot be reversed in the short run; the intensity is further augmented by extraction of boulders from the riverbeds in many upstream rivers of the north-eastern hills; and thus, require consideration in floods disaster mitigation measures.

10.3 Embankments and restoration of wetlands

Evaluation of the issues on embankments reveals complexity of the problems, but as indicated earlier perceived benefits of the people appear more. There are multiple uses of

the embankments in the flood affected areas and it has clearly emerged that likening and confidence of people and the State on embankments continues.

It is also found that the structure of embankment is criticised or objected by people on the grounds of denial of fertilising silt to the agriculture fields, rise in bed levels of rivers because of sedimentation, blocking natural drainage from the countryside and the catastrophe created on breaching. People are also aware how the landscape of the state has been changed by construction of the embankments. Moreover, despite all the perceived benefits the uncertainties and anxieties over the embankments continue on probable breach by the fury of flood water. In this context we also need to perceive that the efficacy of the embankments depends on the ongoing anthropogenic activities in its catchment areas of the river and treatment of the catchment areas. The negative outcomes generated by the embankments also make us think it flood management strategies are much more than mere 'river control' though embankments.

The data on the encroachment of forest and vanishing wetlands in the state are a grave concern, augments floods havoc. The conversion of forests to agrarian zone and wetland to habitations have created a vicious cycle of ecological crisis in the state. It is however not only human intervention, but the havoc of sand depositions also too contributed to vanishing wetland. In Bordoloni area of Dhemaji district one observes how the huge marshy lands and wetlands are now filled with heaps of sand; appear that natural factor has helped to reclaim land for human activities.

10.4 High valued farm activities in homesteads and smaller plots of land in floods affected areas

In floods affected areas there are ways out to generate livelihood. Planning is required to what extent the available homesteads and small plots of land can be used during off-monsoon period to develop the agriculture and manufacturing sectors and create specific production and processing/value addition hubs. Market and assurance of remunerative returns however remain as prime determinant. It is important for the state to read effectively, what forms of agriculture and manufacturing process and model would suit best. The challenge is to create space for engagement of the surplus manpower. In this context the state also has scope to develop hubs of certain standard services sectors-beyond the unorganised services sector, but with comprehensive protective provisioning to face any form of eventualities.

The way the smallholding tea sector is contributing to the economy (though failed to ensure its entitled share), smallholding agriculture and farm activities too can usher in the economy of the state and realise the goal of creation of decent livelihood with certain approaches and supportive regulations. It will require creation of certain institutional structure to strengthen and develop the existing markets of rural areas and block level.

Perhaps it is not floods (though flood induced land degradation is), but unremunerative agriculture or other farm and non-farm activities is the reason for outmigration for work to non-standard jobs and in poor human development context. Homestead land shows possibility to concentrate on farm and non-farm sectors with high valued products of certain horticulture, plantations, animal husbandry, dairy, food processing, weaving. These sectors in small initiatives not to be seen as sporadic and piecemeal activities at individual

level, though may see success in individual initiatives; but visualise as a structure where every farm household is part of a comprehensive production structure and take advantage of market through collective and organised mode with supportive regulations of the state.

The concern is how people trapped in poverty in rural areas and rural out-migrants in urban ghettos could be accommodated with effective use of meagre land resources, even in floods affected areas of the state; and if so, to what extent? Smallholding agriculture in land constrained situation need to look beyond with indigenous and diversified products (examples ginger, chillies, jackfruits, vegetables, pisciculture, animal husbandry, dairy), extremely specific to the state. The land use for diversified products and value addition however will be driven by demand of the market factor.

The country has a huge market to cultivate domestic or internal source of growth. The task is to ensure fair share for the producers and generate strong multiplier effects in the local economy with the entitled amount of money. The right models of marketing would be, to have regulated and interlinked collections centers at different levels of settlements hierarchy so that the small farmers and producers' sale their goods produced at locations close to their home at right price. Development and strengthening of markets at different levels of settlement hierarchies is essential because for a farmer/producers/manufacturer located in a remote (floods affected) village, travel costs and opportunity costs of time spent to sale a small quantity in distant market is too high; this is the reasons in many cases farmers throw their products to certain agents and collectors. Lack of such structure has been acting as disincentives to entrepreneurial activities in rural areas as well as has made the agriculture sector unremunerative.

The need overall is careful reading on the local developments by the state agencies. The components of input supply, procurement and distribution systems need to be well designed and organised at decentralised level to create an effective supply and value addition chain. Data reveals that though the public procurement system of the regulated markets of Assam ensures remunerative prices for the products of farmers; what lack are timely repayment, non-procurement, or inflexibility to procure in smaller quantities. A look at the quantity procured by the regulated markets reveals insignificant volume, though the procurement prices are apparently higher; thus, do not reflect possibility to drive a local economy. In addition, it is important for the state marketing boards of the region to have provisions to buy the products in the times of excess production; store and release the products in the market, considering shelf life of the respective products and thus ensure fair returns to the farmers.

10.5 Restoration of social orders

Restoration of educational institutions in flood affected areas may take time and challenges emerge for making up for the loss incurred in the process of human capital formation. The impact of floods on education in terms of attendance rate is mainly attributed to damaged infrastructure such as the bridges, culverts, classroom blocks and toilets. Moreover, incidences of untreated morbidity in flood affected areas and certain outcome indicators in health sector such as maternal health and children malnutrition would question not only physical access during the floods but also on basic provisioning of in the health care institutions. There are enormous issues in such contexts having

serious economic and social manifestations often unaddressed. Adequate public provisioning of basic services would take care of the negative fallouts.

Restoration of livelihoods which are decent and sustainable, to a large extent would help in mitigation of the trauma of the affected people. As we have seen lack of appropriate opportunities in the flood affected pockets have made outmigration from flood affected villages of the state a significant phenomenon. It could be worthwhile to see how remittances have helped the affected households to cope with the situation. Livelihood restoration in some flood affected pockets in the state is visible in individual initiatives with changes in land use and cropping pattern. For instance, in the flood-prone districts of Morigaon and Dhubri, many farmers have adopted a risk-averse strategy by an appropriate combination of crops and seasons taking advantage of shallow tube well irrigation.

We know that the entire pockets of flood affected districts are not affected by flood and sand, and there are certain identified pockets which are vulnerable. The tasks should be uncomplicated to make the planning for livelihood restoration in localised context, at least at the level of district making it a unit for planning and implementation. There is scope to effectively converge the ongoing flagships programmes of government for flood relief support and for resource planning to ensure sustainability in the farm as well as in the non-farm sectors. The resources thus spend (a huge proportion often unspent) are often not planned towards assets generation and resource management, with possibility of leading to livelihood generation in future. Moreover, there are crisis of seeds for re-plantation of crops in post flood period. The Krishi Vigyan Kendras and Assam Agriculture University have started to look at this issue.

10.6 The trauma of flood

Flood havocs, damages and deaths inflicts trauma on affected people and result in a wide range of mental and physical health consequences; all having serious economic and social consequences; the outcomes may continue over extended periods of time. Floods, as observed in many parts of the state have challenged psychosocial resilience of the affected people. The distressing experiences that most people experience transiently or for longer periods after disasters can be difficult to distinguish from symptoms of common mental disorders. This calls for the need to reduce the impact of primary and secondary stressors on people affected by flood. There are anxiety disorders, often not captured and Researchers (Galea et al 2005) find that women are at higher risk of post-traumatic stress disorder (PTSD) after disasters.

The World Health Organization recognises that the mental health consequences of floods have not been fully addressed by those in the field of disaster preparedness or service delivery (Ahern et al, 2005). Interventions in context of Assam needs to address the traumatic experiences faced by people during and after the flood and economic consequences including treatment costs and livelihood losses in the process.

10.7 Additional measures

Additionally, interaction with the people in flood affected villages has helped to draw certain issues which are crucial to take measures for disaster mitigation. In certain context damages done by the nature are beyond the control of the State at least in the short run.

Affected people in such context look for solidarity, a shelter and adequate support in terms of the basic provisioning.

Certain basic approaches such as raised platform and raised tube wells have been of significant help in flood affected areas. Before the concept of raised tube-wells came up, people had to walk a few kilo meters with whatever vessels possible to carry, to a nearby village which is on higher ground to get some water. Toilets on the raised platform are also a boon for the people, especially girls and women. The provisioning in most cases is initiated by voluntary organisations, but often inadequate to fulfil need of entire people in affected areas. Still there are cases that with minimum effort maximum outcome can be achieved.

Overall, there is need to have clear perspectives to monitor the overall environment – natural as well as on the administrative fronts to support the innovative approaches of the people and give the approaches an institutional towards risks and disaster reduction.

Reference:

Ahern M et al (2005) Global Health Impacts of Flood, *Epidemiologic Reviews*, Vol. 27 No.1

Galea, S, A Nandi and D Viahov (2005) The Epidemiology of Post-Traumatic Stress Disorders after Disasters, *Epidemiologic Reviews*, Vol. 27 No. 1

Global Environment Facility (2006) *Land degradation as a global environmental issue*, Scientific and Technical Advisory Panel, Washington DC



Removal of sand from agriculture field; sand used to raise road height generates jobs in the process



Rivers are no more perennial; A dry riverbed in to raise road height generates jobs in the process



Excavation of sand for raising plinth height of house and road construction



Vast deposit of sand in paddy field



Depleted homestead



A home with vanished homestead



Piggery emerges as an activity to cope



Tractors; opportunity cost of not ploughing even in degraded land is high



Raised tube well would help to lessen the crisis



A newly installed tube well required high platform



NREGA resources are used to construct channel



Embankment protection at sediment loaded Simen River



The RCC bridge withstand the fury of floods



Removal of sand from riverbed



Sand piles on a health sub centre



A depleted homestead, under sand



Effort to raise Boro paddy with shallow tube well



Adapts with raised homestead and summer paddy



Summer paddy and fishing in a affected village



Jute adapts well in flood affected areas; market dampens with advancement of chemical sciences



Effort to raise pisciculture in waterlogged land cause by embankment



A well developed and maintained fishery



A damaged road, communication feasible only in Winter



Road swept away by high floods water



Effort to raise paddy, anxiety remains



Efforts to raise paddy amid floods



The embankment eroded away,



Embankments are used as shelter too



Digging deep along embankments would help to absorb excess water and pisciculture as well



Embankment also requires outlets. water logging leads to degradation of land

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