CHAPTER-VII

Summary and Conclusions

The Island of Majuli located in River Brahmaputra in Assam valley has been subject of much attention due to its uniqueness as a river island, its bio-diversity, the people and its rich culture of the Satras. The island has caught attention of public and academics at large for other reasons also for the island is subject to frequent floods, constant bank erosion, displacement, rehabilitation and protection of this invaluable repository of natural and cultural heritage. Many believe and with scientific evidence to its support that the island may soon fall of the World map if the rate at which the island is shrinking is continued unabated. These concerns surely needs to be addressed and has rightly attracted volumes of research on the causes of bank erosion and progressive reduction in the size of the island. Unfortunately however, comprehensive researches on the social and economic problems of the island particularly on the economic and demographic as well as social consequence of bank erosion are few and discreet. A cursory survey of available literature on the island bears testimony to this claim. It is in this context that the present research was undertaken to understand the socio-economic and demographic consequences of bank erosion in the island.

As is well known the process of river bank erosion may primarily be a physical process but it has important demographic, social, cultural and economic implications for the vulnerable section of the people. River bank erosion is a very serious problem which is associated with loss of land, deposition of sediments along the river course. It causes complete loss of agricultural land and homestead land, leaves the poor in a totally helpless state without a source of income and livelihood. River bank erosion destroys the existence modes of production and ways of life, affects kinship and community organization and networks, causes environmental problems and impoverishment and threatens the cultural identity of the people. The immediate effect of bank erosion is also displacement. People who live in the marginal areas are severely affected. The consequences of river bank erosion leads to population redistribution, out-migration, changes in occupational structure and increases level of poverty and these impacts are never uniform either spatially or socially. People who are financially deprived are more likely to face the adverse impacts of
river bank erosion than those who have better access to resources and income. People who are exposed to hazard or those who do not have ability to cope with the consequences and risk are more vulnerable groups.

The approach of the study emphasizes on the vulnerability aspect that permeates through the entire research. The purpose of this research was to analyze pattern of demographic, economic and social changes that are taking place among the inhabitants within the island due to its shrinking size over the years. The specific objectives placed before the research were to identify areas within the island facing erosion and shrinkage and to identify different vulnerability zones within the island, to analyze demographic, economic, social and cultural changes taking place in the island during the last three decades and to assess social and spatial consequences of these changes. The research questions included following: a) in view of the shrinking size of the island over the years, how has the vulnerable section of the population responded to this critical situation? b) While the river bank erosion has been an ongoing process over the years, what demographic, economic and social changes have been experienced by the people living in this island? c) What are the major consequences of the shrinking of the island and how are the consequences vary across spatially and socially differentiated people? d) What are the mechanisms of adaptation adopted by the people? This question assumes significance in the context of restricted economic opportunities within the island which itself is shrinking over the years.

The research was undertaken at both macro and micro level. At the macro level care was taken to understand the entire island while micro level study was confined to a few selected villages located in two different vulnerability zones—the non-affected stable/non-affected zone and the affected vulnerable zone. While selecting, the villages care was taken so that villages are chosen from different ethnic groups, to find out the ethnic group which are more prone to flood and erosion. Four villages belonging to different ethnic group were chosen from the areas which are highly affected. Another three villages were chosen from the areas which are far less affected but belonging to different ethnic group. Three villages were chosen from Mishing community, two belonging to affected areas and the third was located in relatively stable zone. One Kachari village was selected from flood prone zone, whereas one Deori village was selected from relatively stable zone. Another set of two
villages were selected belonging to the ethnic groups of Sut and Kaibartta, one from stable areas and one from flood affected zone.

While collecting the data the study period was confined to 30 years, i.e. 1970 to 2001 while making use of the secondary data from census which helped in understanding the changes that have taken place in the socio-economic, demographic and cultural spheres. This time period has been taken because of the earthquake in 1950 which brought natural and geographical changes to the island resulting in intense erosion. All the secondary data has been analysed at the village level. As discussed, villages were classified according to their location in diverse zones of vulnerability depending on toposheets and remotely sensed data. Demographic, economic, social and cultural changes were analysed using village level data. Researcher had to face a number of constraints while collecting the primary data. Many of the areas are not easily accessible in most parts of the years especially during flood. In addition to that the administrative boundaries of the region changes so frequently that it created difficulties in collecting data from particular government offices.

The region

The Island of Majuli is purely a region of fluvial geomorphology.Geomorphology of this region is directly related with its physiographic characteristics. The tributaries of the River Brahmaputra usually bring flashy floods with heavy load of fine silt and clayey sediments. Another significant feature of this system is the formation of the islets locally called the Chaporis around the Majuli Island. This is resultant of the braiding of the river. The banks of the island as well as the North and the South banks of the river Brahmaputra have the wetlands- a characteristic feature of the hydrology of the system. These are locally known as the Beels. They are the abodes of rich flora and fauna unique to this region, unique for the breeding ground.

When the island was formed is not precisely known. However historical records suggest that the island existed for at least 800 years or more. The island has been always prone to erosion since inception with consequent result of gradual reduction of its territorial extent. Erosion has become more rampant since the 1950 great earthquake. The extent of the island has been estimated to be much larger in 17\textsuperscript{th} and 18\textsuperscript{th} century. The problem in
Majuli Island is the shifting pattern caused by the braided nature of the Brahmaputra as alluvial rivers carve out their own section and river channels keep on shifting every year.

The island consists entirely of sand and silt deposits. There are fertile deposits of the silts and clayey silts of varying depth on the surface of the soil, which are intensively cultivated. The geology of the entire region is subjected to extensive earthquake activities. The underlying rock is deep below the riverbed and does not affect the movement or configuration of mass of sand continually moving in the bed of Brahmaputra in which Majuli island is situated. The large mass of moving sand in the riverbed is augmented by a large silt load of the Brahmaputra during the flood season.

Due primarily to low general elevation the flood water generally hits the roads and embankments and ultimately breaks and damages the houses and paddy fields etc during rainy season. The roads are highly affected because they are constructed against the slope of the physiography of Majuli and due to continuous flood and river bank erosion it is affected badly.

Decline in forest cover in the island is the most significant of the changes which has been consistent over the years. Even the area under degraded forest too has declined over the last forty years. Sharp decline in marshy and swampy areas in this period too is worth mention. Marginal decline too has taken place in areas under shrubs and grasses. On the other hand, area under settlement has shown maximum rise apart from a less spectacular rise in area under agriculture as well as area under water body. Area under sand cover too has nearly doubled.

The changes in land use provide valuable clues regarding extension of agriculture and settlements at the cost of forest land, degraded forest areas and the swamps and marshy lands. This is inevitable with population growth and more and more areas of the island either coming under water bodies or becoming un-arable as they are too sandy to support agriculture. The loss of marshy and swamps to agriculture and settlements has its ecological consequences in terms of blocking the natural drainage within the island aggravating the flood worries even in areas less affected by flood.

Much of the cultivable area has already been brought under cultivation. The island is most intensively cultivated. Very small size of the holdings discourages the farmers in adopting a modern technological implement for higher productivity. The reason is the socio-economic conditions like growing population, law of inheritance, etc. Moreover, the
occurrence of frequent flood and erosion hinders the development of agriculture which subsequently leads to the erosion of the cultivable lands. The size of the land holding in the study area is an important indicator of the economic condition of the household. Low per capita land availability shows the pressure on land in meeting the food and shelter requirement of the people.

Rice constitutes the most important crop cultivated in this island. The acreage under this crop has been increasing over the years. Cultivation of rape and mustard too shows an increasing trend. Cultivation of other crops particularly wheat, black gram, peas etc is showing a decline over the years.

Majority of the workforce in the island is owner cultivators. The proportion of the agricultural wage earners is not very high though their proportion is on the rise. Interestingly the proportion of artisan workers is increasing over the years. Restricted opportunities in agricultural sector are pushing a significant proportion of the working force to look for employment in daily wage earning and in traditional crafts. Increase in the proportion of daily wage labour is largely attributed to loss of agricultural land to people in the vulnerable areas affected by recurrent floods and erosion of land.

In spite of declining economic opportunities in the island, the population has been growing at a rapid pace though there has been some decline in growth in recent years. This has increased the man-land ratio increasing the pressure on the dwindling size and resources of the island. Population density is clearly rising at a rapid pace since the year 1941 though the real increase took place after the great earthquake of 1950 resulting in a substantial reduction in the size of the island. Increasing density of population in the island despite outmigration suggests tremendous redistribution of population within the island for those people who had no option but to remain in the island faced with loss of land, villages, houses, crops and turning into environmental refugees.

Though the deficit of women in island’s population still remains as a demographic concern, compared to many other states of the country, women in the island do not face much discrimination and indeed are better placed than majority of women in many Indian states when it comes to mortality by sex and as far as health indicators are concerned.

The cultural life of Majuli is inextricably woven with the institution of the Satras. The Island has been the cultural capital of Assam for the past five hundred years. However,
this important institution that has been the nerve centre for the island’s inhabitants is threatened by incessant flood fury and many of them have become part of the river bed.

**Formation, Decline and Vulnerability**

Largely based on literary evidences the island is known to have come into existence at least 800 years back, though its exact time of formation is shrouded in mystery. Neither the date nor the record of the creation of the island is available. However, after the great earthquake of 1950 when a displacement in bedrock occurred, the island has been susceptible to frequent flooding and bank cutting resulting in rapid loss to the hitherto stable landmass known as Majuli that supported large human settlements with flourishing economy and culture.

Since the beginning of 20th Century up to 1950, the island was more or less stable and the land area was around 1325 km² which suddenly faced severe erosion after the earthquake and the land area reduced to less than half of its size. In the year 1961, the size of the island was only 565 km². Since then the available land area is progressively declining with increasing frequency of floods and bank erosion both on the northern and southern side of this island. Recent estimate of the size of the island’s inhabited land area is estimated at a meagre 421 km²—a little less than one third of what it was in the year 1950. Satellite images reveal the island’s size to be even less than this figure.

While the landmass of the island has been subject to erosion since the year 1900, the rate of erosion has been phenomenal only in the recent times, particularly after 1990 resulting in a rapid decline in the size of the island. After the formation of the island, the most important problem that threatens the very existence of the life and properties of the island is the continuous and extensive bank erosion by the river Brahmaputra. This accelerated rate of shrinking in size of the island has left its vast impact on the society, economy, demography and culture. However, The loss of land area in different parts of the island is varied. In the Ahatguri Mauza which is defined as high erosion has lost more than 10km² of land. Moderate erosion has taken place in the south west part of the island where the loss of land is between 1 and 10 km². Minimum land has been lost (less than 1 km²) in the north eastern part of the island. The central part of the island is least affected.

A major problem that afflicts the island is frequent inundation of vast areas of the island. Flood leaves the people in a state of woe and misery. Vast areas are vulnerable to
floods and that the western part is far more prone to such events compared to the eastern section. Around 16 percent area of the island is vulnerable to severe flood and bank erosion of which around 2.7 percent area is extremely vulnerable. A fourth of the area, mostly in the central part is moderately vulnerable, while over 60 percent area is relatively less vulnerable from the flood hazards. The least vulnerable areas largely confined to the easternmost section account for only a little over fifth of the island’s land area with an elevation of over 85 meters.

Over three fourths of the island has become extremely critical from the point of view of flooding and bank erosion. The situation appears extremely grim for a majority of the inhabitants of the island who are faced with an uncertain future. The process of out-migration has already begun and many villages already lost to the river are being rehabilitated outside the island and/or are getting redistributed within the island in the absence of Government support. Ironically the flood control measures have themselves accelerated the problem of erosion which is now seen to be more anthropogenic in character than physical.

What is more intriguing is the fact that the critical areas are becoming not only larger in their extent but also more widespread intruding into areas considered non-critical in the past. The enlargement of the critical areas rendering more areas highly vulnerable year after year is attributed not only to the fluvial processes of increased siltation but more importantly to anthropogenic factors such as construction of embankments, deforestation etc.

**Distribution, Displacement and Redistribution**

The island has been shrinking in its area over the years though the extent of erosion of its banks is not uniform. The southern bank is more prone to erosion and so is the western part of the island. The shrinkage has been far more accelerated after 1950 and more particularly after 1960s. Ahatguri subdivision located in the Western part is most hit by erosion followed by Salgora in the East. The island however is subject both to erosion and deposition which is a dynamic process leading to varying size of the island in different years. The erosion activity has far exceeded depositional activity of the river. Nevertheless, the depositions in the form of char lands have played a significant role in internal
redistribution of the population either as a voluntary or involuntary process consequent upon large-scale displacement taking place in the margins of the island. The margins of the island are largely inhabited by the Mishing tribe who are popularly known as Noi-parias, or the river bank dwellers. Shifting from one place to another in search of a shelter for the family has tremendous impact not only on livelihood of these people but also their very survival of their culture and identity, as the entire life and lore of a Mishing is deeply associated with the river. Over 50 percent of all Mishing households are now landless.

Continuous erosion and flooding over the past three decades have resulted in displacement of a large chunk of the population living in the island who have transformed into environmental refugees in an island which they consider as their home. The displacement has engendered a process of redistribution of population in the island unprecedented in history of the island. The quantum of displacement has been gradually increasing over time.

The trend in population growth and villages reveal the fact of displacement on account of erosion of villages and subsequent outmigration leading to fast decline in the growth rate in nearly all parts of the island. Ironically, though the number of villages in all the subdivisions declined during 1991-2001 decade, the population and households continued to increase. There has been unprecedented rise in the number of households compared to declining growth rate of population, out-migration and loss of villages to the river. This can be seen in the background of breaking down of large multi-member households or joint families which is perhaps unsustainable under the conditions of frequent displacement of a large chunk of population. The gap between rate of population growth and rate of increase in households however is much less in Ahatguri division which is worst hit but much high in Salmora division relatively less affected from flood.

Spatial pattern in population distribution shows clear shift in concentration away from the margins of the island which are facing the brunt of erosion fury of the river. Until 1991, the margins of the island had greater concentration of population. The situation is getting reversed during the last two decades. This is evident from growing number of abandoned villages concentrated more in the southern and western margin. The situation however changed dramatically by the year 2001 which revealed not only phenomenal increase in the number of such abandoned villages but also the distribution of such villages
which was now all over the island including the northern bank that rarely experienced abandonment before 1991. Resettlement of displaced people in char lands located in the western section however has been responsible to a shift of population concentration towards these vulnerable areas.

An inevitable outcome of displacement and rehabilitation led redistribution of population in the island has been substantial increase in the proportion of very large sized villages in contrast to small hamlets that used to be the norm in the island.

There has been a general trend in falling household size over the years signifying a process of breaking down of large family size which was a norm prior to 1991. This process is however less pronounced in most affected villages compared to those stable villages. Initial increase in household size is noticed among the displaced due primarily to flocking together in comparatively safer villages in close proximity to their original habitation and then shifting slowly to other places, specially to either moderately flood affected or flood free areas.

Sex Composition of the villages too is changing dramatically. Overall, villages with deficit of females are on the rise over time coupled with a few villages with excess of female too. The net result is an accentuation in the imbalance of sex composition in the island.

Decline in population in a large number of villages is more evident in the last decade of twentieth century. The fact that excessive population growth is confined to much fewer villages than those with net decline in population also reveals the fact that the redistribution process is both internal to the island as well as external involving rehabilitation outside the island.

An East-West traverse study of population concentration reveals a bell shape in 1971 with two margins of the island on its eastern and western section characterized by less concentration and maximum concentration being in the centre. The location of the first inhabited village on the eastern margin was farther away from the bank. Dispersal of population is seen to have intensified by the year 2001. This is due to rehabilitation of people in the char lands located on the western margin as part of Government policy.
Social, Economic and Demographic Consequences

Analysis of the selected affected and non-affected villages revealed that ethnicity is far more important a factor and not whether they are affected or not as far as prevalence of different types of families. Prevalence of joint family system is relatively more among the tribal communities. While community culture is more important a factor in determining types of households, nuclear households are becoming more numerous as a consequence of displacement. Maintaining joint family system in condition of distress appears difficult.

Housing conditions in the affected villages are in pathetic condition. Most affected households in the selected villages live in *kachha* houses. Living under constant threat of erosion and displacement, and without a stable livelihood, the affected households have no means of constructing even a semi *pucca* house. Proportion of households having fewer rooms per dwellings is more among villages affected by displacement. Such households are rare in villages unaffected.

Landlessness holds the key to the economic misery suffered by the villagers in affected villages. Very large proportion of the households has lost much of their land leaving many completely landless. The proportion of the landless is increasing in all the affected villages. Incidence of landlessness has increased rapidly particularly among the Mishing households. Significantly the proportion of households with relatively large holdings has fallen rapidly within the last decade and no households now has more than one hectare of land. Faced with the problems of increasing landlessness, the landless has fewer options but to look for share cropping. The opportunity for this too is shrinking at a faster pace.

A small proportion of the households had operational holdings of different size in nearly all the affected villages selected for the study before they were affected by bank erosion and displacement. The situation underwent drastic changes after their displacement and there was a significant rise in the proportion of households depending on operational holdings. However, there has been a great reduction in the size of holdings operated by these households as a consequence of landlessness suffered by a great number of families who seek share cropping as an alternative. Sudden rise in the demand for share cropping has made the size of operational holding go down in the last decade to less than 1 hectare for a majority of the affected households. This has certainly made the affected more
vulnerable to food security and has increased impoverishment among great numbers of the
affected families.

Reduction in the size of operational holdings has been much higher in the non-
affected villages. However, this reduction in the non-affected villages is explained by the
fact that they used to operate very large holdings in the past and hence greater reduction in
operational holdings in such villages is not as much of a concern as is the case with affected
households who tend to suffer from greater vulnerability with a small reduction in the
operational holdings on the face of loss of own land and increasing landlessness.

The study also revealed that a majority of the households suffer from a fall in the
production compared to what they used to get from the same plot of land some 10 years
back. Majority of the households who depended on crop production informed that the
productivity is falling and they are bringing home much less than earlier from the same plot
of land. Reduction in crop production in the non-affected villages is understandable for
there has been a general decline in the productivity in the island and that the non-affected
villages where the quantity of production is usually larger than the affected villages do
experience decline in productivity and hence no household reports any increase in
production. The study reveals wider disparity in income levels in the non-affected villages
compared to the affected villages.

Erosion increases the percentage of landless people and also contributes to the
surplus agricultural labour force. This in turn becomes responsible for severe under-
employment among the agricultural labourers. There has been a significant change in the
occupational structure of the population in the affected villages. Agriculture as the chief
source of livelihood has been lost to many affected by erosion and displacement and the
affected people have turned to non-agricultural sectors for a living. Although
unemployment is not serious problem in all the villages this is more definitional than real.
Disguised unemployment has increased manifold. Percentage of daily wage labour is high
among the affected villages due to loss of land and it is increasing day by day.

In terms of livestock assets, the loss in the affected villages is staggering. Fewer
affected households now have livestock. Dependence on livestock too seems to be on the
decline in villages which are not affected by erosion and displacement. However, the
decline in livestock as an asset in non-affected villages is not as precipitous as in the
affected villages showing a desperate condition of these villages where most households
have been unable to support large livestock population on account of their own survival problems and lack of land.

Demographic parameters show much less impacts compared to economic ones as revealed by marginal differences in population growth, household size or marital structure in affected and non-affected villages. However falling sex ratio in affected villages compared to the non-affected villages show greater vulnerability of women to displacement and associated economic hardship. This is further proved by presence of many widowers in affected villages.

Overall, the study revealed that the segment completely dependent on agriculture was far more affected than those dependent on non-agricultural occupations. Hence the displaced Mishing people seem to have less resilience to cope with the problem of displacement compared to the other displaced tribes. It is this section of affected people who are getting marginalised and pauperised faster than those who were not dependent on agriculture fully. The case of Kaibartta village reveals that they have been able to cope with the problems of erosion and displacement to a great extent. Disparities however seem to be on the rise in the non-affected villages.

Coping and Adaptation

In the absence of proactive support from government to which the poor always looks forward to, the affected people have devised their own ways to survive under most trying conditions. They have devised both short term coping mechanism and a long term adaptive strategies to counter the adversities if they do not wish to be rehabilitated elsewhere and still eke out a living within the dwindling opportunities that the island offers. Understandably, the strategies work for some and do not work for the others depending upon the strengths and weakness of the households and the degree of shock that they receive.

Indigenous communities living on the river banks have developed traditional livelihood mechanisms seen in their dwellings, agriculture, livestock rearing practices and food storage. They have developed skills to foretell floods and weather and these skills have become an important resource to survive under extremely trying conditions. One of the coping strategies employed by them to overcome the problems of flood for a short duration is by designing the structure of their houses in such a way as to withstand the fury
of flood and by raising the plinth of the houses at a higher level. However, this strategy has been used by those who have developed this skill as a matter of culture or those who can afford. Hence, not all communities are employing this strategy and hence are prone to flood disasters. However, the communities not using these strategies are also learning to use them when faced with multiple displacements.

Housing structure is one of the important ways to adapt. Stronger the housing structure lesser the susceptibility. People have a perception in their mind that they have to evacuate their household at any point of time. So they build their houses in such a way that it can be always relocated within a short time period and so people mostly stay in chang ghar. In the affected villages houses are made of kaccha and semi-pucca and there is absence of any concrete house. Their roofs are also made of thatch and tin roof.

Significantly, migration as an adaptive strategy is not adhered to by the people of the affected villages in large measure. This is perhaps due to lack of skills and the fear of the unknown which binds them to the island and the community. This is why the sample villages selected for study and those which are particularly affected do not show much migration of either households or members of the households to work outside the island for a living.

After displacement relief camps and embankments are the two main immediate staying arrangements for affected people. Only relatively affluent manages to construct their own houses ravaged by flood.

Although land quality has deteriorated in most places, there is little evidence of changes in cropping pattern in the sample villages. Even shift to non-farm occupations is highly muted as a long term adaptive strategy. There is little effort to increase productivity through irrigation or use of modern technology.

Only a few could sell their land during the period of crisis. Most of the households lose their land and hence the question of selling land does not arise. They become completely dispossessed. To cope up with the loss of cultivable land majority of people rely on self help groups while some on money lenders. Not much distinction exists between affected and unaffected villages where majority of the respondents depends mainly on self help groups.

On the face of continuous hazards and misery respondents in the affected villages worry for their economic survival which is comparatively higher than the non-affected
villages. The impact of river shrinkage is also observed in the amount of purchasing power where the households face enormous pressure on food security. It is among all the affected villages that majority of the respondents are dissatisfied with their living conditions, whereas a sharp contrast is seen among the affected and non-affected group of villages where majority of the respondents are somehow satisfied with their living conditions.

Regarding people satisfaction on governmental measure it is seen that almost all the sample villages show negative response in getting help from government. However, community help including neighbour seems to be very important for immediate evacuation and rehabilitation.

Nearly all the sample villages depend entirely on private tube well. To talk of the assets own use of water pump, bullock-cart, hand-cart and tractor is almost completely absent in affected villages except in one or two households can be seen using them. Use of granary storage is seen highest in non-affected group of villages. Boats, so important in coping with the flood menace are available to extremely few households.

Overall, the coping and adaptive strategies are poorly developed in the island, particularly among the most severely affected segment which relies more on its community support and cooperative efforts more than structural adjustments made through cropping pattern change, shift towards non-farming occupation or migration.

Understandably, the issue of demographic and socio-economic consequences of river bank erosion is a vast area. The present research could address only a small proportion of what can be done within the constraints of time at the disposal. The limitations are too many given the difficulties in collecting data and on multitude of aspects which afflict the inhabitants on a continual basis. Even within the restricted parameters of analysis, the dissertation forcefully brought out the fact of internal displacement and associated consequences particularly that of redistribution of population, loss of livelihood and misery of the vulnerable sections living on the edge. Evidently, the issue of rehabilitation could not be addressed within the limited scope of research. Moreover, it could also not address the problems of those who had to be resettled in the numerous old and newly emerging chapories as well as outside the island. These are some vital topics which constitute significant areas of future research. Moreover, future research can also focus purely on the tribal segment of the inhabitants who seem to be far more vulnerable than the others as brought out by the present investigation.