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Impacts of Flood on Socio-Economic Activities of Riverine People: A Case Study of Three Selected Villages in Dibrugarh District, Assam

Prasanna Bora

Guest Lecturer, Department of Geography,
N.N Saikia College, Titabar
E-mail: prasannabora789@gmail.com

Abstract—*Excessive input of water in a drainage system within a short span of time causes flood and erosion. Flood leads to inundation of low lying area and causes mass destruction of human lives and property mostly in densely populated areas. Nigg and Tiemy (1993) have seen the impact of disaster in terms of social change. Burhi Dihing is a meandering river which has a character of frequent flood and shifting bank line within the alluvial plain by erosion. The present study is based on empirical level. Empirical data is generated from both primary as well as secondary sources. The proposed study emphasizes to understand the impact of flood and erosional activities on socio-economic profile of the study area. In the study area damages are not limited to the agricultural sector but significant damages also occurred to residential properties business and public infrastructure particularly larger floods out of 284.3 Bigha lands 1.36% of agricultural lands and 1.70% of built up area are affected in flood.*

Keywords*: Flood, Erosion, Socio-Economic, Damage.*

1. Introduction

Flood is a natural phenomenon caused due to excessive input of water in a drainage system within a short span of time. The National Erosion and Flood Control Action Plan Committee (2005) defined flooding as a condition which exists when discharge of a river or stream cannot be accommodated within the margin of its normal channels so that water spread over adjoining land. Flood is a common natural phenomenon of humid regions such as Assam, where excessive rainfall in the lower reaches of Brahmaputra valley and snow melt in the upper reaches accelerates the process of heavy and reaches of Brahmaputra valley and snow melt in the upper reaches accelerates the process of heavy and rapid water discharge. Floods, flash floods, riverbank erosion and deposition of sand are the most frequent water-induced hazards in the eastern Brahmaputra basin in Assam (Das et al. 2009). Nasir et al. observed that socio- economic impact of flood included the loss of and destruction of properties and life, which may eventually last for a short or long term. Flood and erosion cause mass destruction of human lives and property mostly in densely populated areas. Nigg and Tiemy (1993) have been seen the impact of disaster in terms of social change. The study is mainly concerned with the impact of flood on the people residing near the river. Burhi Dihing is the largest south bank tributary of river Brahmaputra of about 380 km from source to mouth. This river has close relation with history and geography of Assam. To study and analyze the nature and impact of flood and erosion on the riverine people three villages of Borboruah Block of Dibrugarh District i.e., Kawoimari, Senimari and Dihing Majdoor have been selected.

2. Objectives

- To assess the nature and frequency of flood phenomenon in the study area.
- To study the impact of flood hazard on livelihood condition of the people.
- To suggest measures to improve the livelihood condition of the population in the study area.

3. Database and Methodology

3.1 Database

The requirements of the present study have been collected through both primary and secondary data source. In case of primary data the information of the study area have been collected by using a schedule .On the other hand, secondary data have been collected from various sources like different journals, books and research papers , Daily flood bulletin(Water Resource Department),Govt. of Assam etc.

3.2. Methodology

For the compilation of the work both qualitative and quantitative methods of analysis have been used. It has been completed in three phases:

i. Pre field work
ii. Field investigation
iii. Post filed work

i. Pre field work

- Selection of the site and identification of the river.
- Preparation of schedule.
- Collection of secondary data through authentic sources.
- Analysis of past literatures on flood hazards

ii. Field investigation

- Recording of GPS points for each household undertaken for the study by using GPS device.
- Asking question to household owner regarding flood hazard and impact as per the prepared schedule.

iii. Post field work

- Tabulation, classification, editing, coding. and analysis of data using general mathematical and statistical principle.
- Computation of data by using simple statistical analysis like percentage, average and correlation.
- Preparation of bar graphs, line graphs, pie charts etc. for various analysis.

4. Study area

Flood is a natural event which causes immense destruction. Burhi Dihing river experiences flood almost every year especially in its lower reaches. Its flows through the districts of Tinsukia and Dibrugarh in Assam and is one of the important drainage in Dibrugarh which causes destruction at a large scale almost every year. The total length of Burhi Dihing is about 360 km with a catchment area of 8730 sq. km (Bhagabati, at el., 2007). Therefore, to analyses the impact of Burhi Dihing floods on the people of Dibrugarh. The latitudinal extent $27^{o}\ 5^{/}\ 38^{//}$ N to $27^{o}\ 42^{/}\ 30^{//}$ N latitude and longitudinal extent is $94^{o}\ 33^{/}\ 46^{//}$ E to $95^{o}\ 29^{/}\ 8^{//}$ E longitude. Some villages of Borboruah and Khowang block have been selected. Among them Dihing Majdoor Sonali Gaon is a village dominated by the wage labourers. This village falls under Borboruah block which is almost 1.5 km away from river and a nearest Police station, Post Office and Hospital are at Khowang which is almost 1.5 km from the village. Another selected village is Senimari which is the just adjacent to the Dihing Majdoor Sonali Gaon. This village is mainly dominated by the cultivators and daily wage labourers and some of the private job holders. It is almost away from the river and falls under Khowang block. The third village under study was Kawoimari which falls under Borboruah block and is almost 1.5 km from the river. (Figure 1)

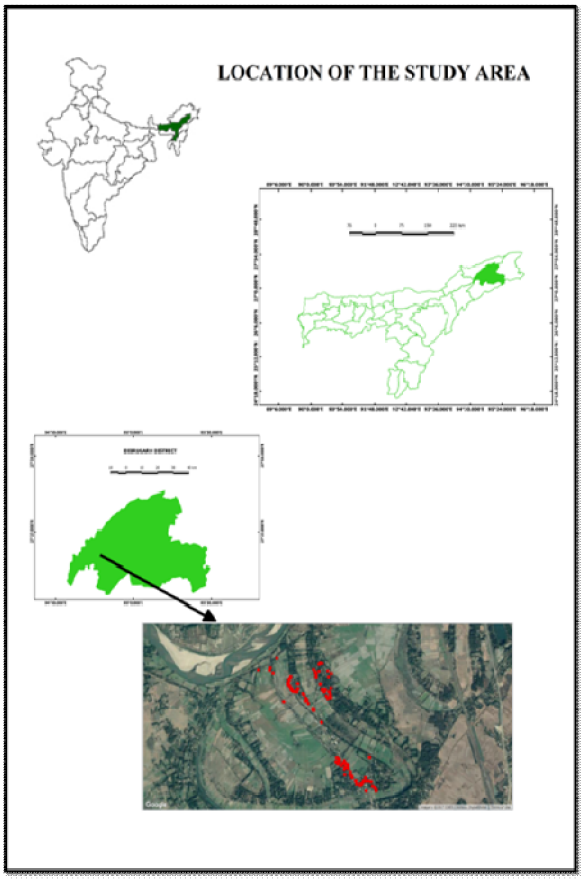

Figure 1: Map of the study area.

5. Result and Discussion

5.1. Flood Disaster of the River

Flood is temporary imbalance in nature i.e. caused due to heavy precipitation beyond absorbing capacity of land, vegetation, natural reservoir, in bank capacity of rivers and streams draining the area. Flood is the common phenomena in the Burhi- Dihing basin caused by heavy rainfall associated with sedimentation and aggradations of the river bed. According to the Dibrugarh Water Resource Department, the danger level of flood water in the Burhi Dihing River is 102.11meter, but the average level of Burhi Dihing River since the year 1983 is about 103. 12 meter which is above the danger level. The river has flooded for 30 times since 1983 to 2015, out of 30 floods, 23 floods occurred with water 104 meter i.e. in 2015 which is the highest recorded flood of that period. The flood in 2015 turned out to be most devastating by having a flood water level of 104.15 meter. (Figure: 4). In Dihing Majdoor Sonali Gaon, out of 25 households surveyed, 52 % of the households in built-up area were inundated up to 3-4 feet of water level. Besides, 20% of the total households were totally inundated having water level above 4 feet. In Senimari village, the highest flood water level was 3- 4 feet as 33.33% of the total households were inundated up to that level. In Kawoimari village, 38.59% of the households were

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having water level 3-4 feet. As a whole, it can be concluded that the average water level in the study area was in Dihing Majdoor Sonali Gaon (Figure: 2)

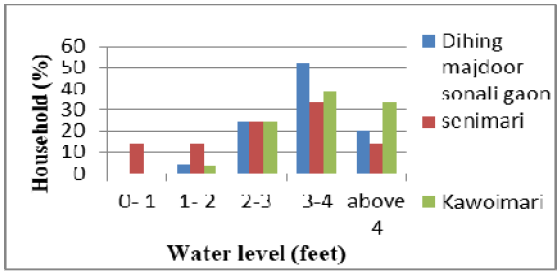

Figure 2: Water level in built-up area of the study area, 2015, Source: Primary survey, 2017.

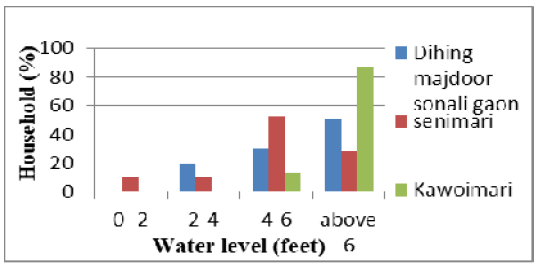

Figure 3: Water level in agricultural fields of the study area, 2015, Source: Primary survey, 2017.

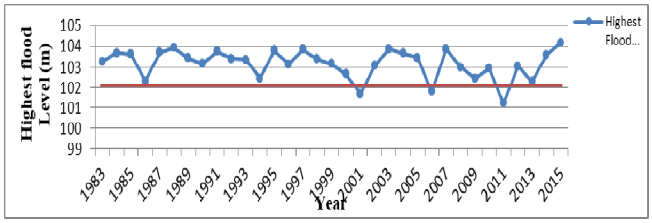

Figure 4: Water level of Burhi Dihing river, 1983 to 2015

Flood water is high in the agricultural fields as compared to the built –up area which is exceeded above 6 feet. In Dihing Majdoor Sonali Gaon, out of 20 households surveyed, 50% experienced water level above 6 feet whereas in Senimari village, the highest water level was 4-6 feet i.e. , agricultural fields

5.2. Flood Damage Assessment

of about 52.38% households were inundated. In Kawoimari village, agricultural fields of 86.66% of households were inundated above 6 feet of water. The agricultural field of Kawoimari village was highly inundated as compared to other villages. (Figure: 3)

Flood plains are land areas adjacent to the rivers and stream that are subjected to running inundation owing to their continually changing nature, flood plains and other flood prone areas need to be examined in the light of how they might affected by flood. In the study area damages are not limited to the agriculture sector but significant damages also occurred to residential properties, business and public infrastructure, particularly in larger floods. Out of 284.3 Bigha lands 1.36% of agricultural lands and 1.70% of built up area were affected by the flood (Figure: 5

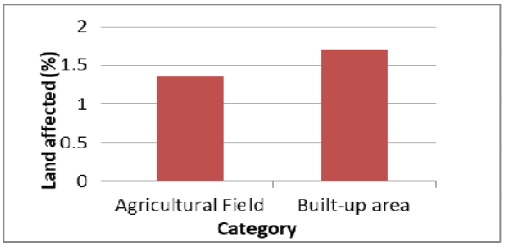

Figure 5: Estimated Land affected in flood, 2015,

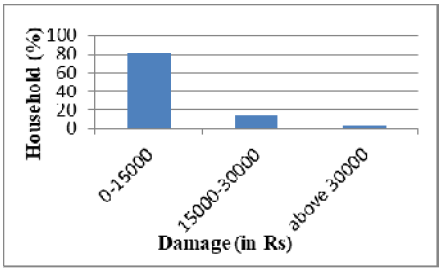

Figure 6: Estimated damage of built up area, 2015

Besides, the land property, villagers also lost their houses and household items which costs for a large amount. The data obtained after survey in study area reveals that in built- up area about 3.88% households lost their property for a total cost of above 30000 rupees, 81.55% households lost about 15000 rupees and 14.56% households lost 15000 to 30000 rupees (Figure 6). Besides, houses and household items, the villagers also faced severe

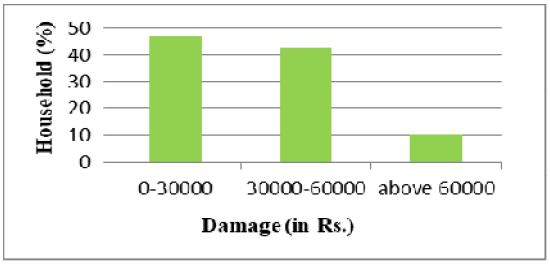

Figure7: Estimated damage of agricultural fields 2015,

Source: Primary survey,2017

damages in their agricultural field. All the crops were washed away in flood water. In 10.20% of households the total agricultural loss was above 60000 rupees, 42.85% households lost for about 30000 to 60000 of rupees and 46.93% households lost below 30000 rupees. (Figure7). As agriculture is the main source of livelihood some of the households also lost their income.

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Table 1: Reasons for income loss, 2015

Income loss due to	Lost job(A)	Forced absenteeism from work days(C)	Lost business activity(B)	B,C	Total
No. of household	0	7	79	17	103
Household (%)	0	6.796117	76.69903	16.50485	100

Source-Primary survey, 2017

The main reason behind income loss is forced absenteeism from work days i.e. about 76.69% of households, as maximum population of the study area is involved in primary activities. The population which is totally depended on agriculture lost their income because of the lost business activity i.e., 6.79% of households. About 16.50% of households lost income because of forced absenteeism as well as lost business activity, it includes those households which are involved in both agriculture and is also a wage labour (Table1)

Table 2 Estimated animal loss, 2015

Animals	Cattle	poultry	Total
Number	319	587	906
Percentage	35.20971	64.79029	100

Source: Primary survey, 2017

The villagers have lost their poultry and cattle which is also one of the main sources of their income. Out of 906 animals 35.20 percent of cattle and 64.79 percent of poultry was lost. It is shown in the Table 2

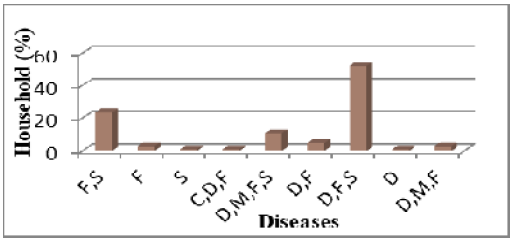

Figure 8: Flood impact on health condition of the people, 2015

C-Cholera, D-Dysentery, M-Malaria, F-Fever, S-Skin diseases Source: Primary survey: 2017.

Flood in the study area has not only damaged the properties but also has impacted human health. The people residing in the village faces various diseases after flood some of them also lead to death as hospitals are at distant places from the center. The major diseases include cholera, dysentery, malaria, fever and skin diseases. About 52.42 % of households face only fever and skin disease. Figure 8 shows different diseases experienced by the people residing in the study area.

5.3 Flood protection measures

Flood control refers to all methods used to reduce or prevent the detrimental effects of flood waters. Mechanism for flood protection used in study area are raised entrance of the houses, house built on raised ground and pillar, extra storage on higher place etc. Out of 103 household only 1 household has built their house on raised ground and is also raised their entrance to control flood water to enter in the house and also has an extra storage on higher place. The highly used mechanism is extra storage on higher places i.e. 69.90% of the households use this mechanism. Besides, there are others mechanisms also used by the people which are shown in the Figure 9 Although, the measures are taken, it has failed to provide much relief in the study area.

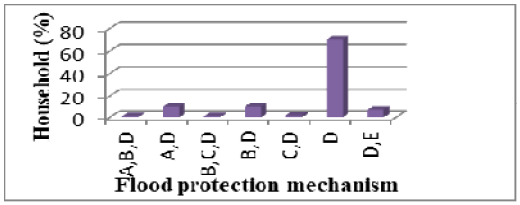

Figure 9: Flood protection mechanism adopted in the study area,

A-Raised entrance of the house, B-House built on raised ground, C-House built on pillar, D-Extra storage on higher place , E-Others Source: Primary survey:2017.

6. Suggestions

Analyzing the whole study it can be suggested

1. The living condition of the people may develop by some government initiation such as providing basic facilities like small health center in the village, improvement in education making people aware about the health and hygiene condition.
2. Proper concrete flood protection mechanism should be provided rather than the temporary embankments which is more responsible for the huge destruction in the study area.
3. Proper pools and culverts must be constructed so that excess water can be drain out in a sequential man4. The early warning should be provided when there are the chances of occurrence of flood.
4. The early waring should be provided when there are the chances of the occurrence of flood
5. The government should also provide provision for the development of their agricultural activities, so that they can sell out their product outside the village and can earn more which leads to ultimately develop their living standard.
6. The people who are nearby the river are in need to be shifted to other areas as the floodplain is highly prone to flood each and every year during monsoon season.

7. Conclusion

From the present study, it is seen that the floods are most recurring and devastating natural hazard in the study area which cause brutal economic damages, impacting human and animal life etc. almost every year. With devastating floods, the people of this area are finding it tough to find a sustainable

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means of livelihood. Although some measures are undertaken, it has not provided much relief to the dwellers. The water level of the Burhi Dihing becomes very high during rainy seasons causing severe floods.

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