IMPACTS OF FLOOD IN ECONOMY OF ASSAM, INDIA
AND THE CHANGING CROPPING PRACTICE

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Abstract

About 86 percent of the state’s population is directly or indirectly dependent on agriculture with net cropped area being 27.53 lakh hectares -35 percent of total geographical area of the state. Agriculture in Assam exhibits most of the characteristics of backward agriculture and aiding to this patheticity frequent, intense and unpredictable floods have been deteriorating the sector covering 4.75 lakh hectares of cultivable land -19.1% of the net area sown. Sali rice which is solely dependent on monsoon rain has been the most adversely affected victim. Floods during the monsoons affect the rice crop causing significant reduction in the rice productivity and also slight decrease in the productivity of pulses and oilseeds. The cultivation procedure of Sali rice continues during the months when floods become more intense. Reduction in the rice cultivation is more significant as it is directly linked to food security. Traditional coping activities and adaptation strategies have become less useful in dealing with the changing nature of the multiple water-induced disasters. As an effort to deal with the picture the attention of the farmers is moving to Robi crops and vegetables. This paper attempts to explore how the cultivators in the flood plains of Assam are trying to cope with flood induced production risks in terms of cropping pattern choice and the resulted change in the agricultural scenery of the state.
Objectives

1. To enquire the magnitude of flood in Assam.
2. To examine the relationship between flood and the changing cropping practices in Assam.
3. To study the overall impact of flood on the economy of Assam.
4. To suggest some remedies to deal with agro-flood relationship in the state.

Methodology

The analysis in this study relies on secondary data on various variables of interest. The data have been collected from various official statistical documents published by the Government of India, the NEDFi, the Government of Assam, the North-Eastern Council, the Fertiliser Association of India, and the Assam Agricultural University, Jorhat. The collected data have been interpreted to realize the objectives of the paper.
Introduction:

Assam known as the gate way to North-East-India, covers a total geographical area of 78,438 Sq. Km. spreading over 32 districts with a population of 31.2 million as per census 2011. Agriculture and its allied activities plays the most important role in the 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 the greatest proportion of the population. About 90% of the farmers belong to small and marginal groups, the average operational holding being 1.55 hectares. The state of Assam receives the blessings of the Mother Nature and experiences plenty of rainfall which is highly advantageous for cultivation. Rice is the main food crop in Assam's agriculture as it is the main diet of state population. Other crops cultivated in the state include jute, sugarcane, fruits, tea, pulses, coconut, potatoes, cotton, areca nuts etc. The state with its vast network of rivers is prone to natural disasters like flood and erosion. The Brahmaputra and Barak River with more than fifty numbers of tributaries feeding them, causes the flood devastation in the monsoon period each year leaving remarkable impacts to the economy of the state.

Agriculture in Assam

Providing occupation to 86% of the state’s population agriculture has been in dominating role in Assam since the dawn of economic start-up. The state accounts for a fairly significant share of the country’s yield of many crops. Prominent crops grown are rice, rapeseed and mustard, jute and mesta, tea, potato, sweet potato, areca-nut and turmeric. Tea, being the pride of Assam, accounts for over half the country’s output and about 14 per cent of the world’s total tea output. Assam is also an important producer of banana, papaya, chilies, cabbage, cauliflower, brinjal, lemon, orange and pineapple though less than one per cent of the cropped area in Assam is being used for cultivating each of them. There is a tremendous potentiality for pushing the yield of these crops. Since these crops are high value crops with a greater possibility for commercialization the scope of increasing their contribution to state’s income is expected to be significant.
The favourable agro-climatic condition allows Assam for cultivation of mushrooms, asparagus, broccoli, bamboo shoots and other exotic vegetables. The state produces 8% of India's total spices and 57% of the countries ginger. Assam also produces hottest chilli in the world. The state is also rich in the cultivation of medicinal and aromatic plants. Out of 1200 species of Orchids found in India 293 species are grown here. 950 species found in the state are identified to have medicinal properties which have been in use for hundreds of years in Ayurvedic, Unani and other traditional medicinal practices.

The soil of Assam is also favourable for the cultivation of Jute. The Jute produced in Assam is one of the finest qualities of Jute in the world. Ramie, the strongest natural fiber which is eight times stronger than cotton is also produced in the state.

Many plant species found in the state are extensively used for extraction of oil. Some of them are used in cosmetic production like perfumes, incense, freshener etc. Agaru, citronella, lemon grass, and eucalyptus are dominant in this category.

Other notable plants cultivated in the state are rubber, bamboo and cane. Rubber plantation covers 10,500 hectors of area. The Green Assam Bamboo is a cultural heritage of Assam. Out of 126 species of bamboos in India, 54 species bamboos are cultivated in Assam. Of the 90 million tons of bamboo in India, more than 50 million tones are found in Assam and North –East region. Many micro and cottage industries are being set up based on Bamboo which is used for construction of houses, making of furnishers, food, making of handicrafts, paper. Out of 60 Species of canes produced in India, 20 species found in Assam and other north–eastern states. Among them Jati, Tita, and Lejai are used for commercial purposes.
Cropping Pattern

Rice has been in dominating role in the cropping scenery of the state. Out of the gross cropped area (4159977 hect.) more than 55% is covered by rice cultivation. The cropping pattern in Assam is largely dominated by paddy. The paddy grown in Assam is categorized into three types, viz, winter, autumn and summer paddy on the basis of their harvesting periods. However, the harvesting periods of these varieties have now been advanced to a great extent following the emergence of short duration HYV seeds. The following table reveals the cropping pattern in the state.

Table -A: Area under cultivation (in ‘000Hect)

<table>
<thead>
<tr>
<th>CROPS</th>
<th>2008-09</th>
<th>2009-10</th>
<th>2010-11</th>
<th>2011-12</th>
<th>2012-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>2484</td>
<td>2529</td>
<td>2571</td>
<td>2646</td>
<td>2488</td>
</tr>
<tr>
<td>Cereals (maize and wheat)</td>
<td>72</td>
<td>85</td>
<td>70</td>
<td>65</td>
<td>62</td>
</tr>
<tr>
<td>Pulses</td>
<td>114</td>
<td>119</td>
<td>126</td>
<td>132</td>
<td>142</td>
</tr>
<tr>
<td>Oil-seeds</td>
<td>272</td>
<td>296</td>
<td>292</td>
<td>295</td>
<td>326</td>
</tr>
<tr>
<td>Cotton</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Jute</td>
<td>60</td>
<td>65</td>
<td>62</td>
<td>66</td>
<td>65</td>
</tr>
<tr>
<td>Fruit and vegetable</td>
<td>169</td>
<td>180</td>
<td>186</td>
<td>200</td>
<td>197</td>
</tr>
</tbody>
</table>

Source: Statistical Handbook of Assam, 2013, Govt. of Assam.

In recent years a shift to commercial crops has been noticed in the state. Attention of the people has shifted to profit making crops, fruits, spices and vegetables.
Magnitude of flood in Assam

The two Main Rivers of the state Brahmaputra and Barak along with their tributaries are fed with excessive rainfall during the monsoon season. This creates severe flood each year causing widespread damage to the agriculture, properties, transportation and also human life. According to RastriyaBarhAyog (RBA) the flood prone area of the state is 31.05 lakh hectares (about 39.58% of the total land of Assam). This area is about 9.40% of total flood prone area of the country. The earthquake of 1950’s is considered to be one of the reasons of devastating flood in the state as it reduced the water-carrying capacity of the rivers. The most destructive floods were faced by the people in Assam were in 1954, 1962, 1972, 1984, 1988, 1998, 2002, 2004, 2012, 2014 and 2015.

Table -B: The magnitude of flood in Assam

<table>
<thead>
<tr>
<th>Items</th>
<th>2007</th>
<th>2008</th>
<th>2010</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of villages affected</td>
<td>10295</td>
<td>3019</td>
<td>3630</td>
<td>1,592</td>
<td>4446</td>
</tr>
<tr>
<td>Crop area affected (in hectares)</td>
<td>674671</td>
<td>314000</td>
<td>147038</td>
<td>7121.79</td>
<td>372178</td>
</tr>
<tr>
<td>Population affected (in ‘000)</td>
<td>10868</td>
<td>2906</td>
<td>2546</td>
<td>848</td>
<td>4203609</td>
</tr>
<tr>
<td>Houses damaged (fully)</td>
<td>15846</td>
<td>30315</td>
<td>4864</td>
<td>44</td>
<td>54088</td>
</tr>
<tr>
<td>Houses damaged (partially)</td>
<td>NA</td>
<td>26235</td>
<td>49638</td>
<td>547</td>
<td>82095</td>
</tr>
<tr>
<td>No of human life lost</td>
<td>134</td>
<td>40</td>
<td>17</td>
<td>Nil</td>
<td>90</td>
</tr>
</tbody>
</table>

Source: NE data bank (NEDFi)
The table reveals the extent of destructions caused by flood in the state. Landslide has been another emerging devastation accompanied with flood. This life threatening disaster has consumed thousands hectares of land at riverside leaving hundreds of people homeless.

**Impacts of flood: the changing cropping pattern**

The risk-averting strategy plays an important role to influence the cropping choices of farmers. A diversified cropping pattern is suggested as an important strategy to cope with risk and uncertainty associated with agriculture due to climatic and biological vagaries (Shiyani and Pandya 1998).

In Assam the extent of damage by floods to the crops varies from year to year depending on the timing and intensity of floods. In a normal year, floods occur from June to August when the monsoon rainfall over-feeds the major rivers of the state. Floods occurring at that time badly damage the standing sali paddy, the main kharif crop of the state. The farmers in the state therefore hold greater risk and uncertainty during the kharif season.

Sali rice is the most popular among the farmers of Assam because of its necessity to rainfall and matching rain-fall precipitation during the period of its cultivation. Unfortunately, floods take the most devastating form during the time of its cultivation. Thus the regions which are less prone to floods are more likely to have a higher proportion of areas under Sali rice and the areas with higher propensity to flood damage have greater share under Ahu rice.

In recent years, to avoid crop losses due to frequent floods many farmers have adopted a risk-averse strategy by an appropriate combination of crops. As a result of this practice, the land-share of affected crops (mostly Sali rice) has significantly declined and the attention of the farmers has shifted to Rabi-crops and vegetables. The Table -C portrays the picture.
The table distinctly portrays the effect of risk-aversion practices of the farmers. The decline in percentage area in rice cultivation and Kharif-crop and the increase in the percentage area of Rabi-crop, oilseed, fruit and vegetable reveals the changing cropping pattern in the state owing to the minimization of risk created by devastating flood in Assam.

### Impacts of flood on the Economy of Assam

Besides affecting the agricultural activities of the state, flood has been in dominant role in impacting the basic economic activities of Assam. Livestock which is an important source of income for the rural population of the state has been the worst victim of the consequences of flood. According to a report published by NEDFi, 1,81,114 cattle were lost due to flood in 2013. Roads and railways are severely damaged including the State Highways, Bridges, PWD roads in flood devastating regions each year causing high level of cost to the state. A heavy amount of money is
being spent each year in flood-relief, recovery, rehabilitation and reconstruction activities. This has been adversely impacting the state economy leading to shortage of money to meet other developmental programmes. Loss of land during flood and accompanied landslides is increasing poverty and landless people also impacting negatively on the capital formation of the state.

**Remedial measures**

The Govt. of India and the Govt. of Assam has taken a lot of efforts and initiatives to control the disaster. Unfortunately most of those have proved to be ineffective. The flood control mechanism requires some more capable and scientific strategies. Awareness on afforestation which improves the strength of soil should be promoted. Embankment should be done with proper scientific assessment at proper time. Increasing the water holding capacity of rivers by digging the bottoms during dry-season can be a good initiative. The high yielding crops and those which can survive in flood should be made easily available and accessible to farmers. Scientific management of watersheds and managing forests for controlling soil degradation, and providing food, fiber and fodder to communities during stressful periods may be suggested. Traditional adaptation strategies such as Chang Ghar (Stilt House), high raised platform, country boats, banana rafts, bamboo rafts should be improved with direct participation of the government.

**Conclusion**

Devastating flood in Assam is considered to be the major cause of disturbance in the agriculture based economy of the state. Flood has the control over the state’s agriculture, human life, transport-communication system and other allied activities. Sali rice has been the worst victim of flood. Many farmers in the state have adopted a risk-averse strategy which has led to considerable decline in the share of kharif foodgrains and an increase in rabifoodgrains, fruits and vegetables. Since rice is the main food of the state, the reduction of its cultivation has threatened the food security of the state. The traditional adaptation strategies have proved to be ineffective to get rid of the consequences of flood. The flood management and mitigation strategies should be sincerely and honestly executed by state and central government and the awareness among public should also be raised.

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