

12 Climate and community

The human rights, livelihood and migration impacts of climate change^①

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Introduction

Climate change is a global problem. However, between the global forces of climate change and the individual challenges of meeting basic needs, communities are the context in which people experience the effects of climate change and seek to adapt to its impact on their livelihoods. Such adaptation may include permanent migration, and this has certainly been one of the foci of international relations and security politics related to climate change. Of course, such migration will have human rights consequences; and there are also human rights causes of some of this migration, particularly as parts of the planet where people have made their homes and livelihoods become uninhabitable. Of equal importance are the problems related to climate change effects that do not cause mass migration but also have human rights causes and consequences. In this chapter, we use a study in rural Bangladesh to demonstrate the import of the human rights considerations of this second, community-level, impact of climate change on human rights.

Climate change poses new sources of threats to the most basic of human rights concerns. As Kyung-wha Kang, UN Deputy High Commissioner for Human Rights, said in 2008: 'Global warming and extreme weather conditions may have calamitous consequences for the human rights of millions of people ... [U]ltimately, climate change may affect the very right to life.'² Food, water, health, housing and life are basic individual human rights that are all threatened by the anticipated impacts of climate change.³

Even while climate scientists dispute the specifics of the relationship between environmental change and anthropogenic climate change, there is no disputing that Bangladesh is on the 'front line' of climate change impacts. Moreover, because Bangladesh is currently experiencing environmental conditions that scientists argue will become increasingly prevalent with climate change, studying the impacts of certain environmental changes on the people of Bangladesh should provide a better understanding of the potential social, political and economic impacts of climate change.

Migration plays a part in these impacts, but as we will show, its role is interwoven throughout a range of social, political and economic impacts of

or importance

changing environmental conditions. As a way of diversifying sources of livelihood, migration has become a part of the changes in political economy and livelihoods. Thus, to understand the relationships among climate change and migration, we need to understand the ways in which environmental change affects communities. Specifically, we need to understand the dynamics between the built and natural environments and the political economies these sustain.⁴ Community-level political economies affect the sources of income and livelihood available in distressed environmental conditions, and therefore influence how well the people who live there can adapt to changing environmental conditions. To anticipate the argument of the paper, slow-onset environmental changes and disastrous (rapid-onset) environmental events have become features of the underlying political economies of these communities. These complex dynamics (and indirectly environmental changes) are pushing Bangladeshis to incorporate migration strategies into their livelihood strategies, affecting how they do so, and impacting the human rights consequences of these dynamics..

In this chapter we first outline the methods of a multi-site, cross-community transdisciplinary study of the effects of slow- and rapid-onset environmental changes that are similar to those anticipated to be more common and more widespread with climate change. Second, we discuss those findings that are related to one particularly pernicious – and anticipated to be widespread – consequence of environmental and climate change: threats to populations living at sea level. Finally, we argue that the human rights impacts of these environmental changes are integrated throughout the political economy. Thus, addressing the human rights impacts of climate change entails addressing not only environmental change but also the way in which inequalities in the power to influence the local political economy affect human rights consequences of that change.

Transdisciplinary methods

So much of what we anticipate to be the migration and human rights impact of climate change depends on how we understand its effects on the physical environment in dynamic relationship with the local social, economic, political and engineered environment. Therefore, our research is transdisciplinary – across the social and physical sciences – and focuses on identifying the dynamics among these forces rather than on the consequences of these dynamics at a particular moment in time and in a particular place. Based on our preliminary research, we identified a particular place and time when these dynamics were likely to be in evidence.

Site selection: meso-level and transdisciplinary observations

Although we could have organised our study around any number of environmental changes that we expect climate change to accelerate or exacerbate, we focus on those that are relevant to low-lying populations.

South-western Bangladesh is a globally relevant site for studying the localised ways in which certain global trends are experienced because it is a site of enduring poverty, of environmental stresses that are similar to those anticipated from future climate change, of the influence of the global export market for shrimp (which might be considered both an adaptive response to environmental stress and an activity that degrades the environment), of saline ground and surface water (which may become more prevalent with climate change) and of vulnerability to seasonal flooding and cyclone events (which may become more severe with climate change).⁵

During the decade of advancement towards the Millennium Development Goals, the south-west of Bangladesh did not see the improvements that other regions enjoyed. Moreover, even the successes that Bangladesh claims in advancing towards those goals are contested when national averages are disaggregated to reveal severe deficiencies at the seasonal, regional and local levels.⁶ Additionally, when the impacts of climate change are discussed globally, the inhabitants of Bangladesh's low-lying river delta are often identified as the community that is most at risk. In these two ways, south-west Bangladesh is already an important area on the global stage.

In the 1960s and 1970s, following recommendations from the United Nations, and with funding provided by the United States Agency for International Development (USAID) and the Asian Development Bank (ADB), the Bangladeshi government built embankments around the river islands. While each island's boundaries were originally defined by the river's hydrology and sediment deposits over the long geological history of the delta, these islands – or 'polders' as they are called locally – are now defined by the embankments, which were constructed to protect the land from saline inundation during the dry season and from storm surges generated by tropical cyclones.

The findings presented here come from integrated social and physical science research across thirteen communities who live on one small (less than sixty-two square kilometres) diamond-shaped island in south-western Bangladesh (identified as 'polder 32'). Much of the variation in political, economic and social experience that is found across the region is similarly evident on this island. For instance, there are differences in changes in land use related to shrimping and political activity related to resisting shrimping. There is also variability in the national response to the impacts of low-mortality, high-damage cyclones and the impact the storms and recovery efforts have had on local economies. Most graphically, satellite imagery of our region of study before and after a major storm (Cyclone Aila, May 2009) led us to focus our initial study on a district where some communities were left exposed to inundation from tidal waters for more than a year after Aila struck.

The area of study sits just north of the Sunderbans – the largest mangrove forest in the world. This UNESCO World Heritage Site encompasses parts of Bangladesh and the Indian state of West Bengal. It contains valuable natural resources that communities who live adjacent to the Sunderbans have relied on

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for years, including crabs, honey, fish, wood, and golpata palm, which the locals use for their roofs. Access to these resources is generally controlled through permits, although unregulated use continues and is often highly organised.

Reference

Social methods

The social dimensions rely on qualitative data collected before the monsoon season in 2012 and 2013. This time of year was selected because employment opportunities are low, so the opportunity cost to a villager of participating in our research was similarly low. Using multiple qualitative methods, participants were asked to share their observations about changes in rivers, embankments and forms of employment over the course of their lifetime, but their responses generally focused on the preceding decade.

The boundaries of each community were determined using a grounded approach. In a qualitative method called the 'village transect walk', at each site researchers walked throughout the community, asking villagers to identify landmarks, boundaries, neighbourhoods, fields, water sources, the informal adjudicatory authority (shalish), schools and other features.⁷

We used three other qualitative methods that were designed to provide us with a rich understanding of the community dynamics. Key informants were defined broadly as those with particular knowledge of a certain aspect of village life, including each form of livelihood that community members practised. Migrants, day labourers and the unemployed were key informants about their own experiences. Participatory rapid appraisal methods were used to create a village map, a seasonal calendar of employment and a calendar of migration for each village. We supplemented these methods with targeted focus group discussions, usually topically oriented. In each community these included at least one women's focus group.

Triangulation across this range of qualitative data enabled us to develop an understanding of the social, economic, political and environmental dynamics of a village from the villagers' own perspectives.

Physical methods

Two scientific claims are present in the background of this chapter. The first (as discussed earlier) is that the environmental conditions in present-day south-western Bangladesh are likely to become more prevalent with ongoing climate change. The second is that climate change affects people's living conditions. So, for example, while there is a general view that sea levels are rising with climate change, we need to know what this means for the dynamics of the whole environment, not just for the absolute eustatic level of the oceans.

To appreciate this perspective, it is important to note that the deltaic environment of south-western Bangladesh is dynamic and self-organised.⁸ It is perpetually changing due to the supply of water and sediment from the rivers, the energy of tides and storms, and the strong overprint of the

regional monsoon climate's seasonal and annual variability. Thus, perturbations of this strongly interconnected system, whether by humans or nature, lead to a cascade of interrelated adjustments to the network of islands and channels. Typically, the magnitude of such responses scales to that of the perturbation, whereby alterations over larger areas or longer periods of time, or even an aggregation of small-scale changes, will have a correspondingly greater effect on the natural system.

We studied these interacting physical processes, and their relation to human activities, using multiple field methods and remote sensing approaches. In the field, we deployed instruments that collect continuous measurements of water level, temperature, salinity and sediment concentrations. We monitored these attributes in the tidal channels and on the mangrove and poldered landscapes in order to understand how water and sediment are transported through the tidal channels and onto the land, where they help sustain its elevation against rising sea levels. To place this recent snapshot of the physical environment in its proper perspective, we also collected sediment cores that reveal the longer-term decadal–millennial-scale behaviour of the natural landscape. Furthermore, our ground-based observations regarding channel erosion, infilling and changing land cover are supported by spatiotemporal analysis of agricultural land use and coastal processes from a compilation of Landsat (satellite) scenes.⁹

Findings

The dynamics between humans and their environment in coastal Bangladesh are nested among interacting global, regional and local forces, some of which are human-led, some of which are environment-led, some of which are events, some of which are trends. Our study revealed many. We focus on those dynamics that are related to the physical condition of the local landscape relative to local water levels in part because this dynamic is so dominant in shaping the livelihoods of those in the region and in part because, with climate change, this dynamic is expected to become more widespread and to affect previously unaffected areas. Moreover, the migration-related dimensions of these dynamics shed light on the complexity of the human rights implications of climate change.

In presenting our findings, we also make reference to scholarship which suggests that our findings are relevant beyond our particular area of study. The import of our research for human rights, livelihoods and migration lies not in the findings that relate to the consequences of these dynamics for specific people but rather in the generalisable findings about the dynamics themselves.

Slow-onset changes in a dynamic landscape

Multiple forces are affecting the height of the local landscape relative to water levels in adjacent rivers or channels. Without polders, this depends on

how much sediment is carried by the rivers, and the ways in which the rivers and tides determine where these sediments accumulate or decline. Outside the polders, high tide levels, due to a complex set of river dynamics and the polder system itself, prevent water from diffusing across the natural landscape.¹⁰ Inside the polders, land levels are falling relative to the rivers due to the subsidence and sediment starvation of land inside the embankments.¹¹

Poldering changes the dynamics of tides in the rivers and tidal channels, and also changes the erosion, transportation and deposition of sediment. In the natural landscape, the twice-daily inundation by tides deposits fresh sediment and builds the land up as sea level rises or the underlying land subsides. As evidence of this, with no embankments, the land of the Sunderbans is as much as 1.5 metres higher above sea level than many polders that have been embanked. Seasonal inundation is prevented by permanent embankments. The landscape cannot adjust to subsidence or to rising sea levels without the annual supply of sediment, so it may become more vulnerable to catastrophic flooding, should the embankments breach (as happened in 2009). In the course of this century, sea-level rise is expected to exceed the capacity of the natural sediment supply, creating conditions of low land relative to water levels even in unpoldered areas. Human-made sources can contribute to this process in other ways as well. For example, India's planned diversion of the Ganges River is expected to reduce the natural sediment supply substantially, which will increase the threat to the sustainability of the coastal lands.

Outside and between the polders, south-western Bangladesh has been experiencing ongoing river migration and saltwater intrusion. Hence, some present-day agricultural fields used to be within the river channel, whereas others have suffered river erosion and encroachment. These changes have taken place within the lifetimes of young people and are confirmed by satellite imagery.¹²

Rapid-onset changes in a dynamic landscape

In addition to the steady dynamics of change over time, Bangladesh experiences frequent cyclonic storms. On average, severe cyclones strike the coast once every three years. The communities we studied felt the impact of Cyclone Sidr (2007) and were severely affected by Cyclone Aila (2009). Breaches in the external embankments allowed in river water and the force of the storm and subsequent tidal flows eroded internal embankments, too. Because the embankments were erected decades ago, the land within them had subsided; without fresh sediment from seasonal flooding over those decades, it was significantly lower than the river or channel, particularly at high tide. Hence, people could resume neither agriculture nor aquaculture until the embankments were rebuilt. Satellite imagery reveals that land was intertidal in some of the communities affected by Aila, so it continued to be inundated with tidal water for up to ten hours a day more than two years after the storm.

The disaster response to Aila was not immediate, but once it began it included a range of construction projects: embankment reconstruction; road reconstruction; new homes; and a planned community comprising families relocated from a portion of the interior of the polder that would not be restored. All of these construction projects required day labour, much of which was provided by women. This became an important element in many families' livelihood strategies. As we will see in the next section, the availability of day labour is an important aspect of human–environment coupling in disaster-prone areas.

Changing political economy

While migration is part of a complicated story of the effects of environmental change on human rights, it is not a singular part. There are eight main trends in the changing political economy of polder 32 which manifest differently across the communities.¹³ This section will describe these trends and their dynamic relationships with each other, the environmental conditions, and certain dynamics in the broader political economy. They are:

- declining reliance on rice cultivation;
- livelihoods drawn from the Sunderbans and protein sources from household river fishing;
- increasing reliance on seasonal migration;
- local day labour in construction;
- long-term migration to urban settings, usually for factory work;
- cash crops (in the northern communities);
- shrimp cultivation (in the southern communities); and
- seasonal high-yield fishing (for one southern community).

These trends – which feature declines in certain opportunities and increasing reliance on other opportunities – are related to each other and to the environmental factors discussed above, including slow and sudden environmental changes, the availability of external resources, and the construction and management of the embankments. Although we focus on those relating to changing land use and migration in order to highlight the relationship between the changing environment and migration and human rights, the other dynamics are also important to human rights and migration because they influence livelihood opportunities throughout the year. Again, as we stated in our discussion of site selection, the country and region have been experiencing human–environment coupling over recent years. We used qualitative data and analysis to understand the dynamics of this coupling.

Under normal conditions, the difference between the height of the land and the height of the rivers is such that people can control the flow of water onto the land with sluice gates. When opened at high tide, these allow water to run onto the land; when opened at low tide, they let water run off the

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land. Note that the tidal amplitude in much of the region – and around polder 32 – is between 2.5 and 4.5 metres, depending on the season, lunar cycle, storm conditions and specific location within the channel network.

This difference has generated opportunities to expand agriculture or aquaculture. Initially, the embankment system allowed the estuarine islands to become ‘green revolution’ farmland. Rainwater accumulated in ponds and internal canals (created by closing off small channels that had formerly allowed tidal water to move on and off the landscape) during the monsoon season, and this was then used for drinking and irrigation throughout the year.

Declining reliance on rice cultivation

As in many parts of south-western Bangladesh, the groundwater in polder 32 is naturally saline and thus cannot be used to irrigate rice. Conceivably, shrimp farming has the potential to provide livelihood activities during the dry season, when rice cultivation is impossible. However, in polder 32, the seasonal experiment with shrimping and rice cultivation did not work as rice yields declined.

Increased shrimp cultivation

Thus, the embankment system created opportunities for conflict over both control of and responsibility for maintaining the embankments and sluice gates, and consequently over which portions of the polder had access to large stores of fresh water for rice irrigation (and, more recently, irrigation of cash crops; see below) and which aquaculture ponds had access to brackish water. In the late 1980s, the south converted to shrimp cultivation after a storm damaged the embankment and local landowners, afraid that their land might be washed away, invited shrimp industry leaders to lease their land in exchange for repair of the embankment. In the north, other outsiders sought to convert land adjacent to a large interior canal to shrimping. This created shrimp-dependent economies in both the north and the south for a time. However, labourers and landowning elites eventually formed an alliance to end leasing for shrimping in the north. Thus, at the time of our research, the north-east communities had cash crop economies and no shrimping.

Shrimping and rice cultivation affect different populations in different ways. For some, shrimp production is lucrative, generating higher incomes than rice production (although it is unclear how it compares with cash crop cultivation). Outsiders have often used threats of physical violence or other forms of intimidation to secure the leases for shrimp production, and the landowners rarely receive the promised returns. In consequence, some landowners have attempted to establish their own shrimp farms with the goal of securing all of the returns for themselves. Disputes around entitlement to land use have not been conflict free, but we have a duty to protect our

respondents' interests, so we do not include details here. In short, relative political power has influenced how such disputes have been adjudicated.

Furthermore, shrimp production changed the political economy in ways that exacerbated inequalities among poor people. Shrimp aquaculture is much less labour intensive than either rice or cash crop cultivation. Additionally, one important shrimp cultivation job is guarding the shrimp ponds from theft. Concerned about the reluctance of shrimp guards to accuse their fellow villagers, family members or local elites, the shrimp farmers (particularly industrial-scale shrimp farmers) hired people from outside the local community. Thus, low-wage workers were brought in to do the low-wage labour of shrimp farming, displacing locals who would have worked on the same fields if they had been designated for rice or cash crop cultivation. Furthermore, the shrimp industry has a supply chain that does not favour those doing most of the work. Some people earn wages that are comparable to day wages in other sectors – 200–250 taka (about US\$3US) per day. However, at the bottom of the supply chain, those who collect and sell shrimp fry generally sell them to middlemen on a per-shrimp basis and earn less than the typical day wage. In short, the shrimp industry provides low-wage employment for some poor people (though mostly not for locals) and forces others to find other sources of work.

The introduction of shrimp farming caused other shifts in the local political economy that have reduced the options available to those who face a family crisis, such as ill health or a work injury. In a rice economy, people tend to have savings in the form of stores of rice which can be exchanged between households. By contrast, most shrimp farmers make an upfront investment with which they purchase inputs (shrimp fry) from a middleman who then buys the back the fully grown shrimp at a price that was fixed at the time of the loan. Because of this lending structure, some small land-owners convert to shrimp farming after a personal event causes them to borrow money. In this system, the shrimp dealer loans money on the promise of shrimp production, while the need to pay back the loan with interest ties the new shrimp farmer to his lender-dealer.

*Increasing reliance on seasonal migration, local day labour in construction,
long-term migration*

Displaced people may shift to wage labour in the local fishing economy, migrate for seasonal agricultural work, or migrate to work in shrimp processing or garment factories for a few years. Some of these opportunities existed prior to the growth in shrimping. Both kinds of factory work have been supported by growth in these export sectors near the cities.

Shrimping impacts the political economy in additional ways that are not directly connected to the supply chain for shrimp, but rather to the growing trend of seasonal migration. Where rice fields have been converted to shrimp and cash crops, local rice is less available. Families with some savings

send a husband for seasonal employment in rice cultivation in other parts of Bangladesh, including Gopalganj, Dumuria and Norail, for which they are paid in rice. These husbands enable their families to have rice even though they cannot cultivate rice or earn enough money to buy rice at home.

While Cyclone Aila further reduced the range of livelihood options in the region by reducing the availability of day labour in shrimping and agriculture in all but a few communities in the north-east (which were able to return to cash crop production in one season), through an indirect effect the cyclone increased the possibility of seasonal migration – and thus a potential new source of income – for poorer families. There are two costs of seasonal migration: the transportation cost and the cost of sustaining the family in the absence of the migrated worker. A family cannot even consider sending a husband to labour without savings to cover both.

As we saw in the previous section, post-Aila construction projects introduced new day labour opportunities, especially for women. The availability of local work for women facilitated seasonal migration for their husbands, even among families with limited savings. With a wife earning a day wage that was sufficient to feed the family, some families with no savings were able to send their husbands or sons to seasonal agricultural employment. They generally returned with payments in the form of rice. Although the jobs created by post-disaster construction and foreign aid more generally are often much needed, such employment opportunities can be parasitic and/or exacerbate community power dynamics.

The human rights effects of slow-onset and rapid-onset environmental change are mediated by the dynamics of the political and economic rights and their consequences for local employment opportunities. Opportunities for employment through migration form part of these dynamics. Therefore, as we argue in the next section, it is just as important to consider the ways in which human rights conditions affect the impact of environmental change on people as it is to consider the ways in which environmental change affects human rights.

Implications: human rights, livelihoods and migration effects

In this chapter we have focused on the dynamics of environmental and economic change in a region that is currently experiencing environmental conditions that will likely become more widespread in the future. We have provided evidence that there is a firm basis for using a human rights lens for thinking about the injustices caused by climate change. Rising sea levels threaten homesteads and livelihoods; storms threaten homes and lives. However, our discussion also shows that the 'threat' to human rights comes not from particular changes or events, but rather from the dynamics in the political economy that affect the extent to which people can survive such threats. In this conclusion, we highlight the implications of these findings: that while certain rights – to food, water, health, housing and life – are

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threatened by the anticipated impacts of climate change, a continuing absence of democratic and economic rights will exacerbate those threats. We begin by focusing on food, water, health, housing and life, and the role of migration in relation to these, which our data support. We further argue that the human rights implications of climate change are more fully understood if we consider the context of enjoyment of rights.¹⁴

Some of the effects of environmental change on human rights are direct, such as when Cyclone Aila caused loss of life, livestock, livelihoods, homes and drinking water. However, the indirect effects and complex interactions among environmental, social, economic and political conditions, as well as the ways in which power inequalities may be exploited (for example, to effect one's will over land use within a polder), can be even more pernicious. If we focus solely on migration's immediate human rights-related causes, then we miss the more pernicious human rights violations. In the context of mass migration, political inequalities may migrate with communities or affect the distribution of the range of options for community members.

Likewise, we have seen migration function as a way of dealing with environmental change and opportunities for migration facilitated by the political response of construction to environmental disaster. These are also indirect, as when Cyclone Aila destroyed embankments, which created opportunities for local employment, which in turn allowed husbands to migrate for seasonal agricultural work, for which they were paid in rice, so they could feed their families despite the transformation in the local economy from rice farming to shrimping (in the south) or cash crops (in the north) and regardless of fluctuations in the price of staples.¹⁵

In light of the direct and indirect effects of environmental change on human rights and migration, the latter is not only an indicator of human rights violations but also a means of dealing with these violations. This poses difficult challenges for how we study changes in patterns of migration due to slow-onset and rapid-onset environmental change.

In south-western Bangladesh, embankments themselves have no political power, but they can enhance landowners' and the political elite's power to control the range of employment opportunities in their communities, depending on how they are designed and used. By altering the physical landscape, embankments also alter the social, economic and political landscapes by defining the spaces in which people live, travel, farm and fish. By supporting embankment-based climate change mitigation and economic development, the government of Bangladesh and the country's international donors are creating economic opportunities and investing in environmental protection. However, the benefits of these are distributed through existing power structures, such that they might ameliorate or exacerbate existing economic and political power inequalities surrounding the construction, maintenance and control of the embankments.

Both elites and villagers within our study communities both believe that the decision-making related to the construction and use of the embankments

is controlled by political elites locally and nationally and by economic elites locally and in the shrimp industry. A range of actors influence these dynamics. Outside of the community are government officials, foreign donors and lenders, the members of an economic elite who lease shrimp ponds, employ workers in factories or in large-scale agriculture, and the courts that adjudicate on land titles. Inside the community there are local government leaders, water committees, informal adjudicatory bodies, money lenders and other middlemen, and landowners.

The point for human rights considerations is to recognise that the embankments, combined with the complex dynamics of social, economic, environmental and political forces, create or exacerbate potentially exploitable inequalities. By considering the indirect human rights effects of environmental change, we highlight that the threats to human rights are not only threats to individual rights to life, health, food, water and housing, but also threats to democratic political equality. In this study we have seen that the underlying political economies, more than slow-onset environmental changes or disastrous environmental events, are threatening Bangladeshis' human rights and pushing Bangladeshis to incorporate migration strategies into their livelihood strategies. This means that in order for climate adaptation and mitigation strategies to benefit local populations, they must consider their impacts on local political economies, and particularly on the advantages and disadvantages *within those local populations*, as well as across the nation. How these plans are implemented and to whom their management is accountable will have significant impacts on local livelihoods, perception of political security and migration.

Whereas sea-level rise over the past half-century has been sufficiently slow to allow sediment deposition on unpoldered lands to keep up, global warming is expected to accelerate sea-level rise to unprecedented rates, such that large areas are likely to be inundated, regardless of local land-use practices. This change implies that in many places the socio-ecological dynamics over the coming century are likely to be very different from those of today.

As sea-level rise accelerates, embankments may be insufficient to preserve many of the coastal islands, and entire populations may be displaced. The inequalities in these communities will be one of the challenges to their resettlement. A much greater fraction of Bangladesh's population lives further inland, where we expect the dynamics we describe here to play out with greater intensity in the future. The interplay between environmental change and the changing social, political and economic context of affected communities will vary from place to place and over time, but the importance of this interplay will remain crucial to understanding the impacts of and responses to environmental change and their human rights implications.

The environmental changes witnessed in south-western Bangladesh – erosion of land, infilling of waterways, and increasing threat of flooding and saline inundation from the coast, floods and cyclones – are just some of the conditions that are expected to increase with climate change. By focusing on the

dynamics of the indirect causes of human rights implications of these changes and of their relationship to other social, economic and political dynamics that are not explicitly related to climate change, we can see the importance of addressing climate change as a matter of development and justice and not considering these as discrete areas of expertise or policy design. Climate change policy that does not take into account the justness of the development plans it includes will exacerbate the human rights-violating consequences of climate change, not ameliorate them. Migration will be part of this story, but not an unmediated solution to the problems associated with climate change.

Notes

- 1 This chapter shares insights published in Bangladesh: B. Ackerly, M. Anam and J. Gilligan, 'Environment, Migration and Adaptation: Evidence and Politics of Climate Change in Bangladesh' in B. Mallick and B. Etzold (eds), *Environment, Migration and Adaptation: Evidence and Politics of Climate Change in Bangladesh* (AHDPH 2015).
- 2 Human Rights and Equal Opportunity Commission (HREOC) *Background Paper: Human Rights and Climate Change* (2008) 1.
- 3 UN General Assembly, 'Agenda Item 2' (2009) A/HRC/10/61 HRC.
- 4 This research is part of ISEE Bangladesh (www.vanderbilt.edu/ISEEBangladesh) a multi-disciplinary, multi-university (Vanderbilt, Columbia, Dhaka, Khulna, and Jahangirnagar) project studying community and regional resilience to environmental change in the context of coastal Bangladesh. The partnership is funded by the US Office of Naval Research (Vanderbilt IRB approval 120454). The study includes the study of the sedimentology, hydrology, sociology, economics and politics in historical perspective from qualitative and quantitative sources. Additional data collection and analysis are still ongoing. Other persons whose efforts significantly contributed to the data analysed in this article include Leslie Wallace Auerbach (physical), John Ayers (physical), Sayed Md Saikh Imtiaz (social field research), Bishawjit Mallick (social) and Anna Carella (social). Preliminary research by Bina D'Costa and Gouranga Nandy was essential for site selection.
- 5 See, for example, H. Murakami, M. Sugi and A. Kitoh, 'Future Changes in Tropical Cyclone Activity in the North Indian Ocean Projected by the New High-Resolution MRI-AGCM' in M. Mohapatra *et al.* (eds) *Monitoring and Prediction of Tropical Cyclones in the Indian Ocean and Climate Change* (Springer 2014) 253–271.
- 6 L. Benneyworth *et al.*, 'Drinking Water Insecurity: Water Quality and Access in Coastal South-Western Bangladesh' (2016) 26(5–6) *International Journal of Environmental Health Research* 1; T. Gunda, L. Benneyworth and E. Burchfield, 'Exploring Water Indices and Associated Parameters: A Case Study Approach' (2015) 17(1) *Water Policy* 98.
- 7 Generally, the meso-level is between large-scale macro forces, such as economics, politics and social norms, and the micro-scale of individual economic, political and social interactions. For the purposes of this study, the meso-level is synonymous with community, which we define as indicated in the text through those sharing geographic, political and social institutions and activities. We will argue that, despite formal entitlements in law, human rights may or may not be enjoyed in communities. See B. A. Ackerly, 'Human Rights Enjoyment in Theory and Activism' (2011) 12(2) *Human Rights Review*; B. A. Ackerly and J. M. Cruz, 'Hearing the Voice of the People: Human Rights as if People Mattered' (2011) 33(1) *New Political Science*; B. A. Ackerly, J. Gilligan and S. Goodbred, 'From

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 - 9 <http://landsat.usgs.gov> accessed 25 October 2016.
 - 10 J. Pethick and J. D. Orford, ‘Rapid Rise in Effective Sea-Level in Southwest Bangladesh: Its Causes and Contemporary Rates’ (2013) 111 *Global and Planetary Change*.
 - 11 L. W. Auerbach *et al.*, ‘Flood Risk of Natural and Embanked Landscapes on the Ganges–Brahmaputra Tidal Delta Plain’ (2015) 5 *Nature Climate Change*.
 - 12 Ibid. Details in supplementary data (C. Wilson, S. Goodbred, C. Small, J. Gilligan and S. Sams, ‘Widespread Infilling of Tidal Channels and Navigable Waterways in Human-Modified Delta Plain of Southwest Bangladesh’, submitted to *PNAS Sustainability Science*).
 - 13 Our observations are consistent with a longitudinal study of land use in one village (A. M. S. Ali, ‘Rice to Shrimp: Land Use/Land Cover Changes and Soil Degradation in Southwestern Bangladesh’ (2006) 23(4) *Land Use Policy*) and a comparative study of disaster and migration in two villages (C. L. Gray and V. Mueller, ‘Natural Disasters and Population Mobility in Bangladesh’ (2012) 109(16) *Proceedings of the National Academy of Sciences*). Studies by NGOs seek to explore the complexity of these dynamics and their impact on rights (Environmental Justice Foundation (EJF), *A Nation under Threat – the Impacts of Climate Change on Human Rights and Forced Migration in Bangladesh* (2012)). Due to the combination of physical and social data, we are able to provide insights into these dynamics as they relate to each other.
 - 14 S. Caney, ‘Human Rights, Responsibilities, and Climate Change’ in C. R. Beitz and R. E. Goodin (eds), *Global Basic Rights* (Oxford University Press 2009); Environmental Justice Foundation (EJF), *Climate Change Migration Human Rights* (2011). For a review of UN human rights resolutions and reports related to the environment and human rights, see <http://srenvironment.org/un-documents> accessed 25 October 2016.
 - 15 On the rights-based dimensions of changes in the global food economy, see B. A. Ackerly, *Just Responsibility: A Human Rights Theory of Global Justice* (Oxford University Press forthcoming).