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Climate change realities of the Indian Sundarbans

Upasona Ghosh, Darley Jose Kjosavik and Shibaji Bose

FIGURE 5.1 Precarious fishing in the Indian Sundarbans (Photo credit: Shibaji Bose).

Introduction

While scientists and policymakers grapple with ways of understanding and framing climate-related uncertainty at macro-scales, people's everyday life is mired with uncertainties that are immediate. An understanding and appreciation

of these immediacies calls for studies from the grassroots that can build bridges with the macro-level framings thus informing substantive policymaking. Conway *et al.* (2019: 7) have argued for “the critical need to situate climate adaptation within the context of broader socio-economic, environmental and political processes; something that top-down approaches often fail to consider”. “[T]he complexity of lived experiences” (ibid.: 7) provides the substratum for this chapter which seeks to understand the experiences of uncertainties as they unfold in the everyday lives of the people of the Indian Sundarbans, a marginal landscape and India’s largest wetlands seemingly drifting out of mainland West Bengal in Eastern India. We focus on livelihood uncertainties and other uncertainties arising from climate, political economy and embankment politics, and the way the “above”, “middle” and “below” (see Chapter 1) understand, perceive and respond to these (Figure 5.1).

We use elements of the livelihood framework (Scoones 1998; Ellis 1999, 2000) to understand the livelihood portfolio and the ongoing diversification process pursued by households in the study area. In the process, we coin the term “distress diversification”, which we feel is more apt to describe what is going on in the Sundarbans. The term distress diversification captures the diversification of livelihood activities by households towards less profitable, more tedious, more risky, more dangerous, more fragile, more uncertain and marginal activities. It also includes diversification towards activities that are more labour and capital intensive, especially in eroded and marginal lands, which would require higher initial investments and incur higher cost of production than previous livelihood activities. While this distress diversification affects both women and men, the intensity is felt more by female-headed households. The term also captures the phenomenon of proletarianisation of agricultural and fishing households, when they are forced to work as part- or full-time wage labourers to contribute to the livelihood portfolio of the household. Households tend to engage in these activities under conditions of distress, as we elaborate later in this chapter.

The Sundarbans is a major climate hotspot and faces significant climatic and other ecological challenges such as degradation and disappearance of mangrove forests, erosion of islands due to rising sea levels, erratic rainfall and extreme weather events such as cyclones. While the delta has always been subject to climatic variations, recent changes have aggravated effects on the lives and livelihoods of the inhabitants. Although climate change impacts and related uncertainties have been well documented in the Sundarbans, this chapter tries to understand how actors at various levels understand, experience and respond to and/or cope with uncertainty and vulnerability. Our primary focus is on the two islands of Ghoramara and Mousuni in the Sundarbans, while also capturing the views and perceptions of “middle”-level actors involved in mediating policies of the “above”.

The chapter is structured as follows: we first provide a brief overview of the Indian Sundarbans, contextualising the study, followed by a description of the study islands and methods. We then provide a historical overview of the political

economic and ecological production of the Sundarbans and its uncertainties with an exposition of the general ecological and livelihood uncertainties and vulnerabilities. This is followed by an analysis of people's experiences of uncertainties with the two major livelihood options – agriculture and fisheries. The socio-political disturbances created by the embankment politics and conflicts and how these exacerbate livelihood uncertainties are then discussed. We discuss out-migration as the major coping strategy of the islanders and the attendant uncertainties. This is followed by an analysis of the pursuit of alternatives by the islanders and the crucial role of the “middle” in mediation. We then discuss the political economy of policymaking in the Sundarbans and provide some concluding remarks.

The Indian Sundarbans: a socio-ecological system in transition

The Sundarbans comprises an area of some 40,000 sq km that includes water, forested islands, inhabited islands, cultivable land and part of the mainland. This is the world's largest mangrove delta and is politically and administratively divided between India and Bangladesh. The whole land mass of the Indian part of the Sundarbans can be divided into two types of inhabited islands: areas closer to the mainland and areas on the fringes of the mangrove forest, reclaimed between 1900 and 1980. These two geographically distinct areas comprise the northern and western part, and the southern part of the Sundarbans, respectively. The north-west part is relatively elevated from the sea level and less vulnerable to storms and tidal inundations. This stable delta part has fertile soil and freshwater canal irrigation system. This part is also closer to West Bengal's capital city of Kolkata than its southern counterpart.

Islanders in the Sundarbans region have had to contend with shocks such as cyclones and floods, and variations in its deltaic ecology as well as socioeconomic marginalisation since the first settlements were established (for more historical context, see Chapter 3). In recent years, many scientific studies have shown that erratic climatic events (e.g. more intense rainfall, heatwaves and sea-level rise) are becoming more frequent and pronounced. These manifestations of climate change have added to the existing problems, including frequent embankment breaching; loss of land, homesteads and other assets and salinity ingress in agricultural land and freshwater ponds. All of these have placed huge stress on the traditional agro-fishing economy and strained the islanders' coping capacities. Households are forced to constantly change their livelihood patterns, for instance, undertake agro-fishing, wage labour, seasonal migration to other parts of West Bengal or other states of India and so on (WWF 2010; Hazra *et al.* 2012).

The literature on the Sundarbans (India and Bangladesh) and the Bay of Bengal delta depicts that prominent manifestations of climate change like sea level rise (SLR) is happening at an alarming scale making the life of the islanders increasingly vulnerable (see, e.g., Hazra *et al.* 2002, 2010; Ghosh *et al.* 2015). Incidences of harsh and extreme climatic events like floods and cyclones are predicted in the

near future which would cause the disappearance of the landmass and subsequent displacement of the population. The Indian part of the Sundarbans is highly vulnerable to climate change manifestations like land erosion as it is losing its mangrove cover rapidly (Giri *et al.* 2007). Some of these changes, however, are attributed to the active geology of the delta and the several major rivers draining into the Bay of Bengal. For instance, Mukhopadhyay *et al.* (2015) suggest that the changes, especially in the islands of Sagar, Nayachar, Ghoramara and New Moore, are resulting from changing dynamics in the Bay of Bengal as well as its numerous rivers that play a major role in accretion and erosion dynamics of the delta. In a recent study on Ganga–Brahmaputra–Meghna (GBM) delta, Brown *et al.* (2018) found that GBM deltas are at high risk of long-term flooding, even if the global temperatures stabilise. Moreover, large-scale reclamation, deforestation and unsustainable exploitation of natural resources have contributed to changes in the physical and biological dynamics of the Sundarbans delta (Hazra *et al.* 2002; Ghosh *et al.* 2015; Hajra and Ghosh 2018).

Along with the changing climate, recent demographic trends (Census 2011) exhibit Sundarbans' marginality from a development point of view due to its mono-cropping-based agriculture and dwindling fishing economy despite being ahead of the state average in sex ratio (Sundarbans = 955, West Bengal = 950) and overall literacy (Sundarbans = 84.06%, West Bengal = 77.08%). At the same time, the impacts of globalisation have also led to changes for the islanders through the widespread uptake of mobile phones, television and satellite television and the consumption of packaged food and beverages. The problems that take centre stage in an ecologically challenged place like Sundarbans are heightened vulnerability to climatic events like floods and cyclones, which, in turn, exacerbates livelihood uncertainties.

Ethnographic exploration in Ghoramara and Mousuni

An ethnographic exploration was conducted in two islands, namely, Ghoramara and Mousuni, of the Indian Sundarbans between March 2015 and September 2018. These are among the ten sea-facing islands in the southern part of the Sundarbans and, therefore, most vulnerable to climate events (Hazra *et al.* 2010). Both these islands fall under the administration of Sagar and Namkhana Block of South 24 Parganas District and are the two most climate-affected islands within the Sundarbans (Hazra *et al.* 2002).

Ghoramara has already lost substantial land area due to climate change-induced land erosion and embankment breaching (Hazra *et al.* 2010). In 1975, the total area of this island was 8.51 sq km, which decreased to 4.43 sq km in 2012 (Ghosh *et al.* 2014), a reduction in size by half. This is an indication of the alarming rate of land erosion and the consequent loss of habitat and livelihoods. The situation has forced the islanders to out-migrate, causing a drop of 0.55% in the population growth per year compared to overall growth of the nearby Sagar islands (Census 2011; Hajra and Ghosh 2018). The Ghoramara Island has

shifted laterally towards the east due to the extensive erosion of the western part and the accretion in the eastern part (Ghosh and Sengupta 1997). According to Ghosh et al. (2003) the eastern shore of the island is likely to merge with mainland India in two–three decades, while the western shore is likely to be totally washed away. Mousuni Island is situated near the river Hatania–Doania (a channel that connects India and Bangladesh). This island was severely affected when cyclone Aila hit the Sundarbans in 2009. Subsequently, a major flood in 2014 further breached the embankment and inundated huge tracts of land in the island. The island has lost 25% of its land area since 1969 and is projected to lose 15% more by 2020 (Hazra *et al.* 2010). Up to three–fourths of the island gets flooded each year.

The agricultural land area of Ghoramara is 1.2% and that of Mousuni is 17% of the total land area, respectively. The percentage of agricultural land is quite low in Ghoramara as this island has experienced the maximum land loss, including large extents of agricultural land over time (Hajra *et al.* 2016). The estimated erosion rates of agricultural land per year during the period from 1990 to 2015 were 0.02 sq.km in Ghoramara and 0.08 sq km in Mousuni (*ibid.*). Considerable changes have occurred in the shape and size of both islands due to processes of erosion or accretion (*ibid.*).

Interactions were conducted mainly with community members who faced climatic shocks directly or indirectly in the last five years (2015–2020). We had interactions with 86 persons, both women and men (including elders), who could describe climatic and related changes over the last 40 years, community leaders like Self-Help Group leaders, school teachers, political and religious leaders, local doctors and grass roots village health workers, local clubs and activists working with environmental issues, *Panchayat* (local administrative unit) members and local media personnel.

A participatory rural appraisal technique, namely, the Participatory Hazard Ranking exercise, was also undertaken as a visual means of enabling the respondents to construct and analyse their own uncertainty contexts in Mousuni and Ghoramara. These techniques were used after six months of the initial ethnographic observation and discussion with the community. The Participatory Hazard Ranking exercise was used to analyse the experiences of extreme climatic events after cyclone Aila. This is because many extreme events after Aila have not received the same attention because of their relatively low scale of impacts. Still they have contributed to the livelihood distress in the islands. The exception being cyclone Amphan of 2020, which we focus on briefly later in this chapter.

A total of 48 key-informant interviews were conducted with the “middle” of the Sundarbans, comprising actors starting from grass roots non-governmental organisations (NGOs), community-based organisations (CBOs) and journalists having an understanding of ground-level realities, to activists working in the Sundarbans for the past three decades and community leaders. We also focussed on the “above” of the Sundarbans, identified through snowballing and interviewed 30 representatives from several government departments, scientists working in

universities and donor agencies funding different developmental projects. In-depth discussions were held with the “middle” and “above” regarding their perception on climate change in the Sundarbans and accompanying uncertainties in local people’s livelihoods. We also relied on secondary literature ranging from journal articles, media reports, grey literature and vernacular writings and magazines.

Historical, political economic and ecological production of uncertainty in the Sundarbans

As discussed in Chapter 3, understanding the unique socio-ecological development of the Sundarbans has been a challenge to historians. According to Eaton (1990), the Sundarbans forest was a frontier zone for many centuries: from 1200 to 1750 AD, it was an economic frontier for wet rice farmers who came from further west of the region, a political frontier for the Delhi Sultanate (1204–1575) and the Mughal Empire (1575–1765). The wet rice farmers brought with them new technologies and forms of social organisation, and the state formation by the Islamic rulers played a major role in the intensification of rice cultivation and introduced new property rights systems. All these contributed to fundamental changes in the ecological system of the Sundarbans – the natural forested ecosystem began to undergo radical changes. The “process of clearing the forests preparatory for agricultural operations produced extremely complex tenure chains extending from the *zamindar* [landlord] at their upper end, down to the actual cultivator at the lower end” (Eaton 1990: 11) with numerous intermediaries in between. Land was leased to the zamindars, who sub-leased it to men who were, in turn, prepared to bring colonies of cultivators from the mainland to the Sundarbans islands. This system brought in countless intermediaries who were, in fact, capitalist speculators (Eaton 1990). Large tracts of natural forests were converted to paddy rice lands by the late 18th century when the British took over the governance of the region and the new colonisation of the area began. Some of the most remote forest tracts of the Sundarbans were transformed into fertile rice fields in the period between 1905 and 1920, by creating a class of small peasants who were forced to settle down permanently in the islands (Ascoli 2020). The extractive tenure systems and the tough ecological conditions of production resulted in the immiseration of the peasantry (Chatterjee 1990).

After independence, the Sundarbans was divided between India and (East) Pakistan (now Bangladesh). New borders were created across the rivers and water bodies, rendering the efforts to control the effects of floods, cyclones and other natural calamities a difficult task. The property rights regime and forest conservation policies continued along the colonial lines. Our discussions with the islanders revealed the complexity of the confused land tenure regimes they inherited through history (see also Chapter 3). A large number of households in our study area do not have land records, and this creates bureaucratic impediments to accessing services from the state including compensations for loss of land and crops due to floods, cyclones and other natural calamities. In this context,

“middle”-level actors mainly the community leaders, NGO/CBO personnel and social science scholars working in the Sundarbans, highlighted that the islanders have to contend with the uncertainties imposed on them by history, geography and politics. Historically, their forefathers were forced to come to the islands by the *probashi zamindars* (absentee landlords) who got the right to the land as lease from the British, while some of the islanders are descendants of the *raiyats* (independent proprietors of land) who settled down in the Sundarbans when the *raiyatwari* system (a land tenure system where the registered land holder (*raiyat*) was recognized as the proprietor from whom revenue was collected directly by the government) was introduced. However, we also found that some households benefited during the massive land reforms implemented by the left-wing governments in the 1970s and 1980s in West Bengal, which included distribution of land to landless households and registration and regulation of tenancy contracts. The process of land reform was complex and protracted and eventually came to a standstill in the late 1980s (see Bardhan et al. 2014 for a discussion of land reforms in West Bengal). Hence, the process was not completed and a sizeable amount of households remained landless. In addition, due to unofficial in-migration in Sundarbans in the late 1980s and early 1990s, there has been a further increase in the number of landless people. However, a large part of the benefits from land reforms in Ghoramara and Mousuni have been lost to the sea, or rendered uncultivable due to salinity ingression, as explained by the informants.

According to experts and “middle”-level actors, climate-related uncertainties are caused by various factors including rising sea level, increase in sea current and increasing variability in the patterns around cyclones and floods. These are exacerbated by government apathy towards the maintenance of bunds, the construction of the Haldia port with total disregard for the islands which are nearest to the Bay of Bengal and insecurities around access to water, health and food. Due to the gendered division of labour, changing access to water, health and food particularly affect younger women and mothers who have caring responsibilities in the household. Ironically, globalisation and market forces have also increased vulnerabilities of local people, already dealing with the impacts of climate change. Take, for example, the advent of the fishing and the tourism lobby. One of the major tourist attractions – the sea beach of Bakkhali – was the temporary site for fish drying for local fishing families. The smell of the drying fish, however, was disliked by tourists and tourist operators. The strong political lobbying by the tourism industry resulted in mass evacuation of small-scale fishing families without providing them with alternatives. As pointed out by Ohdedar (2020), “This impoverishment [of the people of Sundarbans] is not a natural state or determined purely by the fragile ecology. Rather, it is the result of human agency, policies, laws and institutions”.¹ Uncertainties and vulnerabilities of the local populations are, thus, produced through political economic and ecological processes, where the global and the local intersect through networks of power relations. Therefore, we need to go beyond the “schematic of external climatic threats and internal social exposures” (Taylor 2014: 4) in thinking about social transformation, as the internal and external are co-produced and intertwined in intricate ways.

Cascades of ecological vulnerabilities to livelihood uncertainties

Climate change in the Sundarbans is imposing uncertainty for different actors in diverse ways although this varies in pattern and magnitude. Among those, the most immediate and prioritised by the “below”, “middle” and “above” is livelihood uncertainty. Our study shows that communities living in these islands face constant threats to their lives and livelihoods. Climate-induced changes have led to increased heat, unpredictable rainfall and delayed monsoon, whereas climate-induced geo-morphological changes like sea-level rise and increasing sea surface temperature have led to increases in flooding, cyclones, rapid erosion and salinity of land and freshwater sources. These changes have an increasing impact on the household income of the traditional agro-fishing communities. For example, a middle-aged male respondent from Mousuni Island narrates:

In my childhood, the sea wasn't that rough, rain came on time for the seed sowing; we got good fish in ponds and grew vegetables plenty. God knows what happened in the last two decades, everything changes—the rain, the sea, the river, everything.

(Interview November 2016, Mousuni Island)

Saline lands and ponds are rendered unsuitable for cultivation and pisciculture. Moreover, frequent flooding breaches the embankments and destroys household assets and crops, leaving the community in deep economic uncertainty. Consequently, households are compelled to change/modify/diversify their livelihood pattern constantly through multiple ways, viz., cropping pattern changes, wage labour, fishing, prawn seed collection, crab catching, seasonal migration and so on in order to secure income and resources. We discuss these in detail in the following sections.

To explore the frequency and intensity of extreme weather events and the extent of destruction, a Participatory Hazard Ranking exercise was conducted with a mixed group of community members in Ghoramara. The results are provided in Table 5.1. According to the group, except in 2013, every year after the 2009 cyclone Aila, there were natural hazards such as rapid land erosion, high water levels and relative inundation, embankment breaching and moderate cyclones that hampered the daily living and livelihood activities. The impacts were multi-pronged and multi-layered which created deep uncertainties for livelihoods and shelter. Salinity ingression in agricultural fields and fishing ponds; loss of standing crops; loss of other livelihoods; demolition of homestead; erosion of agricultural and non-agricultural lands were the major impacts of such consecutive climatic events. The respondents reported skin rashes, diarrhoea and other waterborne diseases during these periods. According to them, these small shocks cumulatively resulted in loss in fish catch, yearly loss of crops and large-scale out-migration of male family members from the island. Though communities received emergency support from the *Panchayats* and CBOs, they did not receive any long-term support or resources to rebuild their livelihoods or shelter.

TABLE 5.1 The climate shock history of Ghoramara Island. Compiled from the Participatory Hazard Ranking exercise in Ghoramara, 2016, by the authors

Year	Type of Extreme Event	Type of Destruction
2015	Flood and tidal inundations	<ul style="list-style-type: none"> • Water level increase • Breaching of embankment and Inundation initiated
2014	Moderate impact of cyclone Hudhud	<ul style="list-style-type: none"> • Inundation due to embankment breaching • Demolition of homesteads • Severe skin infection • Huge loss of agricultural crops • Loss of fish catch • Loss of cattle • Drinking water crisis due to salinity intrusion
2013	No significant climatic events	None
2012	Moderate impact of cyclone Phailin	<ul style="list-style-type: none"> • Households demolished • Livestock washed away • Children suffered from fever and diarrhoea for almost a month • Loss of agricultural crops and fish catch
2011	Severe Flood due to intense rainfall	<ul style="list-style-type: none"> • Huge loss of land to the sea • Households demolished • Livestock washed away • Children suffered from fever and diarrhoea for almost a month • Loss of agricultural crops and fish catch
2010	Moderate flooding and related inundation	<ul style="list-style-type: none"> • Water logging in households for months • Loss of pond fishing due to salinity intrusion • Loss of agricultural crops due to salinity intrusion

Mousuni Island too experienced similar consecutive impacts but being larger than Ghoramara Island, the manifestations were more localised and almost went unnoticed by even the local administration. As noted by a woman from Mousuni:

This time only our hamlet got flooded during the annual high tide. The villagers kept an eye on the embankment the whole night and quickly fixed the embankment as and when it was breached, all on our own. The *Panchayat* did not help with anything as it was only a matter of few houses.
(Interview December 2016, Mousuni Island)

The communities' experience shows that such localised events are gradually eroding the resources in a subtle manner which is often unrecognisable to outsiders and the bureaucracy but leading towards cumulative uncertainties in the Sundarbans.

Coping with livelihood uncertainties: towards distress diversification

The livelihood framework developed by Scoones (1998) is a common analytical tool especially in rural contexts to understand the resources and strategies available for households to earn a living. Households employ natural, economic, physical and human capital to pursue strategies such as agricultural intensification and/or extensification, diversification of activities, migration and so on. Ellis (1999, 2000) further developed the idea of livelihood diversification and discusses the idea of rural households' construction of livelihood portfolios. The livelihood framework focuses on what households already have and builds on that, where diversification is a strategy for expanding the livelihood portfolio to achieve sustainable livelihoods. Contrary to this, what we see in the Sundarbans is a constant erosion of the various livelihood capitals (natural, physical, financial and human capitals, cf. Scoones 1998), which places serious constraints on the possible strategies that could be pursued by households. Livelihood diversification is, indeed, ongoing in Mousuni and Ghoramara. This, as we elaborate in later sections, is a diversification towards less profitable, more dangerous, more fragile and more marginal livelihood activities such as switching from rice to betel leaf cultivation in unfertile eroded lands on the waters' edge, prawn seed collection, crab catching, fishing in dangerous waters and in the vicinity of the tiger reserve and so on. Therefore, we call this "distress diversification". In distress diversification, households have already lost the assets/capitals/resources they had and diversification is not a choice but a necessity for survival.

Households in Ghoramara and Mousuni are not only displaced to other locations within the islands for new shelter but are also forced to engage in diversified sources of income including wage labour and out-migration. A female farmer from Mousuni said, "We have to dig the earth; we have to work for others; we have to live life" (Interview September 2016, Mousuni Island).

Declining agricultural productivity

Most of the respondents reported loss of productivity of agricultural land due to salinity ingress after Aila and expressed concern that "at least five to six years would be needed to regain the productivity", as stated by a middle-aged male farmer from Mousuni Island (Interview November 2015 Mousuni Island). The experiential knowledge of respondents regarding increasing tidal inundations appears to be in concurrence with the scientific knowledge of sea-level rise in the region. As stated by a female villager from Mousuni:

In my childhood we could not see the river bed from our village. We could see it only from a distance once we got to the top of the embankment. Now the river and the plain are at the same surface level, the river has come so near to us.

(Interview May 2016, Mousuni Island)

It would also mean that the islanders continue to lose both natural and physical capital.

Other respondents added that these localised incidents lead to recurrent loss in agriculture, particularly rice crop and farmers succumb to the cycle of debt leading to gradual economic impoverishment by the loss of financial capital. Loss of agricultural land to the sea, that is, land erosion is also a common phenomenon, thereby losing both natural and physical capital. A farmer from Ghoramara stated:

I had a plot of land until last year which was very near to the embankment. At the peak of harvesting time, the plot started sliding into the sea. It happened so rapidly that I could manage to harvest only a few kilos of paddy which was sufficient for household consumption only for a few months. The compensation given by the government was not applicable in my case as it was not related to floods or cyclone; hence I couldn't claim compensation for losing my land to the sea. Now I have to work as a labourer in my neighbour's field which is a bit centrally located within Ghoramara.

(Interview March 2017, Ghoramara Island)

Moreover, as mentioned above, the loss of soil fertility leads to decrease in crop productivity. Rice is the primary crop and staple food of the study islands and the productivity of rice is an indicator of the regional economy (Hazra *et al.* 2002; Hajra and Ghosh 2016). About two-thirds of the population in these islands are dependent on rice monocropping (Aman crop) for their livelihoods (Census of India 2011; Hajra and Ghosh 2018). Islanders are trying to cope with livelihood uncertainties by changing cropping pattern – from food crops like rice and vegetables to cash crops like betel leaves, which, in turn, has implications for the food security of the islanders. A middle-aged betel leaf farmer from Ghoramara Island stated:

In my childhood, I have seen Ghoramara producing sufficient amount of rice grains and vegetables like chilli and watermelon. The piece of land which was once fertile enough to produce 550–560 kg of paddy has reduced its production to 220–240 kg. We have now shifted from paddy cultivation to betel leaf cultivation. The continuous intrusion of saline sea water during tidal inundation has reduced the fertility of the land. It can hardly produce paddy and betel once in a year. Still we are struggling.

(Interview August 2016, Ghoramara Island)

Switching to betel leaf cultivation is a form of distress diversification consequent to the loss of land fertility, that is, natural capital, as the land is unsuitable for rice cultivation, which is the preferred crop. These lands are perched on the water's edge and could be rendered unviable or vanish into the sea any time by tidal surges and inundations. Construction of betel leaf garden incurs high costs

and only a few can afford to do that. Most of the islanders build the structures necessary for betel leaf garden by taking loans from the local money lenders at high interest rates. As mentioned by respondents, this is a risky strategy. If and when there is a crop loss, due to flooding or erosion of the plot, the farmers are unable to repay the loan and they get caught in a debt trap. Some of the islanders who have already lost their lands work as wage labourers in the betel gardens.

Women farmers are more vulnerable in this regard. We were informed that women who previously had lands used to work their own fields. But after losing their land to the sea, they ended up working as agricultural labourers in the betel leaf gardens of others. From the discussions, it became apparent that this is still a “comfortable” option for them to work within the island as the owners of the gardens are either their close neighbours or fellow villagers. The women we spoke to mentioned that there are limited options left for them to sustain livelihoods like kitchen garden and livestock rearing, due to the loss of land. “As paddy cultivation is depleting, our livestock is getting less amount of fodder. In many cases we have to sell them, though we know that we are losing another source of income”, stated a female villager during an all-female discussion in Mousuni (Interview November 2016, Mousuni Island). Increasing proletarianisation of both women and men is, thus, ongoing in Ghoramara and Mousuni, in the wake of loss of land and other income earning on-farm activities such as animal husbandry. The islanders are increasingly adding wage labour to their livelihood portfolio as a distress diversification strategy.

Agricultural livelihoods are, thus, characterised by continuous loss of natural, physical and financial capitals and distress diversification to other crops as well as wage labour. Although there is no specific intervention targeted at small, marginal or landless farmers to address the aforementioned challenges, there are a few initiatives taken by the “middle” – the CBOs/NGOs with scientific support from agricultural scientists (“above”) of various Universities of West Bengal are supporting the depleting agriculture to adapt in the face of climate change. Discussions with the CBOs revealed that there are attempts to bring back salinity-resistant rice varieties to the marginal farmers especially those who lost productivity of their agricultural land due to salinity ingress. These are contributing to processes of reintroducing local knowledge and practices that existed in the region. These practices had almost been lost due to the Green Revolution agricultural practices promoted by the government of India, where the focus was on the adoption of high-yielding varieties (HYV) of crops and use of chemical fertilisers and pesticides. Of late, the collaboration between agricultural scientists, local CBOs and farmers has led to the development of farmers’ associations in large parts of the affected areas which are attempting to revive traditional and local agricultural practices alongside general awareness programmes of organic farming. Model farms have been selected by a few leading NGOs, mostly concentrated within the project implementation areas. However, there is not much uptake either by the government or by the community outside the implementation areas. These interventions, if scaled up, could contribute

to the revival of livelihoods and perhaps slow down the process of distress diversification to the high-risk betel leaf cultivation as well as diversification out of agriculture to wage labour and other marginal and risky activities such as fishing and crab catching, as discussed below.

Between the tiger and the deep sea: fishing in uncertain waters

Fishing is a traditional livelihood activity in the Sundarbans. One of the traditional inland fishing activity – *meendhar* (prawn seed collection) – was associated with the women fishers of the Sundarbans. This small-scale fishing was considered to be mainly a “women’s job” as it was less risky than deep-sea fishing. Women fishers could contribute to the livelihood portfolio of the household through their *meen* catch. Prawn seed collection, though deemed less risky, is, indeed, a tedious process, which demands standing long in waist deep salt water, leading to health consequences like vaginal infection and body ache.

Deep-sea fishing in coastal waters was another significant source of livelihood for majority of the people in the Sundarbans. Many of their local belief systems and social structure are also built around this livelihood activity. Climate change along with globalisation is now driving this traditional livelihood towards extinction. According to the local fisherfolk, the amount of fish caught in the past two decades is much less than their previous experience. According to the respondents, both climatic and non-climatic factors have caused the declining fish catch. For instance, the extinction of a few fish species due to extreme climate events and the increasing number of fishing trawlers from other states active in the waters of the Sundarbans have caused a decline in the quantity and quality of the fish catch of the islanders. They are also concerned that the waters have become more unfriendly to the traditional ways of fishing. According to them, fishing has now become a professional activity undertaken commercially by outsiders rather than a traditional livelihood activity of the islanders. A middle-aged fisher of Mousuni Island said:

It is not at all a profitable option anymore. The nature of the water has changed; it became rough and wavy along the coast. We—the fisher folk of the village took a collective decision to leave fishing and take up wage labour to sustain livelihood.

(Interview April 2016, Mousuni Island)

The respondents mentioned that the amount of fish catch around the coast is declining. Now they have to go far out into the sea for longer number of days to catch a desirable quantity. “We are not getting good fish catch along the coast. My sons have to go for 7–10 days in the deep sea to catch fish now. I have discontinued going with them as my health is not permitting the stress of journey into the sea”, stated an elderly fisherman from Ghoramara (Interview January 2017, Ghoramara Island). The islanders also referred to the menace caused by the

increased intrusion of mechanised trawlers, leaving chemical pollutants in the water, which has led to degradation of river water and disappearance of some fish species. The diminution of natural capital – the fish population, fish species and the quality of coastal waters, signals increased uncertainties within the fishery-based livelihoods.

Fishers' experiences and observations correspond to the scientific explanation (Hazra *et al.* 2010; WWF 2011) that rising sea surface temperature is impacting the coastal marine life and forcing the species to move into the deep sea. "The coastal marine life has changed especially after Aila. Some of the species have changed their habitat due to the increasing sea surface temperature and migrated to the deep sea", stated the Principal Scientist of Central Institute of Brackishwater Aquaculture, Kakdwip Research Centre (Interview, January 2017 Kakdwip).

The declining fish catch and increasing operational cost make the condition difficult for the fishers in the Sundarbans to continue with this once most viable livelihood option. Available credit facilities are now declining and fishers find it difficult to meet the operational expenses. Inland small fishing, which used to be a prominent livelihood option in Sundarbans, is also decreasing, especially after Aila. Salinity intrusion into the fisheries has made them unsuitable for freshwater fishing and unusable especially for *meendhara* (prawn seed collection). Moreover, *Meen* has always been in controversy because of biodiversity conservation in the Sundarbans as this traditional practice is considered a threat to the conservation of marine species (see also Jalais 2010; Sen and Pattanaik 2017). According to the Biodiversity Conservation Act, prawn seed collection from the fringes of the river is now illegal. From a livelihood perspective, the ban on *meen* collection has resulted in the loss of this natural capital for the households in general and women in particular. This has forced them to engage in distress diversification to crab catching, as discussed "below".

The islanders mentioned that, given the increasing constraints in coastal fishing, inland fishing and prawn seed collection, most of the fishers have switched to crab catching. However, this activity entails more physical stress and is riskier as crabs are mostly found around the tiger reserves, inhabited by the fierce Bengal Tiger. The waters are also home to a large number of crocodile populations. While "tiger widow" is a common phenomenon in the Sundarbans due to a large number of men losing their lives to the tiger in pursuit of livelihoods (collection of minor forest produce, crab catching, fishing, etc.), now women themselves and children are increasingly at risk. This is, indeed, the epitome of distress diversification, especially by the most vulnerable groups – women and children. As told by the respondents, it is mostly women and children who are engaged in crab catching as men are compelled to out-migrate seasonally to work elsewhere for cash incomes. However, as the demand for crab in the market is relatively low compared to prawn and in the absence of commercial market regulations for crab selling, crabs fetch lower prices than the actual market price. This is a reflection of the patriarchal social norms, which undervalue the labour of women and children.

Although crab catching is pursued by many islanders as it is a relatively profitable option, respondents from the “middle” (NGOs/CBOs) reflect on two main challenges that make commercial crab catching not so viable for the community. One, crab is not considered to be a nutritious food in Bengali food culture; hence, it is not very popular in the daily diet. Second, quite related to the first, there is a lack of marketing strategies to sell the collected crabs in an organised way. The respondents maintained that there is a steady demand for Sundarbans’ crab in the Chinese market. However, due to the lack of formalised regulations and influence of the middlemen, the catchers who are risking their lives do not receive adequate payments. According to the “middle”, crab catching can be an alternative for the people if marketised well in combination with risk reduction measures. While crab catching is a potentially viable livelihood activity, it risks the loss of human capital, including human lives.

The above discussion highlights the different forms and dimensions of the distress diversification of livelihoods the people of the study islands are engaged in. They constantly incur loss of natural capital, physical capital, economic/financial capital and human capital due to the extreme weather events, which compel them to engage in distress diversification to marginal, more dangerous and precarious livelihood activities, which, in turn, might result in further loss of human capital and human life itself. In the Sundarbans context, therefore, it may not be fruitful to focus on what households already have, as envisaged in the livelihood framework, but focus should be on the erosion of the various capitals and support alternative less precarious livelihood strategies.

Socio-political uncertainties: embankment politics and conflicts

Embankment failures during extreme events are a common phenomenon in the study islands. These often contribute to the vulnerabilities faced by the islanders due to the loss of homesteads, land and livelihoods and sometimes life itself. The repeatedly breached and continuously eroding embankments in the study islands starkly highlight the ongoing uncertainties faced by the islanders and serve as a foreboding of the disasters-in-waiting. The scale of displacement this has generated and continues to generate is huge. In Ghoramara, after the disappearance of a significant part of the island Khasimara, 30,000 households had been resettled to Jibantala in Kakdwip Block 40 years ago. Since then, there has been no official rehabilitation programmes by the government, although breaching of embankments is a recurrent phenomenon along the coastline of the island. We were told that households from the eroded hamlets keep moving towards the interior of the islands in a centrifugal fashion and live in make-shift houses almost every year. This has, in turn, increased the population density in the interior parts of the island and has led to further pressures on vital resources like drinking water, homestead and cultivable lands. The embankment breaches have led to a gradual stratification of the island societies with the livelihoods of the households living in the periphery taking a direct hit compared to their

fellow islanders living on higher grounds or towards the central part of the affected islands. The loss of homesteads and habitats, agricultural lands, salination of ponds, loss of drinking water sources, etc. are far greater for the people living close to the embankments. This has resulted in livelihood inequities leading to variable uncertainties vis-à-vis the geography within the islands.

Embankments are a highly contested technology in the context of the Sundarbans. Historically, mud embankments began to be erected in the 1770s during the British colonial period in order to facilitate the reclamation and settlement of people and to protect the agricultural lands from tidal waves (Sarkhel 2013; also see Chapter 3). Though continuously maintained by the Public Works Department, the repeated extreme weather events, sea level rise and tidal surges have led to the collapse of large sections of the embankments. In the period between 1961 and 2000, the Sundarbans region experienced 31 severe cyclones. The cyclone Aila in 2009 was an extreme weather event that had catastrophic effects and resulted in the destruction of about 500 kilometres of embankments (Sarkhel 2013). Following this, with the financial assistance of the World Bank, the Sundarbans Embankment Reconstruction Project has been initiated to build “modern” concrete embankments (Mehtta and Bhattacharyya 2020).

While some hail this as a technological breakthrough in the protection of the Sundarbans against climate change, others are critical and ask if this is a sustainable approach to the problem. For example, the title of a National Geographic article reads “Building tomorrow in the Sundarbans: How an inspiring project is rebuilding the lives of an endangered community facing the threat of rising sea levels” (National Geographic 2019).² This project employing “modern” technology is expected to “turn the tide” according to the article. Mehtta and Bhattacharyya (2020), on the other hand, ask, “Is concrete the way forward in rebuilding the Sunderbans?” “During Cyclone Amphan, these modern embankments, with their whopping budgets and their supposed state-of-the-art material, developed cracks, broke and collapsed”.³ Rudra (2010) has discussed extensively the socio-ecological consequences of concrete embankment building in the Sundarbans in the aftermath of Aila.

A scientific expert and senior bureaucrat, in an interview, pointed out: “The World Bank sanctioned INR 5,000 Crores for building concrete embankments in the Sundarbans, out of which only INR 149 crores has been utilised in the last seven years”. Embankment – the life line of the Sundarbans – has not been planned according to the scientific inputs provided to the relevant departments, as stated by several “above” and “middle”-level respondents. According to the website of State Irrigation Department (updated in January 2018), after the devastating cyclone Aila in 2009, which broke at least 400 km of embankments,⁴ a task force on “Restoration of Sundarbans Embankments damaged by the cyclone Aila” was formed by the Union Ministry of Water Resources. Concrete embankments were proposed by the Department of Irrigation, which was recommended by the task force and approved by the Ministry of Water Resources as well as the Planning Commission.

According to Irrigation Department officials in the Blocks to which the study islands belong and the website of the same department, this new embankment is going to be higher than it was previously, which would need more lands from the islands thus making the land mass smaller. It is planned to slant towards the coast covered by mangroves as first line of defence against storms or cyclones. In line with scientific expertise from the Irrigation Department, incorporation of geo-tubes has been proposed in more erosion-prone zones. However, the rest of the embankments is going to be earthen. Ground-level staff of Irrigation Department, a crucial actor for implementation who are mainly working at Block level, pointed out the gap between knowledge and implementation in the construction of embankments in eroded parts of the region. According to the irrigation officer of one of the studied Blocks:

We are not giving enough time to the land to be mature geomorphologically to hold the dense population. More so, building embankment on one side create pressure on the river to erode the land on the side where the homesteads are situated. This faulty design of embankment along with cutting down of mangroves catalysed the rapid erosion of the Sundarbans.

(Interview May 2016, Kakdwip)

The embankment is a bone of contention among various actors. Amidst the pressures and compulsions of competitive electoral politics, the politicians are compelled to act, in forms that are “visible” to their constituencies. The technocrats are always already prepared for technological solutions, while the bureaucrats seem ever ready to push any solution that comes to the table. The voices that arise from the amphibian landscape of the Sundarbans get drowned even before they leave the islands.

According to “below” respondents, breaching of embankments is almost a regular phenomenon now, especially during the monsoons. Local people expect that every year the necessary maintenance and repair works be done before the monsoon in a pro-active manner. However, according to local communities, the Irrigation Department officials and contractors responsible for building or repairing embankments fail to deliver work on time; hence, submergence and temporary displacement occur repeatedly every year. Previously, there was ground-level staff from Irrigation Department (called *beldaar* in Bengali) posted in each island to monitor the status of the embankments. Eventually, these posts were abolished or remained vacant due to the negligence on the part of the Panchayat. At the time of our fieldwork, Ghoramara had only one *beldar* who was close to retirement age (60 years) and without the required equipment to repair the embankments, and Mousuni did not have such a post. The *beldar* of Ghoramara stated that the private contractors appointed by the Panchayat have become more powerful as they are generating wage labour opportunities for the islanders amidst the uncertainties related to traditional livelihoods.

The highly politicised nature of the embankments became obvious during the discussions with the islanders. They mentioned the complexities created by the partisan politics that prevails in the islands, a reflection of wider patron/client nature of West Bengal and Indian village politics which has resulted in prioritising repair work for selective households that support the elected representative. A community leader from Mousuni stated:

The embankment building in the present political context is just to earn some more money. Nothing else. The situation has changed completely. Now we are not making a proper embankment; we are using low quality materials; we often pluck the bricks from the embankment and allow the water to come in; we even break the portion at night which has been built during the day. The political parties are earning benefits out of this embankment breaching.

(Interview February 2017, Mousuni Island)

Embankments are thus not merely physical structures of uncertainty to be breached by the waters but contested political structures to be repeatedly breached and repaired in an effort to sustain livelihoods and negotiate political power at the margins.

The role of out-migration

Migration has emerged as the most popular and accepted way of coping with the ever-present difficulties and vulnerabilities on the islands. The Sundarbans is currently experiencing permanent out-migration as well as seasonal out-migration. Permanent out-migration means that islanders leave Sundarbans and settle down permanently elsewhere, mainly in a nearby city or town. This has been historically attributed to the pull factors (Todaro 1969). Of late, climate change uncertainties and vulnerabilities, that is, push factors are also contributing to permanent out-migration. The northern and the southern parts of the Sundarbans are only about 4–5 and 5–6 hours, respectively, by road from the mega city Kolkata and are experiencing the impact of globalisation and increasing urbanisation. These act as pull factors especially for the educated rural elite of Sundarbans to settle down near Kolkata where they have access to better education opportunities for their children (e.g. English-medium schools) and healthcare facilities (e.g. multi-speciality hospitals). However, they usually leave their parental home under the care of their relatives or elderly parents, sometimes, a piece of agricultural land in these islands as a symbol of their roots. The educated youth are often able to find off-farm employment in the towns and cities. The discussions we had with the educated elite youth revealed that they wanted to leave the Sundarbans because they are worried about the extreme weather events and are not prepared to face another Aila or Amphan (the cyclone

which struck in 2020). “It has now become a land of fury, cyclones, floods, no facilities. I do not want my daughter to be here anymore. I have bought a house in Sonarpur. My daughter got admission in a good school in Kolkata. At least she will have a good life”, stated a young man from Mousuni (Interview August, 2016, Jaynagar, South 24 Parganas).

Seasonal out-migration especially by men has also emerged as a widely accepted coping strategy. Male members migrate to the cities and towns of West Bengal or to other states in India for certain periods of the year and engage in unskilled work like wage labour, as restaurant waiters, working in cold storages, construction sector and so on. The uneducated rural poor mostly opt for seasonal migration. Respondents stated that it is quite difficult for them to cope with this livelihood transition as they often lack even the basic level of skills required for the jobs and they do not have opportunities for acquiring the new skills in the Sundarbans. Hence, physical wage labour is the only option. Most of the households in Mousuni and Ghoramara have at least one family member who has migrated either to other states like Haryana, Kerala, etc., or cities like Delhi, Mumbai, Chennai, or to cities within West Bengal such as Kolkata, Hooghly and Burdwan. During fieldwork, we met with some migrants who had returned home from other states for a certain period of the year and were waiting to travel back to their host regions. In the absence of men, women assume the responsibility as head of the household. When they do not receive remittance in time, they are compelled to borrow from money lenders at high interest rates to meet household expenses. Women in a group interaction in Mousuni stated:

Mahajans increase the rate of interest as per his wish any time. But still we have to take loans from them, if husbands fail to send money on time. Earning options are becoming less and less here. How can we run the show?

(Interview May 2017, Mousuni Island)

It would seem that for a number of island households incomes from seasonal migration of family members are uncertain as well. Therefore, the coping strategy of seasonal migration adds another dimension to the uncertainties.

Searching for alternatives and the crucial role of the “middle”

As the traditional livelihood opportunities are depleting, there is a growing need to build new skills for livelihood and address the problems they face regarding the existing livelihood options. With growing demand from the community, a section of the “middle” is trying to fill the gap by implementing various alternatives by creating alliances. Personnel from NGOs and CBOs widely acknowledged the funding apathy for long-term climate change programmes and went on saying

that the big donor agencies are more interested in short-term disaster reliefs whose impacts are rapid and visible. The Chief Secretary of a local NGO stated:

The international agencies rushed with aid and disaster relief to partially ameliorate the sufferings of the people in the immediate aftermath of cyclone Aila. But little has been done with an eye to provide sustainable solutions that address the basic necessities of the islanders for preparing them to handle climate change impacts.

(Interview January 2017, Kolkata)

For them, skill or capacity development of the community to take up new livelihood options is the priority amidst uncertainties. NGOs working in the Sundarbans have taken a few initiatives in developing capacities of the local youth. Some NGOs run vocational training courses like nursing, beautician or electrical works for youth who successfully completed 12th grade in school. Alongside they are also organising computer training for women through Self-Help Groups (SHGs)-based women's cooperatives, specifically to understand banking processes. This is a timely intervention as most women in the islands receive money from their husbands who are seasonal migrants.

However, according to the members of the civil society organisations we spoke with, their initiatives have been adversely affected by erratic funding cycles from the “above”, be it government or the big donor agencies and, in most cases, failed to address the core issues of sustainability. The “above” seems to be more keen to invest in building and construction work or activities that are easily visible rather than on human resource development. This points to the eagerness of the “above” to show off to the islanders, the outsiders and the media, the development activities that happened/are happening through their benevolence and funding. The sinking islands of the Sundarbans including Ghoramara and Mousuni are hotspots of media activities – both domestic and international media. Harms (2018) provides an insightful account of the social consequences of media encounters with the islands and islanders. Film crews that regularly visit these sinking islands produce captivating footage on climate change for global audiences, while at the same time rework the memories of the displaced islanders and often producing new memories by staging acts of remembering in front of the camera. “In both instances, particular pasts are prioritised and imbued with a sense of urgency and relevance to foreign film teams and global audiences” (Harms 2018: 1).

The media, thus, is an important “middle”-level actor in the Sundarbans. The print, electronic and of late several online pages and forums in social media play an active role both as a watch dog and reporting about this deltaic region. In the period before cyclone Aila in 2009, the occasional stories that dotted the pages of the mainstream media were mainly on the Bengal Tigers and projecting the region as a World Heritage site. A senior journalist mentioned in discussions that, cyclone Aila, with its devastating consequences, stunned the media into

realising the vulnerability of the delta region, the climate shocks and the precarious nature of the islanders of the Sundarbans. The media played a major role in highlighting the devastation in the islands, pressured the government into providing immediate relief to the islanders as well as plan for the building and repairing of embankments. However, with time, both media's attention and the state government's attention towards fast tracking of the projects waned. The more recent cyclones Amphan in 2020 and Yash in 2021 have once again brought the media's attention back to the Sundarbans. It could be surmised that media's role and attention as a "middle"-level actor is largely seasonal and waxes and wanes in tandem with the extreme events.

A senior member of the media fraternity who has reported extensively on the region for a long period sums up media's attention on the region in the following words:

Like the government and most other institutions working in the region, the media too is fickle in terms of how to report about the region. The media has somewhat failed in communicating the voices from the region and instead has limited itself to reporting calamities and climate change warnings.

(Interview March 2017, Kolkata)

One could say that the opinion pieces, expert columns and the editorials of the print media have mostly lacked the coherency and consistency of a narrative that would make the decision-makers and decision influencers to give a policy direction to deal with the short- and long-term developments in the Indian Sundarbans. Based on a study of the role of media in the health system of the Sundarbans, Ghosh et al. (2016) argue for the need of sensitisation and awareness raising of the local media so that they can support integration and translation for wider awareness and dissemination related to locally led cooperatives and women's Self-Help Group initiatives.

The Political economy of climate policymaking in the Sundarbans: the disconnected "above"

"Sundarbans as a region is not homogenous in terms of characteristics, dimensions and climate change impacts. Hence a one-size-fits-all approach cannot resolve challenges of the Sundarbans". This was raised by a leading health economist working on the health system of Sundarbans for more than a decade. According to him, one needs to understand that there are "many Sundarbans within the one" (Interview January 2018, Kolkata). A leading NGO person reminded us of the interlinked socio-ecological system of the islands: "Climate change in Sundarbans cannot be separated from its geology, geo-morphology and society". She continued, "Social evolution is unique in Sundarbans which was always centered on its environment. The socio-political

institutions have a crucial role to play now in the present day social transition in Sundarbans accelerated by climate change impacts” (Interview January 2018, Kolkata). A noted ex-bureaucrat of West Bengal said, “Within this perplexing transition, implementers often miss to hit core factors and end up with messy, unsustainable strategies. Policymaking too, is a subject of this differentials” (Interview January 2018, Kolkata).

The above narratives reflect a significant gap in knowledge while making policies for the Sundarbans keeping the dimensions of “many Sundarbans” in mind. “Many Sundarbans” refers to various geographical locations – (a) the coastal pockets; (b) the deltaic Sundarbans and (c) the mainland, each of which is subject to varied impacts of climate change. “In each location climate change impacts are manifested differently and people are responding in the way they are facing it. This knowledge has to be incorporated in the policy making”, stated a senior climate scientist working for decades in the Indian Sundarbans (Interview January 2018, Kolkata).

Evidence suggests that there seems to be a disconnect between scientific knowledge from environmental experts and policymakers. Though both belong to the “above” in our heuristics, they have failed to draw up a coordinated plan for tackling climate change in the Sundarbans. From our discussions with the “above”, it became clear that this has been exacerbated by the lack of motivation and interest in getting connected with each other and build bridges between concerned departments and academia so that they could act in tandem rather than in an isolated manner. “We are more interested to get connected with the community. We have relations with a few bureaucrats but that’s more on a personal note”, stated one leading climate scientist working on the Sundarbans (Interview September, 2017, Kolkata).

The responses from the donor agencies – a part of the “above” – indicate that they too are not keen to get connected with the policymakers. This concerns the overpowering political influence on the development programmes in the state. Almost all the respondents from donor agencies stated that the state government shows little interest in receiving financial and technical support from them despite their repeated facilitation and advocacy.

I am heading the Sundarbans programmes in my organisation; I never took a single penny either from the past Left Front government or from the present government. If I take money from the government then I have to listen to them who do not have any people-centric approach. And if they listen to us, they cannot build bridges, roads and other infrastructural development which is adding to the people’s sufferings, stated a senior programme officer from an international donor agency.

(Interview December, 2017, Kolkata)

The donor agencies are well connected with the “middle”-level NGOs/CBOs for implementing their development programmes. Nevertheless, this parallel

implementation by donor agencies and NGOs appears to be a patch work which is benefitting only a miniscule portion of the people. For example, a local-level NGO working in a particular region in the Sundarbans is the partner for different donor agencies. They use the funds received from different donor agencies for implementing programmes in that particular region where they operate. Other regions in the Sundarbans with similar development challenges remain ignored.

A lacuna has been observed in the short- and long-term planning and preparedness by the government and civil society who are mainly focusing on disaster response. Following the lessons learnt after cyclone Aila in 2009, the state and local administrations seem to be confident that large shocks can be managed through emergency responses. Yet, despite the consensus between the scientists that concrete embankments are not a permanent solution to coastal erosion/storm water surges, there has been a dominant focus on concrete embankments in the policies for the Sundarbans, as discussed in an earlier section. Ground-level implementation of schemes, such as land acquisition for embankments, mangrove conservation and compensation for crop loss due to natural calamities as well as employment of rural youth under livelihood schemes severely lack community knowledge and participation. For example, the people in Ghoramara told us that after severe flood damage, people from some parts of the island affected with land erosion could not claim compensation for crop loss as the affected agricultural land simply disappeared into the sea. Mostly being tenants and due to lack of knowledge regarding legal/formal formalities, the farmers could not produce the required land documents to the government officials. Consequently, the claims for compensation were rejected. One is reminded of the rendering of the “Anti-Politics Machine” by Ferguson, where development actors construct the object of development in order to deliver development (Ferguson 1990). When the “object” of development, in this case, the land with crops on it, vanishes into the deep waters without leaving a trace, the bureaucracy is at a loss to grapple with it and, consequently, compensation is denied to the farmers as they are unable to document the object of development. It would seem that the certainty of citizenship itself is linked to *terra firma* – firm grounds on which people can stand on and make claims on the state. Discussing the case of the island Lohachara in the Sundarbans, which was subject to large-scale erosion and disappearance of villages, Harms (2017) has pointed to the uncertain citizenship rights and entitlements due to coastal erosions. “Environmental degradations involve” (ibid.: 70), what he calls “corrosion of citizenship at the margins” (ibid.: 70).

Concluding remarks

The findings bring to the fore the experiences and understandings of climate-related uncertainties and other vulnerabilities from the standpoint of different actors. The people at the grassroots (“below”) have a clear perception about changes in weather patterns that have occurred over the last five to ten years. Local perceptions of changes in the climate include increased heat, overall

colder winters, reduced and erratic rainfall and frequent floods and cyclones. The “below” is also experiencing negative effects of climatic change on the various livelihood capitals, so much so their livelihood portfolio is characterised by distress diversification – engaging in more risky, more fragile, more capital intensive and less profitable livelihood activities. The local perceptions of climate change were consistent with scientific evidence regarding climate change impacts in the Sundarbans.

The islanders perceive that their current problems are certainly human induced at least in large part. Nature makes their life uncertain but, paradoxically, also had added an element of certainty through their livelihood activities centred on agriculture, fishing and collecting minor forest produce. As discussed in this chapter, islanders are now increasingly forced into distress livelihood diversification due to the diminution of their livelihood capitals. The increasing imposition of restrictions by the government on fishing, prawn-catching and other livelihood activities in the name of “conservation” is also intensifying and reinforcing climate-induced uncertainties.

As we understand from this study, marginalised environments like the Sundarbans call for radical–critical adaptation as well as the strengthening and protection of local ecosystems and biodiversity in a people-friendly and locally appropriate way. We use the term radical–critical adaptation to flag the structural dimensions and the necessity for radical restructuring of the capitalist relations of production towards a more equitable and socio-ecologically just production and distribution system. Vulnerabilities and uncertainties emanate not merely from an externally imposed climate threat but primarily from the historical–political economic–institutional power relations, which engender differentiated experiences and responses to climate change. We have discussed how the socio-ecological marginalities and uncertainties have been historically produced in the Sundarbans at the confluence of the incorporation of the island’s resources into the circuit of global capital and the twin imperatives of conservation and late globalisation. As argued by Taylor (2014), we need to produce ourselves and our environments differently. This calls for a transformation of the current capitalist relations of production. We would argue that, for this to happen, an ideological shift is warranted.

Postscript

Our last field visit to the Sundarbans was in September 2018. Since then, the islanders have faced four catastrophic events – cyclone Bulbul in 2019, COVID-19 and associated lockdowns since early 2020, supercyclone Amphan in May 2020 and cyclone Yash in 2021. In addition to the loss of lives and infrastructure, these have further exacerbated the livelihood uncertainties of the islanders. Livelihood losses include hundreds of livestock and the agricultural produce of nearly half a million farmers. Amphan hit at a time when the communities were already subject to the impact of COVID-19 in terms of lives

and livelihoods (see Ghosh *et al.* 2020). The lockdown has hindered even the “distress diversification” activities including crab catching and fishing around tiger reserves (see Basu 2020). Seasonal migration, the major coping strategy of the islanders, has all but stopped due to the COVID-19 pandemic. Moreover “there has been a steady stream of migrant islanders who are now being forced to return to the delta from different parts of India” (Ghosh *et al.* 2020).⁵ The intersecting nature of these disastrous events are, indeed, devastating for the lives and livelihoods of the Sundarbans islanders, which need further research to unravel the short- and long-term effects.

Notes

- 1 <https://www.thethirdpole.net/en/climate/opinion-to-rebuild-the-sundarbans-india-needs-to-rethink-its-laws/> (accessed on 20.05.2021)
- 2 <https://www.nationalgeographic.com/environment/2019/02/partner-content-transforming-sundarbans/> (accessed on 12.01.2021)
- 3 Mehhta and Bhattacharyya (2020) The Telegraph online, dated 01.07.20, <https://www.telegraphindia.com/opinion/is-concrete-the-way-forward-in-rebuilding-the-sunderbans/cid/1784882> (accessed on 12.01.2021).
- 4 A study of embanked landscapes in the Bangladesh Sundarbans found that the islands enclosed by embankments in the 1960s have lost an elevation of 1.0–1.5 m; and as a consequence when there was large scale breaching of embankments during hurricane Aila, the islands lay inundated for more than two years until the embankments were restored (Auerbach *et al.* 2014).
- 5 Ghosh *et al.* (2020) <https://steps-centre.org/blog/rebuilding-same-or-rebuilding-different-critical-questions-in-the-aftermath-of-cyclone-amphan/> (accessed on 05.02.2021).

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