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Abdur Rashid Ahmed and Amanur Rahman

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# Measuring Agriculture Loss of Flood-affected Farmers in Assam with Special Reference to Lower Brahmaputra Valley

Abdur Rashid Ahmed<sup>\*1</sup> and Amanur Rahman<sup>2</sup>

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## ABSTRACT

Economic growth of agriculturally-dominant regions depend on the growth of agriculture sector which, in turn, controlled by the flood. The state of Assam in India is one of the agriculturally-dependent states of the country but Brahmaputra River, the lifeline of the state, brings flood in the state during the each and every monsoon season. The aim of the study is to measure the size and extent of the agricultural loss especially monetary loss caused by flood. Using descriptive statistics and simple graphs, the study reveals that almost 81% of the farmers are either marginal or small farmers and mainly grows potato, paddy, jute, and along with other seasonal vegetables practice fishery. The analysis of the study states that monetary loss in paddy crop is one-quarter of the total financial loss whereas monetary loss of the farmers in jute cultivation is less compared to other main crops of the study area. In contrast, monetary loss in fishery sector is largest amounting to almost half of the total financial loss whereas least loss found to be in livestock sector. Thus, the study demands urgent public policy to cope with the flood problem in Assam and hence, in turn, reduce the agricultural loss.

**Key words:** Economic growth, Agriculture sector, Flood, Brahmaputra, Monetary loss, Descriptive statistics

The economic growth of agriculturally dominant countries mainly depends on the growth of agriculture sector of the country. But the growth of agricultural sector is controlled by the frequency and severity flood. Hence, flood plays an important role in the path economic growth and development. The state of Assam in India is one of the agriculture-dependent states of the country and it is the most populous and second largest state of the north-eastern India. The agriculture sector is the predominant sector for economic growth of the state. More than half of population are engaged with agriculture and allied sectors and the population mainly depends on its agricultural produce. While the river Brahmaputra, one of the largest rivers in India and world, running across the whole state of Assam works as the main source of water supply for the state. But the river also brings flood in the state during the each and every monsoon season. In consequences, flood has become a common natural calamity of Assam in every year which adversely affects the state. However, Assam has experienced at least 12 major floods since 1950 excluding the regular annual episodes of

flood. Although always prone to floods, the frequency of disastrous flood was increased in the area after the 1950 Assam-Tibet earthquake. Water Resource Department of Govt of Assam has identified 25 vulnerable and very severe prone sites and estimated that the Assam Valley portion of the Brahmaputra has lost approximately 7.4 per cent of its land area due to river bank erosion and channel migration.

For instances, the overflowing water of Brahmaputra caused substantial flood in the state of Assam in the month of July, 2017 affecting several neighbouring Indian states including Arunachal Pradesh, Nagaland and Manipur. More than 85 people were lost their lives in the flood as reported by the regional and national newspapers. Besides, 40 lakh people have been affected by the flood and over 5 lakh have been rendered homeless. Similarly, in the previous such major flood in 2015, Assam also affected by heavy flood which were generated by heavy rainfall at the end of the August through Brahmaputra river and its tributaries. The flood caused the death of 42 people and numerous landslides in the hilly areas of the state including road blockages and affected 16.5 lakh people in 21 districts. In Dhubri district, the westernmost district of Assam, alone more than 400 villages were in a position where it was impossible to reach them and it was even difficult to send aid to the suffering civilians of the district. The major disheartening impacts of floods in Assam were human loss, devastation of agricultural produce, destruction of homestead land and other properties, river bank erosion and channel migration, loss of livestock and severe disease after the flood.

\* **Abdur Rashid Ahmed**

✉ rashidonemail@gmail.com

<sup>1</sup> Assam Don Bosco University, Kamarkuchi, Sonapur, Tepesia - 782 402, Assam, India

<sup>2</sup> University of Science and Technology Meghalaya, Meghalaya – 793101, India

Flood is one of the worst natural disasters in the world and agriculture is one of the major affected sectors of an economy. Agricultural loss is the common economic loss and several empirical studies support this claim. Several empirical studies [1-4] claim that flood is one of the important factors which cause agricultural losses in India. Flood also damages human and physical stocks hence weakens agricultural sector of the rural economy. Thus, flood mainly affects rural farmers who live in flood-prone villages where they mostly depend on the agriculture. A study conducted by [5] revealed that agriculturally dominant rural economy disturbed by flood of Mungkung River in Indonesia.

According to regional study of flood, agricultural production of Assam is highly dependent on flood risk which reduces total production of Sali which is one of the important paddy cultivations only due to varying flood timing and uncertainty [6]. Flood during the monsoon affects the rice production and also decreases the production of other crops including pulse and oilseeds, etc. Every year, flood damages many things in agricultural properties, transportation and human physical also [7-8].

Thus, the consequences of flood might be very adverse for a country which is primarily dependent on agriculture and it is very important to know about the agricultural loss caused by flood state like Assam and for the country like India where rivers play important role. Hence, the central aim of the study is to know about the size and extent of the agricultural loss caused by flood in Assam especially in the lower Brahmaputra valley. Thus, the finding of the research will make government to understand the need of public policy to cope with the flood problem in Assam and hence, in turn, reduce the agricultural loss. Based on the above stated argument, the main objectives of the study are given as below:

- (i) To determine the average monetary loss in agriculture borne by the farmers during last 5 years (2015-2020).
- (ii) To provide plausible policy recommendations to reduce agricultural loss.

## MATERIALS AND METHODS

### Study area and sample size

The study is based mainly on primary data which has been collected through direct personal interview with the help of a structural schedule. The data collection has been done in the month of October, 2019. The study has been carried out in Keshervita and Tokraipara villages of the South Salmara Mankachar district (a newly created district in 2016 bifurcating erstwhile Dhubri district) of Assam in Lower Brahmaputra valley. In the present study the simple random sampling method was used for data collection. The total sample size of the study is 72 households among the total affected households.

### Statistical tools

The study employed different statistical tools and methods based on the nature of data. The objectives of the study were tested with the help of statistical tools like

descriptive statistics, frequency distribution, percentage tabulation, bar and pie diagrams.

## RESULTS AND DISCUSSION

### Pattern of landholding

The pattern of landholding is important aspect to understand the type of farmers. For this purpose the farmers have been divided in to four usually common categories viz. (i) Marginal farmer owning less than 1 hectare of cultivable land, (ii) Small farmer owning more than 1 hectares but less than 2 hectares of land, (iii) Medium farmer owning more than 2 hectares but less than 10 hectares of land and (iv) Large farmer owning more than 10 hectares of land. The data in (Table1) displays that almost 81% of the farmers are either marginal or small farmers and mere 19% of the farmers owns more than 2 hectares of cultivable land [9].

Table 1 Pattern of landholding

Types of farmers	Frequency	Percentage
Marginal (<1 hectare)	31	43.06
Small (1-2 hectare)	27	37.50
Medium (2-10 hectare)	11	15.28
Large (>10 hectare)	3	4.17

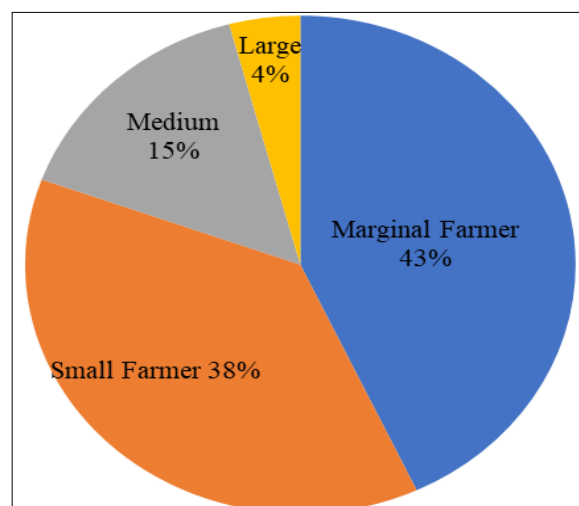


Fig 1 Distribution of landholding

### Cropping pattern and production

Most farmers of the study area grow mainly potato, paddy, jute, and other seasonal vegetables. Some of the farmers also practice fishery as allied activities. The data in (Table 2) reveals that the proportion of income from paddy is about 31% with an average income of Rs. 78068 for each farmer. But the proportion of income from potato is about 39% with an average income of Rs. 98299 whereas it only 7% from jute production. Besides, almost 24% income of the farmers accrues from miscellaneous production especially vegetables in the study area [10]. Thus, we can see that growing potato is more profitable in area but less income accrues from jute.

Table 2 Cropping pattern and income

Crop	Total Income	Average Income	Percentage (%)
Paddy	2849480	78067.94	30.58
Potato	6974280	98299.29	38.51
Jute	808360	17963.55	7.04
Others	3778020	60935.8	23.87
Total	14410140	255266.58	100.00

### Extent of monetary loss in agriculture

From the following table (Table 3), we can observe that monetary loss in paddy crop due to occurrence of flood is 24.34% with an estimated average loss of approximately Rs. 39298 whereas monetary loss of the farmers in jute cultivation is about 10.7% with an estimated average loss of Rs. 17262.

Table 3 Monetary loss of various crops

Type of crop	Frequency	Minimum loss	Maximum loss	Mean	Monetary loss (%)
Monetary loss in paddy	72	14400	78400	39297.6	24.34
Monetary loss in jute	44	9000	36000	17261.6	10.69
Monetary loss in fish	12	15000	120000	80833.3	50.06
Monetary loss in livestock	18	3500	14000	6638.9	4.11
Monetary loss in property	36	10000	35000	17444.4	10.80
Total loss		51900	283400	161475.9	100

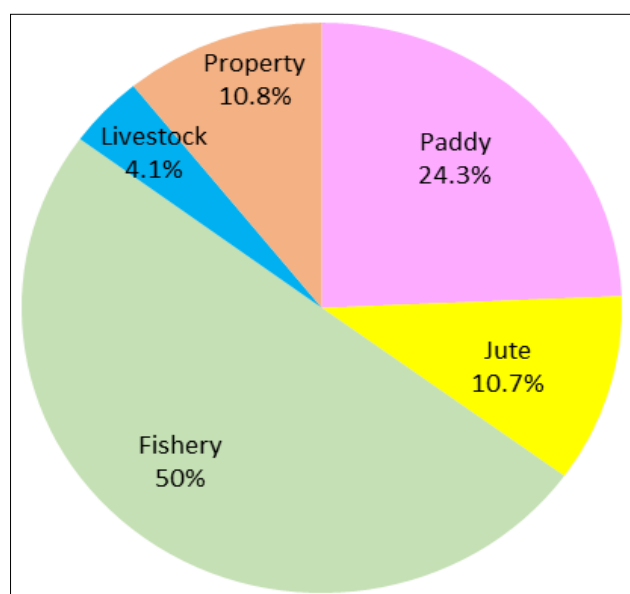


Fig 2 Distribution of monetary loss

Moreover, the category wise distribution of the above monetary loss of the farmers due to flood (Table 4) reveals that about 25% of the farmers incur monetary loss of 50,000 rupees or less but almost 56% of them incurs monetary loss between 50,000 rupees to 1 lakh rupees. However, only 19% of the farmers incur monetary loss between 1 lakh rupees to 2 lakh rupees [12].

Table 4 Category wise distribution of money loss		
Types of farmers	Frequency	Percentage
Below Rs. 50,000	18	25
Rs. 50,000 - Rs.1 Lakh	40	55.6
Rs.1 Lakh - Rs.2 Lakh	13	18.1
Above Rs. 2 Lakhs	1	1.4
Total	72	100

Furthermore, the study reveals that the government relief is not sufficient to meet the farmer's requirement during flood and post-flood adversity. In addition, analysis of the survey data shows that the many of the farmers are not aware

But the largest monetary loss due to flood occurred in fishery sector amount to almost 50% with an estimated average loss of Rs. 80833. Lowest monetary loss occurred in livestock sector including death of cattle, goat, poultry etc. However, almost 10.8% of the total monetary loss is from destruction of property [11].

about the agriculture insurance and most farmers don't use modern technology in their agriculture resulting lessened mechanization.

## CONCLUSION

The real impact of flood on agricultural sector is not understandable and measurable precisely because direct and indirect consequences of the flood are not truly separable. However, there is a need of government intervention to reduce the risk and agriculture development and must address the issue of national importance. To design a workable strategy the government, need a clear account of both monetary as well as non-monetary loss. The study attempts to fulfil such ambition measuring the most important part of the flood loss i.e., the monetary loss of the farmers due to flood.

The study reveals that almost 81% of the farmers are either marginal or small farmers and mainly grows potato, paddy, jute, and along with other seasonal vegetables practice fishery. The analysis of the study states that monetary loss in paddy crop is one-quarter of the total financial loss whereas monetary loss of the farmers in jute cultivation is less compared to other main crops of the study area. In contrast, monetary loss in fishery sector is largest amounting to almost half of the total financial loss whereas least loss found to be in livestock sector.

### Author contributions

All works regarding conceptualization, development of methodology, draft preparation, review and editing etc. all carried out by ARA and AR participated in data collection. Both read and approved the final draft.

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