

**FLOOD HAZARD AND LIVELIHOOD PATTERN IN FLOOD AFFECTED AREAS OF ASSAM  
WITH SPECIAL REFERENCE TO DHEMAJI AND LAKHIMPUR DISTRICTS**

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**Abstract:**

The state of Assam has been experiencing highest number of floods which adversely affect life of its inhabitants and their livelihoods. Dhemaji and Lakhimpur are the two important districts of eastern Assam which face havoc of flood every year with massive destruction leaving many people of these regions helpless and homeless. The people living in the flood affected areas of these two districts had to struggle hard to sustain their lives and livelihoods. The study is mainly concerned with the livelihood pattern of the people residing in flood affected areas of Lakhimpur and Dhemaji districts of Assam and how devastating floods affect human life, livelihood and livelihood assets of these two districts. The present study is based on secondary data such as journals, report, statistical hand book and Economic survey, Assam, Census of India 2011, websites and so on. It was found that though recurring flood caused a huge damage to paddy field and agricultural sector, agriculture is still considered to be the most important source of livelihood. Due to recurrent flood, farmers cannot depend on wet paddy cultivation alone. They have grown flood resistant paddy seed like 'Bao' which they can cultivate during rainy season also. Besides agriculture, other livelihood options available in the flood affected areas of both the districts comprise of animal husbandry including live stocks and poultry, sericulture, handlooms, horticulture, fishing and so on. Implementation of Integrated Farming System (IFS) in some flood affected areas of Dhemaji district which included Rice-Fish-Horticulture and Livestock-Fish-Horticulture as Livelihood interventions enhanced income of the farmers. The study also revealed that huge range of fertile croplands in the districts of Dhemaji and Lakhimpur have turned barren as a result of the massive accumulation of sand from the flood water of Brahmaputra and its tributaries. The farmers have no longer been able to grow any suitable crops in such damaged soils. Therefore, a large number of people shift to greener pastures. This paper is expected to provide some insight that may help policy formulation towards flood management and providing livelihood security to the people of these two districts.

**Keywords:** Livelihood, Flood affected areas, Adverse effect, Agriculture, Dhemaji, Lakhimpur

**Introduction:**

Livelihood is a means of supporting one's existence especially financially or vocationally. It encompasses people's capabilities, assets, income and activities required to secure the necessities of life. Livelihoods rarely refer to a single activity. It includes complex, contextual, diverse and dynamic strategies developed by households to meet their needs. (•Gaillard, J.; Maceda, E.; Stasiak, E.; Le Berre, I. and Espaldon, M. , 2009)

Livelihood does not only mean the activities that people undertake to earn a living. It comprises of all the different elements that contribute to or affect their ability to ensure a living for themselves and their household (FAO, 2003). This includes : the assets that the household owns or is able to gain access to human, natural, social, financial and physical; the activities that allow the household to use those assets to satisfy basic needs; the different factors that the household itself may not be able to control directly, like the seasons, natural disasters or economic trends, that affect its vulnerability; Policies, institution and processes that may help them or make it more difficult for them, to achieve an adequate livelihood.

Livelihood options or assets of livelihood are vulnerable to climate change. Flood, drought and other climate extremes have direct impact on food crops yields and can also influence the food supply system directly or indirectly. Change and variability in climate play a major threat to food security in some regions of the developing world which are largely dependent on rain –fall and labour-intensive agricultural production (Parry et. al. 2004, IPCC, 2001).

### **Objectives:**

1. To study the present livelihood pattern and initiatives.
2. To examine the impact of flood on livelihood pattern and livelihood asset.

### **Methodology:**

The methodology used to prepare this paper is descriptive and analytical in nature. The data are collected from secondary sources including journals, books, statistical handbooks, Assam, Economic survey of Assam, reports and websites.

### **Flood Hazard in Assam:**

Flood has already caused a huge loss to the entire world. There have been more than \$1 trillion losses globally since 1980, and the situation becomes more worsen than before. An up-to-date analysis from World Resources Institute 's Aqueduct Floods finds that the number of people affected by floods will double worldwide by 2030. (Luo, Samantha Kuzma and Tianyi, April 23, 2020 )

Developing countries are more vulnerable to natural hazard like flood and have less capacity to adapt a change. According to the World Resources Institute approximately 5 million of the 21 million people affected by floods in India. The most flood prone areas in India are the Brahmaputra, Ganga and Meghna river basins.

The state of Assam comprises of two valleys namely Brahmaputra and Barak valley. During monsoon season, Assam has to face three major problems namely floods, bank erosion and drainage congestion. The flood of Assam is of recurring in nature which causes damage to huge areas in the state. The loss of livelihood and livelihood assets in terms of residence houses, granaries, crops and cattle are immense. Huge damages to basic infrastructure such as roads, bridges, schools, communication systems and other such facilities on account of flood reduce wealth of the nation which hampers the development process of the state. (Assam, 2019-20)

The State of Assam, after independence, had faced some major floods in 1954, 1962, 1972, 1977, 1984, 1988, 1998, 2002, 2004, 2008 and 2014. Rashtriya Barh Ayog assessed that the flood prone areas of the Assam are 31,500 Sq. km which is about 39.58 percent of the total land area of the state. On the contrary, the country as a whole about 10.2% of total area falls under flood prone area, indicating that flood prone areas of the State are about four times the national mark. Records show that annually 9.31 lakh hectare area on average are affected by flood in Assam. (Assam, 2019-20)

According to Assam State Disaster Management Authority (ASDMA) flood report dated 29<sup>th</sup> July, 2016 around 18.99 million people were said to be affected in 3306 villages across 22 districts of the state. The

districts with high number of population and villages affected were Dhemaji (15703 from 299 villages), Lakhimpur (100669 from 146 villages), Golaghat (150326 from 114 villages), Jorhat (167760 from 228 villages), Darrang (185527 from 133 villages), Morigaon (254545 from 322 villages), Bongaigaon (164634 from 175 villages), Kokrajhar (54026 from 49 villages) Barpeta (364817 from 406 villages) and Sibsagar (46796 from 93 villages) (ASDM, 2016)

Assam witnessed significant flood event in 2020 in the Brahmaputra valley and it coincided with the COVID-19 pandemic. Initially, due to heavy rainfall flood started in May 2020 affecting 30000 people and destroying crops across 5 districts viz Lakhimpur, Dhemaji, Dibrugarh, Darrang and Goalpara. By October 2020, over 5million people in 5474 villages in various districts were affected by devastating flood. (sdmassam.nic.in)

In August 2020, three districts namely Lakhimpur, Dhemaji and Baksa were adversely affected by flood. Lakhimpur was the worst –hit with 9500 people affected while number of flood victims in Dhemaji and Baksa were 2100 and 300 respectively. (ASDM, 2020)

Disaster authorities of Assam reported on June 30,2021 that a total of 7,587 people had been affected in Dhemaji and Dibrugarh districts. One bridge and 867 hectares of crops were damaged in Dhemaji district. (DAVIES, 2021)

### **Livelihood Pattern in Flood Affected Areas of Assam:**

Livelihood options in the flood affected areas of Assam comprise of agriculture, animal husbandry, sericulture, handlooms, horticulture, fishing and so on. Traditionally, agriculture and allied activities play an important role in socio-economic development of the state of Assam as this sector is the major contributor to the state economy as well as providing livelihood to a significant proportion in flood affected regions of the state.

Other traditional livelihood activities available in the flood affected areas include fishing on commercial or subsistence basis in local rivers, ponds, lake etc., rearing of livestock such as pigs, cattle, poultry etc. and sale of animal products like eggs, milk, meat etc., collection of firewood, driftwood and other timber or nontimber forest products for self-use or for exchange ; handlooms for weaving of traditional clothes –Gamocha (Assamese Towel), Mekhela Chador( attire for women)etc. and wage labour –especially in areas where immigrant communities are pre dominant and land holdings are small or non-existent for many households. (RGVN)

The economy of Assam is predominantly agrarian in nature and agriculture sector continues to support more than 75% of population, either directly or indirectly, providing employment and support to more than 50% of the total workforce (Economic Survey, Assam, 2015-16). The economy of Lakhimpur and Dhemaji districts are generally agro based and agriculture is the main source of livelihood of the people living in flood affected areas of these two districts. Approximately 80% of the population of Dhemaji district are directly or indirectly engaged in agriculture sector. (GOI, 2011) . A large proportion of the land area of both the districts is allocated to agricultural activities. The total land areas allocated to cropping activities in both the districts in the last few years have been presented below

**Table: 1.1: Area under Agriculture (in Hectare) in Dhemaji and Lakhimpur Districts**

| Districts | Net area Sown |         | Total cropped Area |         | Area sown more than once |         |
|-----------|---------------|---------|--------------------|---------|--------------------------|---------|
|           | 2016-17       | 2017-18 | 2016-17            | 2017-18 | 2016-17                  | 2017-18 |
| Lakhimpur | 93225         | 94725   | 179221             | 194863  | 85996                    | 100138  |
| Dhemaji   | 70934         | 70934   | 117757             | 111967  | 46823                    | 41033   |
| Assam     | 2773855       | 2722530 | 4087449            | 4045496 | 1313594                  | 1322966 |

Source: Statistical Hand books, Assam 2018, 2019

The table shows that 'Net area Sown', 'Total cropped Area' and 'Area sown more than once' in both the districts as well as Assam for the periods 2016-17 and 2017-18. It can be seen from above figures that in Lakhimpur district Net Area Sown, Total Cropped Area and Area sown more than once had been expanded during the period 2016-17 and 2017-18, indicating the importance of agriculture as a source of livelihood in the district. On the contrary, in Dhemaji Net area Sown remained stagnant and Total cropped Area and Area sown more than once had been declined during the same period, reflecting growing importance of alternative livelihood options in the district. Again, in case of the state as a whole, there had been marginal fall in Net Area sown and Total Cropped Area and marginal increase in Area sown more than once.

**Table: 1.2: Percentage of cultivators and agricultural labourers in Dhemaji and Lakhimpur districts**

| Category of workers           | Dhemaji district | Lakhimpur district |
|-------------------------------|------------------|--------------------|
| Cultivators                   | 73.21%           | 55.67%             |
| Male cultivators              | 70.44%           | 53.99%             |
| Female cultivators            | 77.19%           | 58.88%             |
| Agricultural labourers        | 6.05%            | 10.21%             |
| Male agricultural labourers   | 4.28%            | 7.93%              |
| Female agricultural labourers | 8.60%            | 14.58%             |

Source: Census of India, 2011

The above table reveals that while the percentage of cultivators are more in Dhemaji compared to Lakhimpur district, the opposite is true for agricultural labourers in these two districts.. It is also seen that female agricultural labourers and female cultivators are more than male agricultural labourers and male cultivators respectively in both the districts. It indicates an encouraging trend of female work participation in the agriculture sector and it is definitely significant from the point of view of livelihood among women.

The Agricultural Census 2010-11 shows that the participation of woman in agriculture is in a gradually increasing rate. The total number of woman holders is increased by 16.40 percent over Agriculture Census 2005-06. The Female holders shared 2.12 percent of the total holdings while it was only 1.80 percent in 2005-06. (Agricultural census 2010-11)

**Table: 1.3: District wise Area, Production and Average Yield of Rice**

| Name of the district |                                         | 2007-08       | 2014-15       |
|----------------------|-----------------------------------------|---------------|---------------|
| <b>Lakhimpur</b>     | <b>Area (in hectare)</b>                | <b>121644</b> | <b>131042</b> |
|                      | <b>Production in tons</b>               | <b>91760</b>  | <b>266308</b> |
|                      | <b>Average Yield in K.G per hectare</b> | <b>764</b>    | <b>2059</b>   |
| <b>Dhemaji</b>       | <b>Area (in hectare)</b>                | <b>74409</b>  | <b>80570</b>  |
|                      | <b>Production in tonnes</b>             | <b>94174</b>  | <b>117402</b> |
|                      | <b>Average Yield in K.G per hectare</b> | <b>1283</b>   | <b>1478</b>   |

Source: Directorate of Economics and Statistics, Government of Assam.

The data presented in the above table indicates that rice being the staple food, the area, production and average yield of rice in both the districts had been expanded between 2007-08 and 2014-15. Despite the fact that devastating flood has been damaging paddy field and agriculture is at stack, the area, production and average yield of rice have shown increasing trend. It assures that agriculture is still the prime source of livelihood.

In a study on livelihood activities among 200 male youth in flood affected areas of Dhemaji, M. Kakoty and others found that the rural male youth opted for 17 types of livelihood activities and most of them chose Sali rice cultivation due to availability of suitable land as a reason. (Madhu Kakoty, Utpal Barman and Shyamolima Saikia, 2018)

**Table 1.4: Average yield and Area under High Yielding Variety of Rice in Assam  
(Area in Hectare, Yield in KG per hectare)**

| District  | Autumn Rice |         |               |         | Winter Rice |         |               |         | Summer Rice |         |               |         | Total Area |         |
|-----------|-------------|---------|---------------|---------|-------------|---------|---------------|---------|-------------|---------|---------------|---------|------------|---------|
|           | Area        |         | Average yield |         | Area        |         | Average yield |         | Area        |         | Average yield |         |            |         |
|           | 2017-18     | 2018-19 | 2017-18       | 2018-19 | 2017-18     | 2018-19 | 2017-18       | 2018-19 | 2017-18     | 2018-19 | 2017-18       | 2018-19 | 2017-18    | 2018-19 |
| Lakhimpur | 7181        | 2650    | 2753          | 2433    | 70272       | 58400   | 3276          | 3790    | 14332       | 3700    | 4100          | 4100    | 91785      | 64750   |
| Dhemaji   | 510         | 12195   | 2859          | 2895    | 39650       | 64468   | 3085          | 3342    | 1225        | 7114    | 3270          | 3270    | 41385      | 83777   |

Source: Statistical Handbook Assam, 2018, 2019

The Agriculture Department of Assam focuses to raise productivity in agricultural sector through distribution of High Yielding Variety seeds among farmers at free of cost. The benefit of this free distribution of HYV seeds has also been obtained in Lakhimpur and Dhemaji districts which is evident from the above table 1.3. It is found that total area under HYV rice increased in Dhemaji district from 41385 hectare in 2017-18 to 83777 hectare in 2018-19. On the contrary, total area had declined in Lakhimpur district during the same period.

A wide range of horticultural crops including fruits, vegetables, flowers, spices, nuts, tubers, medicinal and aromatic plants are produced in Assam. Horticulture crops occupy about 15% of gross cultivated area of the State with an annual production of more than 67 lakh metric tons of various horticultural produces. (Economic Survey Assam, 2019)

Horticulture is another important source of livelihood of the people of flood affected areas of Dhemaji and Lakhimpur districts. All the varieties of banana are plentifully available in both the districts. The production of banana is found in all most all households. Apart from banana, mangoes, jackfruit, papaya, orange, pineapple, areca nut, coconut etc. have also been grown in both the districts. All these fruits are seasonal but banana is found throughout the year. Besides, varieties of vegetables like Brinjal, Cabbage, Cauliflower, Okra, Papaya, Tomato etc. are widely grown.

**Table 1.5: Production of some Horticultural crops (in tons) in Lakhimpur and Dhemaji districts**

| District  | Banana  |         | Papaya  |         | Potato  |         | Pineapple |         |
|-----------|---------|---------|---------|---------|---------|---------|-----------|---------|
|           | 2007-08 | 2015-16 | 2007-08 | 2015-16 | 2007-08 | 2015-16 | 2007-08   | 2015-16 |
| Lakhimpur | 29588   | 44689   | 4229    | 3284    | 31131   | 46498   | 5379      | 2320    |

|                |              |              |            |             |              |              |             |             |
|----------------|--------------|--------------|------------|-------------|--------------|--------------|-------------|-------------|
| <b>Dhemaji</b> | <b>15329</b> | <b>24948</b> | <b>390</b> | <b>3344</b> | <b>23857</b> | <b>43137</b> | <b>2874</b> | <b>2534</b> |
|                |              |              |            |             |              |              |             |             |

Source: Directorate of Economics and Statistics, Assam

It is seen that production of Banana and Potato increased between 2007-08 and 2015-16 in both the districts. Fishery and aquaculture play significant roles in providing food and nutritional security and livelihood to a significant section of people in the state. There is enough water in natural bodies, marsh lands, lake and other wetlands where fish seeds can be cultivated for better harvesting. Government and other agencies have been suggested to breed and distribute fish seeds to the flood affected farmers. Fishery sector has been identified as one of the Ratnas among the selected Navaratnas under the Chief Minister's Samagra Gramya Unnayan Yojana (CMSGUY). Fish production in the state touched a level of 3.31 lakh MT during 2018-19 against the requirement of 3.54 lakh MT. More than 90% of people in Assam prefer to have fish in their meal. In the rural areas of Assam fish production is an important economic activity and it provides a good scope for employment and livelihood. (GOA, 2019-20)

Fisheries in Assam are of various types. Fish is reared on commercial basis in the beels, rivers, swamps, forest derelicts, ponds and tanks. There are registered fisheries as well as some unregistered ones. Private tanks, marshy areas, dead rivers and canals generally fall in the unregistered group. Various types of breeds are found in beels and rivers in the district. Fishes like Rohu, Bhokua, Barali, Chital, Kaliajora, Kurhi, sol etc are found in big beels. Fishes that are found available anywhere are Kawoi, Magur, Singra, Puthi, Darikana etc.

**Table: 1.6: District wise Number of fisheries in Assam**

| <b>District</b>  | <b>Beel Fisheries</b> |                | <b>Ponds and Tanks</b> |                | <b>Derelict Water</b> |                | <b>Forest Fisheries</b> |                | <b>River Fisheries</b> |                |
|------------------|-----------------------|----------------|------------------------|----------------|-----------------------|----------------|-------------------------|----------------|------------------------|----------------|
|                  | <b>2017-18</b>        | <b>2018-19</b> | <b>2017-18</b>         | <b>2018-19</b> | <b>2017-18</b>        | <b>2018-19</b> | <b>2017-18</b>          | <b>2018-19</b> | <b>2017-18</b>         | <b>2018-19</b> |
| <b>Lakhimpur</b> | 20                    | 41             | 16577                  | 16577          | 68                    | 68             | 2                       | 2              | 16                     | 16             |
| <b>Dhemaji</b>   | 16                    | 46             | 4950                   | 5100           | 145                   | 145            | -                       | -              | 21                     | 21             |

Source: Statistical Hand Book, Assam -2018 and 2019

The above table reveals that beel fisheries had been increased in both the districts between 2017-18 and 2018-19. During the same period Ponds and tanks were increased from 4950 to 5100 only in Dhemaji district. Number of other types of fisheries remained unchanged in both the districts during the same period.

**Table: 1.7: District wise Fish Production and Fish Imported from outside the states**

| <b>District</b>  | <b>Fish Production (in metric tonne)</b> |                |                |                | <b>Fish imported from other States (in metric tonne)</b> |                |                |                |
|------------------|------------------------------------------|----------------|----------------|----------------|----------------------------------------------------------|----------------|----------------|----------------|
|                  | <b>2017-18</b>                           | <b>2018-19</b> | <b>2019-20</b> | <b>2020-21</b> | <b>2017-18</b>                                           | <b>2018-19</b> | <b>2019-20</b> | <b>2020-21</b> |
| <b>Lakhimpur</b> | 12789                                    | 12989.80       | 15281.35       | 16602          | 125                                                      | 525            | 210            | 18.62          |
| <b>Dhemaji</b>   | 5088                                     | 5240.40        | 7109           | 8336           | 90                                                       | 209.60         | 198            | 489            |

Source: Statistical Hand Book, Assam -2018 and 2019, Directorate of Fisheries, Assam

The people of Assam prefer to have fish in their meals. Increased market demand for fish is one of the main reasons for selecting fish farming as a livelihood activity in flood affected areas of Dhemaji and Lakhimpur. But the state is not self-sufficient in fish production. During the period 2017-18 to 2018-19 fish imported from outside the state increased from 11367 tonne to 12641.44 tonne in Assam. (Statistical Handbook, 2018 and 2019). Table 1.7 reveals that there had been considerable increase in fish production in both Dhemaji and Lakhimpur between the time period 2017-18 to 2020-2021. But the import of fish from other states was also increased considerably. National Fisheries Development Board, (2015) stated that fishery is the most promising areas to alleviate poverty and to provide livelihoods in Assam. So, it will become a very useful intervention for livelihood approach. (Madhu Kakoty, Utpal Barman and Shyamolima Saikia, 2018)

Animal husbandry sector has significant impact on employment generation in the state and plays a vital role in income generation of both the rural and semi-urban economy. The Animal Husbandry and Veterinary Department of the state has been implementing various schemes to create gainful employment in the rural areas with the objective to boost up the socio-economic condition of the rural economy.

**Table: 1.8: Livestock and Poultry Population in Assam as per 2012 Live Stock Census (in Nos)**

| Sl. No | Livestock species           | Total Numbers   |
|--------|-----------------------------|-----------------|
| 1      | <b>Total cattle</b>         | <b>10307604</b> |
|        | <b>a. Crossbreed Cattle</b> | <b>395902</b>   |
|        | <b>b. Indigenous Cattle</b> | <b>9911702</b>  |
| 2      | <b>Buffaloes</b>            | <b>435265</b>   |
| 3      | <b>Sheep</b>                | <b>518067</b>   |
| 4      | <b>Goat</b>                 | <b>6169193</b>  |
| 5      | <b>Pigs</b>                 | <b>1636022</b>  |
| 6      | <b>Fowls</b>                | <b>18718209</b> |
| 7      | <b>Duck</b>                 | <b>7300402</b>  |

Source: Directorate of Animal Husbandry and Veterinary, Assam.

The above table reveals that cattle population constitutes the largest group of livestock in Assam with 103 lakh cattle. Among the total livestock, cattle have the highest share with 54.02% followed by goat 32.33%, pigs 8.57%, sheep 2.71% and buffalo 2.28%. (Economic Survey, Assam 2019-20)

The districts of Dhemaji and Lakhimpur have large varieties of livestock and poultry species. Agriculture is the main source of livelihood and therefore cattle, buffaloes, goats are commonly found in every household particularly in the rural areas. Besides these pigs, ducks, sheep, fowls, pigeons etc. are reared in almost all the households. The domestic animals are taken in herds to graze in the agricultural fields after the harvest of paddy. During night they are kept in shades. Most families rear pigs, goats and poultry; however, lack of adequate veterinary facility and knowledge of scientific breeding has left the livestock with poor gene pool. People continuously lose their cattle and poultry to the scourge of floodwaters. The Department of Animal Husbandry and Veterinary has been constantly helping the farmers to rear livestock. In spite of the existence of Government infrastructure the people have not benefited from the services as most of the time, veterinary personnel and medicines are not to be found.

**Table: 1.9: Livestock and Poultry population of Lakhimpur and Dhemaji districts as per 19<sup>th</sup> Livestock Census, 2012**

| District | Cattle | Buffaloes | Sheep | Goats | Pigs | Fowls | Ducks |
|----------|--------|-----------|-------|-------|------|-------|-------|
|----------|--------|-----------|-------|-------|------|-------|-------|

|           |        |       |      |        |        |        |        |
|-----------|--------|-------|------|--------|--------|--------|--------|
| Lakhimpur | 607682 | 13819 | 1349 | 210354 | 131243 | 598214 | 288187 |
| Dhemaji   | 453390 | 14547 | 716  | 143154 | 118913 | 604542 | 224774 |

Source: Statistical Handbook Assam -2019

The above table reveals that in both the districts Cattle population constitutes the largest group of livestock, followed by goats, pigs, buffaloes and sheep.

Traditionally, sericulture is a major cottage industry in the state. Non-mulberry silk in general and Muga silk in particular has been an important household's production and livelihood options in the state over the years. The climatic condition and soil texture of Lakhimpur and Dhemaji districts are particularly suited to rear different insects for sericulture such as Eri (*Philosamia richini*), Muga (*Antheraea assama*), Mulberry (*Bombyx mori*) etc since time immemorial. Sericulture, the most prominent and common livelihood of Lakhimpur district next to agriculture, contributes 25% to 30% of the total domestic production of Assam (official website of Lakhimpur District).

Muga silk and Eri silk worm rearing and production of silk yarn and fabric is widespread amongst the people of Dhemaji. Weaving is one of the most important household industries among women folk and most of the women are skilled weavers. Many households derive their livelihood from it. Many households practice weaving as a subsidiary occupation.

Total number of sericulture villages in Assam were 8828 and total number of families engaged in the production of Eri, Muga and Mulberry in the state were 240939, 30164 and 29905 respectively in 2018-19. (Statistical Hand Book, Assam 2019).

**Table: 1.10: Number of sericulture villages and families engaged in sericulture in Lakhimpur and Dhemaji Districts**

| Sl no. | District  | Number of Sericulture villages |     | Number of Family Engaged |         |         |         |          |         |         |         |
|--------|-----------|--------------------------------|-----|--------------------------|---------|---------|---------|----------|---------|---------|---------|
|        |           |                                |     | Eri                      |         | Muga    |         | Mulberry |         | Total   |         |
|        |           |                                |     | 2017-18                  | 2018-19 | 2017-18 | 2018-19 | 2017-18  | 2018-19 | 2017-18 | 2018-19 |
| 1      | Lakhimpur | 736                            | 736 | 4878                     | 14035   | 4257    | 7932    | 3270     | 7924    | 12405   | 30627   |
| 2      | Dhemaji   | 531                            | 531 | 21900                    | 10181   | 8863    | 3103    | 2200     | 1000    | 32963   | 14815   |

Source: Directorate of Sericulture, Assam

The above table indicates that total number of families engaged in Seri cultural activities were increased in Lakhimpur district from 12405 to 30627 during 2017-18 to 2018-19 while in Dhemaji district number of families engaged in this livelihood activity declined during the same period. Due to lack of proper infrastructure and appropriate marketing facility the sericulture industry has not been fully exploited.

Mustard cultivation may become the best adaptation measures as livelihood for flood affected people in Assam. There is enough water in natural bodies, marsh lands, lake and other wetlands where fish seeds can be cultivated for better harvesting. Government and other agencies have been suggested to breed and distribute fish seeds to the flood affected farmers. Lakhimpur and Dhemaji are the worst affected districts where only few hectares of cultivable land are left without silt deposits. This sand covered lands are best for mustard cultivation.

**\*\*The damage of standing rice crop due to high rainfall and flood in the low-lying areas of Dhemaji district**

during the month of June to September was a common phenomenon. In order to overcome the adversity of flood, a sub project was approved as “Live Better with the Flood- an approach for Sustainable livelihood Security” in Dhemaji district of Assam under National Agricultural Innovation Project (NAIP) Component – III. The project adopted Sustainable Livelihood Approach (SLA) under which Integrated Farming System (IFS) had been promoted. The project has covered more than 3400 small and marginal families of Dhemaji district. Rice-Fish-Horticulture and Livestock-Fish-Horticulture were included as Livelihood interventions under IFS module. Under the Livestock-Fish-Horticulture module, two sub modules as Piggery-Fish-Horticulture and Poultry-Fish-Horticulture were introduced. Introduction of Rice-Fish-Horticulture module has helped farmer to integrate fish cultivation in their existing rice field along with growing of horticultural crop. It has enhanced the income of household from Rs. 6111.00 to Rs. 31800.00 per year per household. Similarly, from Piggery-Fish-Horticulture and Poultry-Fish-Horticulture the income enhancement was from Rs. 9420.00 to Rs. 30992.00 and Rs.85400.00 to Rs. 28560.00 respectively.\*\* (NAIP, 2014)

### **Impact of Floods on Livelihoods:**

Flood acts as a both boon as well as hazard in the Brahmaputra valley. Flood has been welcomed by the farmers as a traditional mechanism to upgrade the quality of soils because it enables silt deposition. However, now a days flood is often perceived as a disaster and it brings misery in human life. Flood becomes a barrier in development process and it also induces poverty in Assam. (NAIP, 2014)

Flood damages are broadly categorized as direct loss and indirect loss. Direct losses include losses of human life, crops, wealth etc. whereas loss of livelihood is an indirect loss.

**Table: 1. 11: Lost due to disaster in Assam, 2017**

| <b>District</b>  | <b>Loss of human life due to flood (In Nos.)</b> | <b>Loss of Livestock (In Nos.)</b> | <b>Loss of Livestock lost (In Rs.)</b> | <b>Loss of Agriculture (In Rs.)</b> |
|------------------|--------------------------------------------------|------------------------------------|----------------------------------------|-------------------------------------|
| <b>Lakhimpur</b> | <b>12</b>                                        | <b>203</b>                         | <b>3340000</b>                         | <b>212738520</b>                    |
| <b>Dhemaji</b>   | <b>10</b>                                        | <b>101</b>                         | <b>1679000</b>                         | <b>31109000</b>                     |
| <b>Assam</b>     | <b>160</b>                                       | <b>2763</b>                        | <b>37617000</b>                        | <b>1786930253</b>                   |

Source: Assam State Disaster Management Authority, Government of Assam.

The economy of Dhemaji and Lakhimpur are generally agro-based. Sericulture, fishing and driftwood business are practiced in smaller scale. However, sand deposition and other adverse effects of chronic floods on fertile land have made even affluent farmers land less. Huge range of croplands in the districts of Dhemaji and Lakhimpur have turned barren as a result of the massive accumulation of sand from the flood water of Brahmaputra and its tributaries, including the areas of Subansiri, Dikrong, Singora, Simon, Ghagor, Jiadhol, Moridhol and so on. As the fertile agricultural lands have been covered by sand and gravel, the farmers have not been able to grow any suitable crops in such damaged soils. The scope for self-employment as well as wage employment has been largely reduced in such areas. Sand deposition has also resulted in the extensive loss of shelter and public buildings such as schools. Buildings are getting gradually buried under the sand deposits. This has caused a threat to livelihood of the people of this area. Therefore, a large number of people shift to greener pastures within the district to carry horticultural practices. Thousands of young people from flood affected families of Dhemaji and Lakhimpur districts abandoned their studies to find a job in hotels, spas or work as security guards in the metros like Mumbai, Pune, Delhi, Hyderabad, Bangalore or Thiruvananthapuram.

In a study of Adjusting to flood on Brahmaputra Plains, P.J Das and others have observed that in the surveyed

village Majgaon of Dhemaji district, agriculture is still primary source of livelihood and paddy is the staple crop. Although they do not raise seasonal rice varieties like Sali paddy because of damage by flood water, they manage to grow Bao in normal flood years since it is not easily affected by flood. In Matmora (surveyed village) agriculture is no longer the main occupation. The consecutive flood of 2007 and 2008 left almost the entire area of agricultural land in Matmora irreparably damaged (Das, P.J, D. Chutiya and M Hazarika, 2009) Tarun Dutta is of the view that fisherman community in Assam especially from the river belt of Charikariya and Brahmaputra, the Missing and Kaibarta community of Lakhimpur district have been suffering more than the others due to devastating floods every year in the area since these communities are losing their traditional fishing ground and spaces. The wetlands of Charikariya and Brahmaputra area and the canal links of these areas become useless due to sedimentation of breaching of embankment of Brahmaputra. Flood water with silt deposition has made this canal unusable, as a result, farmers and fisherman have lost their livelihood opportunities, who often end up as wage labourer or rickshaw puller with lesser income in urban centers. (Dutta, 2016)

The staple food of the people in flood affected areas of Assam is rice. Food stock in granaries specially farming families were lost to inundation of flood waters in their houses. People have stocks of paddy in fewer quantities, as they were small farmers having little land for cultivation. They usually cultivate the paddy only for their consumption and not for commercial purpose. The affected population, thus, is exposed to food scarcity and malnutrition. Vegetable garden and horticulture products have also damaged severely causing shortage of vegetables.

So far as livelihoods for women are concerned, livestock rearing, kitchen gardening, weaving and firewood collection are adversely affected due to recurring flood. For men, livelihood such as daily wage, cultivation/agriculture and fishing are badly affected (Joint Rapid Needs Assessment Report: Assam Floods 2016).

Jia-Dhal River in Dhemaji district no longer flows through its original channel. The river bed has dried up with sand during the dry season. The loss of a living river is seldom seen in a state like Assam. It has adverse impact on livelihood options like farming and fishing during the dry season. (RGVN)

Sand deposition in the Kesukhana Village of Dhemaji district has also destroyed the existing areca nut trees, which have lost all their vegetation and fruits. This has reduced the livelihood options of households in such affected areas. (RGVN)

There has been land degradation due to growth of scrub in the sand deposited areas, converting once fertile farm land into waste land. Such land has become unfit to the traditional livelihoods of the local people. (RGVN)

Purchasing capacity of the rural households in flood affected areas is very low. Weak market in flood affected areas and lack of lively market places reduce the impact of farm-based livelihood options and lower the possibility for developing non-farm livelihoods in these areas. (RGVN)

Flood affected people started adapting alternative post flood and pre flood agricultural cropping pattern to ensure their food security and livelihood round the year. Due to recurrent flood, they cannot depend on wet paddy cultivation anymore. But they have grown flood resistant paddy seed like 'Bao' which they can cultivate during rainy season also.

### **Conclusion:**

A livelihood encompasses people's capabilities, assets, income and activities required to secure the necessities of life. Livelihood options and livelihood assets such as land, pond, water reservoirs, livestock holding, agricultural inputs, irrigation infrastructure, crops, housing etc are vulnerable to flood. Climatic extremes such

as flood and drought have direct impact on food crops yields. Dhemaji and Lakhimpur –the most important districts of Assam experience highest numbers of floods in Assam. Every year flood causes severe losses of property, shelter and even the life of human being. There are huge damages to roads, bridges, schools and communication system which hamper the development of the state. Agriculture is the main source of livelihood in flood affected areas of Assam. Apart from agriculture, sericulture, fishing and drift wood business is practiced in smaller scale in Dhemaji and Lakhimpur districts. However, recurrent flood causes sand deposition in the huge range of agricultural land and most farmers become landless in these two districts. These agricultural lands become no longer useful for cultivation of rice and some people are compelled to change their livelihood. Thousands of young people migrated to metros like Mumbai, Delhi, Pune, Hyderabad, Bangalore and so on in search of job and better life. They find job in hotels, spas or work as security guards. The devastating flood causes heavy losses of properties which tells us the ineffectiveness, insufficiency and unsatisfactory conditions of existing flood control measures. For effective management of flood, long term measures in the form of multi-purpose storage reservoirs in the upper catchments of river basins, small dams, big sluiceways and watershed management are must.

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