

Chapter 15

Island Erosion and Afflicted Population: Crisis and Policies to Handle Climate Change

Tuhin Ghosh, Rituparna Hajra and Anirban Mukhopadhyay

Abstract Environmental Refugees are unable to maintain a secure livelihood in their own habitat due to environmental hazards, with minor optimism to return. This category includes the people who are displaced due to the disruption in physical and/or social systems, and subsequent losses or degradation of ecosystem services. The impacts of sea level rise in combination with complex hydrodynamic conditions, have caused severe coastal erosion on islands of the Indian Sundarban. In a recent past, within the Hugli River (lower course of River Ganga) estuary, three islands namely Lohachahara, Suparibhanga and Bedford completely submerged and Ghoramara Island eroded significantly which resulted in a considerable population of environmental refugees. In 1991 there were 374 inhabitants in the Lohachara Island who became landless after submergence, and were compelled to move other places. Ghoramara Island is located between $21^{\circ} 53' 56''$ N to $21^{\circ} 55' 37''$ N latitude and $88^{\circ} 06' 59''$ E to $88^{\circ} 08' 35''$ E longitude within the Hugli estuary of western part of Indian Sundarban. The major occupation of local people is agriculture, fishing and prawn seed collection. Time series analyses using multi-temporal satellite imageries of 1975 and 2010 unfold the erosional pattern of this island. Some of the distinct villages of this island are already under water. Due to the displacement from their own habitat and also gradual loss in ecosystem services, increased rate of migration in this island has resulted. The poorer people who lost their homeland were compelled to move towards mainland areas like Kakdwip/Namkhana or comparatively stable islands like Sagar Island,

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with little or without any token compensation from the Government. Some of the economically stable people migrated to their other properties in the central part of the Island, hence ensuring their wellbeing. This people are often still paying land tax for their lost land, with little hope of becoming compensated by either cash or land, in the near future.

Keywords Erosion • Refugee • Migration • Rehabilitation policy • Ghoramara Island

Introduction

In the context of climate change and aggravated natural hazards, environment related migration is evolving as a global crisis due to the displacement of larger sections of population from their own original areas. The concept of Environmental Refugee was first introduced by Lester Brown, from the World Watch Institute in the 1970s (Black 2001). Contemporary studies by El-Hinnawi (1985) and Jacobson (1988) on forced migration due to environmental degradation and natural hazards, further popularized the concept. This group of people are forced to leave their own habitat temporarily or permanently, due to the disruption in their supporting ecosystems or from environmental hazards (El-Hinnawi 1985). Jacobson (1988) expressed that the environmental refugees are evolving as a single largest cluster of displaced persons in the globe. The concept of environmental refugee has become much more popularized, and has been receiving proper attention during recent times (Mayer 2002).

The waves of environmental migrants that spill across borders can destabilize domestic law and order, and also international relations, associated with environmental degradation (Homer-Dixon 1991). Also, Myers (2002) described the environmental migrants often cannot have any hope to get secured livelihood in their homelands, and little or no chances to return. Here, the migrants are considered to experience the so-called trans-border migration. But, the migration may not be always trans-border. During decades, the close links between environmental degradation and forced migration has been observed (UNHCR 1993), and the social/economic/political reasons—rather than any single driving factor—have predominantly played a role. It is very difficult to distinguish the migrants driven by environmental or economic factors. Most often, poorer people driven by environmental degradation (Myers 1993), indicate that the definitions of such refugees are ambiguous and inconsistency. In fact, governments and international agencies find it difficult to recognise environmental migrants to, as they often do not have any legal basis.

The 1951 United Nation Convention on Refugees and the subsequent amendment in 1967 expressed the initial international law or standard criterion to define the term refugee and Bate (2002) showed that the compulsion can vary from moderate to intense. There are several conflicts on the definition of the refugees, on the

basis of the 1951 UN Convention and a global debate is ongoing for its refinement (Bell 2004; Black 2001) as the Geneva treaty on International Refugee Legislation and United Nations High Commissioner of Refugees were established after World war II (Stojanov et al. 2008). This revision needs to clarify the new emerging groups of migrants like Internally Displaced people, Economic Refugee, Humanitarian Refugee and Environmental Refugee. As an alternative, the concept of internally displaced persons (IDPs) appears relevant to those suffering displacement by environmental change and the Guiding Principles on Internal Displacement, along with national implementation policies, indicate a developing and expanding regime potentially suitable for climate change migrants (Williams 2008). The UNHCR's Guiding Principles on Internal Displacement identifies rights and guarantees for the protection of those suffering forced displacement (UNHCR 1998). So far, the problem of environmental refugee is increasing. Based on this fact, organizations such as the International Organization for Migration, the UN Environment Programme and IPCC are taking initiatives on this matter (Black 2001).

Large scale migration is often taken as a 'cause' rather than the 'effect' of environmental degradation (Williamson 1996). Increasing flow of migrants put additional pressure on the resources of the destination areas, and threatens the livelihoods of present inhabitant (Panda 2010). In addition, movers may have to accept whatever opportunities come their way in the new location (Loneragan 1998). Complete resettlement of environmental migrants is difficult (Mayers 1993). Movement may lead to the substitution of one set of stresses (environmental) for another (economic, social, political and/or further environmental stresses) (Loneragan 1998). An appropriate plan is necessary to combat the negative impact of environmental migrants on the ecological sensitive area like Ghoramara Island (Hazra and Bakshi 2003).

Environmental Migrants from Vanishing Island

The IPCC (1990) estimated that climate change will aggravate the displacement of people and further migration due to various disruptions in their wellbeing. There is a projection of 150 million people by 2050 (Myers 2002), in which 50 million people will be displaced due to a 1 m sea level rise (Jacobson 1988). Almost 120 million people could be rendered homeless by 2,100 both in India and Bangladesh, due to sea level rise and given the proximity of Bangladesh to India much of the people will end up as migrants in Indian cities which are already facing resource scarcity (Rajan 2008).

Myers (2002) argues that climate migrants from Bangladesh alone might outnumber all current displaced population worldwide. Similarly, a large stretch of the Indian coast is under risk due to sea level rise, along with intensifying cyclone and larger storm surges. As India possess second largest population (63 million), 7,500 km coastline, 60 % people living in the low lying coastal zone and seventh in terms of area (82,000 sq km) (McGranahan et al. 2007). According to Kelman (2006) climate

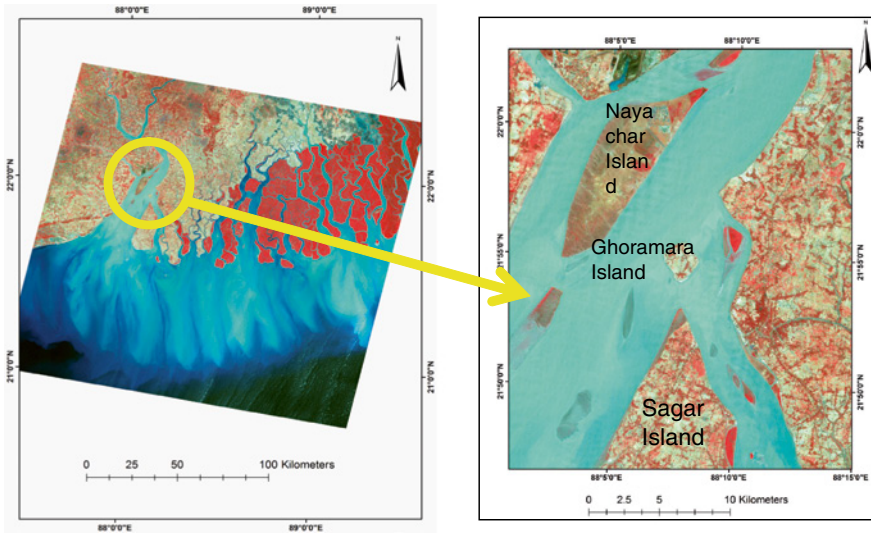


Fig. 15.1 Location map of Ghoramara Island

change often effects on freshwater quality and geomorphological changes which might make some Small Island Developing States uninhabited forcing migration. In the Hugli River estuary within the Sundarban Island system on Bay of Bengal there are evidences of submergence of islands, severe erosion and migration of island dwellers (Ghosh et al. 2003; Hazra et al. 2002; Hazra and Bakshi 2003). In recent past, three such islands namely Lohachara, Suparibhanga, and Bedford completely submerged (Ghosh et al. 2003) and another populated island Ghoramara experiencing severe erosion and aerial loss (Ghosh and Sengupta 1997; Ghosh et al. 2003). Ghoramara Island located between $21^{\circ} 53' 56''$ N to $21^{\circ} 55' 37''$ N latitude and $88^{\circ} 06' 59''$ E to $88^{\circ} 08' 35''$ E longitude within the Hugli estuary of western part of Indian Sundarban (Fig. 15.1). The major villages within the Ghoramar Island are Khasimara, Khasimara Char, Lakshmi Narayanpur, Bagpara, Baishnabpara, Hatkhola, Raipara, Mandirtala, and Chunpuri, of which first five villages are already under water (Jana et al. 2012; Ghosh and Sengupta 1997; Ghosh et al. 2003). The island is under threat of severe erosion, embankment failure, cyclone and storm surge (Hazra and Bakshi 2003; Ghosh et al. 2003). Largely, these are the factors for habitat loss, gradual loss in ecosystem services, depreciation in wellbeing and resultant migration of the people of this island.

Methodology

In this study, the use of primary and secondary data has been employed, as there is a serious lack of migration data with local administrations. Primary data of the study area was collected through field surveys with structured questionnaire

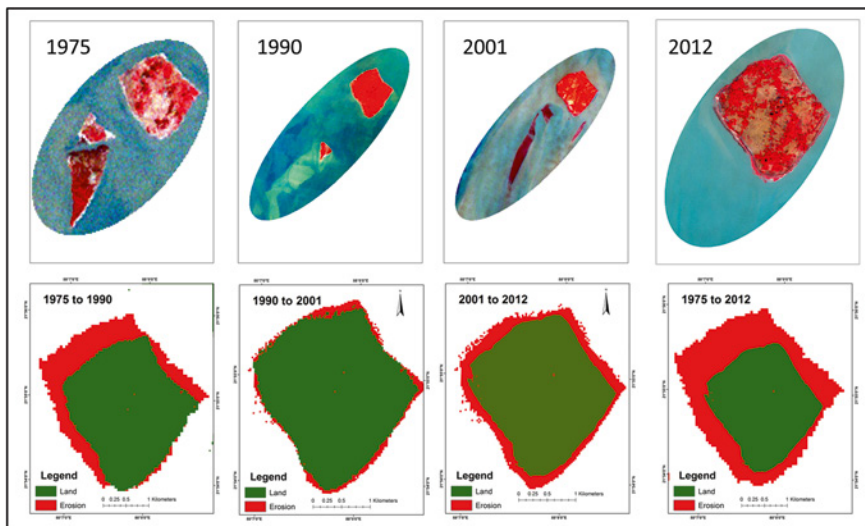


Fig. 15.2 Time series analysis to identify the extent of erosion in Ghoramara Island during 1975–2012

surveys involving the local inhabitants of Ghoramara and Sagar Islands, while satellite image analyses show the level of degradation on the basis of coastal erosion.

A questionnaire survey revealed the impact of coastal erosion on the population, their livelihood and the adaptive response as a form of accelerated migration. This has also unfolded the perception of local people on erosion induced migration, managements etc. Time series satellite image analysis was done using the multi-temporal satellite imageries of 1975, 1990, 2001, 2010 to understand the changing patterns of the islands. Secondary data from different years were collected from Census of India, and the population dynamics was studied.

Result and Discussion

The time series analysis is showing a considerably higher areal loss of Ghoramara Island. Satellite images of 1975, 1990, 2001 and 2010 have been used for this change detection study (Fig. 15.2).

The time series analysis shows that total area of Ghoramara was 8.51 sq km in 1975, decreased substantially to 4.43 sq km in 2012 which clearly indicates the severity of erosion (Fig. 15.3). Erosion was higher during 1975–1990 and in this period Lohachara, Suparibhanga and Bedford Islands become submerged along with the Khasimara, Khasimara Char, Lakshmi Narayanpur, Bagpara, Baishnabpara villages of Ghoramara.

Among these islands, Lohachara and Ghoramara were populated. Thus a gradual process of habitat loss is observed, which drives the urgency for migration.



Fig. 15.3 Degradation of land area during 1975–2012

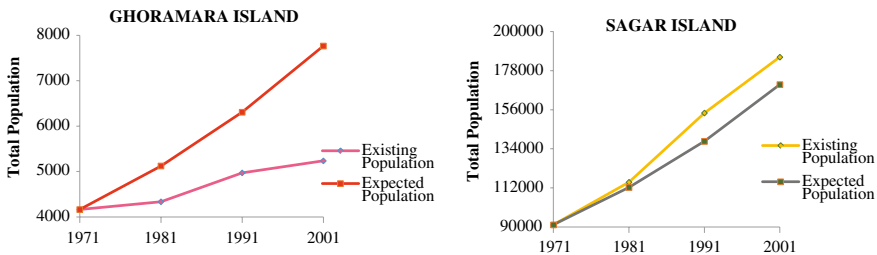


Fig. 15.4 Population growth trend in Ghoramara and Sagar Island from 1971 to 2001

The major event of migration occurred during 1975–1990, due to the massive erosion within that island cluster.

This populous island ecosystem is rapidly changing its morphology due to the exclusive erosion. Lohachara and Bedford Islands disappeared from its original location and triggered the migration of their local inhabitants. As a result, the rate of population growth in Ghoramara Island is 0.55 % while the overall growth the Sagar administrative block is much higher than that, about 2.1 % per annum. Only due to migration, the actual growth is much lower than the expected growth (as per the block level growth rate) (Fig. 15.4). The census of India shows very slow growth rate in Ghoramara from the year 1971, 1981, 1991, and 2001, in comparison to other stable islands nearby (Fig. 15.4) (Population Census of India; 1971, 1981, 1991, 2001). The displaced people mainly took shelter at nearby islands like Sagar Island. During 1981–1991 the actual population of Sagar Island became higher than the expected population (with usual 2.1 % growth rate), due to large number of migrants took shelter in Sagar Island for the submergence of Lohachara and five villages of Ghoramara. The population has been decreased from 5236 to 5193 during the year 2001–2011 which may be attributed to migration (Fig. 15.4), in spite of existing growth rate within the same administrative area.

It is hard to keep an eye on the migration flow as actual record of migrants is not available from the administration. The local people’s perception in majority is around 4000 people migrated from Ghoramara island (Fig. 15.5). This quantification of migrated people has been inferred from the questionnaire survey, as the respondent estimated the number of the family migrated due to erosion.

Fig. 15.5 Number of out migrants from Ghoramara Island (according to islanders' perception)

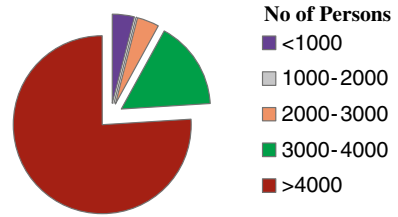
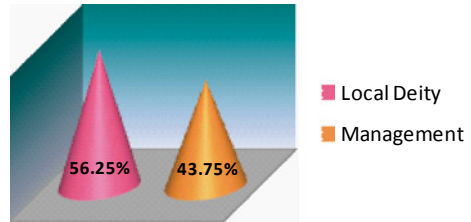


Fig. 15.6 Percentage of community trust on management and fatalism



As the migration is also related with human behavior with ‘push’ factors encourage migration out of their own decision. Gradually, with no or little effort for policy formulation to combat the worst situation was dramatically changed the mindset of the community. It is revealed from the survey that 56 % of the inhabitants of Ghoramara have faith on local deity rather than the management strategies (Fig. 15.6). It halts the implementation of preparedness efforts and the community becomes more vulnerable. This fatalism is often driven by their socio-economic condition, which mostly determined by the proximity to the hazard prone area, and becomes more ‘unlucky’ according to them. Absence of awareness and lack of capacity building is common among the inhabitants.

Conclusion

Worldwide coastal erosion is a common feature in any river estuary, often associated with huge and intensive sediment discharges. The estuary of the River Hugli is no exception, and the erosion within this estuarine island system is likely to displace thousands of vulnerable people in the future, compelling them to move away from their own home areas. According to international laws, these displaced people are yet to be recognized as environmental refugees. There seems to be no official data related to climate-related migration, which shows a deficiency in respect of research. The tracking of migrants from the sending areas and from the receiving areas is a critical task. In reality, the scope for the formulation of policy for their rehabilitation is still uncertain. The complexity of the natural systems and their functional relationship with society is a major hindrance for this kind of policy formulation.

As this paper has shown, erosion has already washed out several settlements, producing environmental refugees. The estimation of total migration has been analysed from the difference between the expected and estimated population to be affected, calculated using the population growth rate and population data (Census). There is a real time relationship between the coastal erosion and migration, although the total migration never complies with that. Even though, in this case study erosion is the major environmental driving factor, there are a number of other reasons and factors behind this migration.

The immediate necessity for vulnerability assessments to formulate a common agenda with implementable policy has to be considered in a regional scale, and there is a perceived need to establish a linkage between climate phenomena, the environment, population and poverty.

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