Climate and community: the human rights, livelihood, and migration impacts of climate change[1]

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Abstract

Climate change is a *global* problem. Food, water, health, housing, and life are basic *individual* human rights. However, *between* the global forces of climate change and 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 certainly, this has 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 human rights causes to some of this migration as well. Of equal importance, but gaining less attention, are the problems related to climate change effects that do not cause mass migration, that may include short-term seasonal migration, and that 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. We find that the human rights impacts of slow and rapid onset environmental change are a function of democratic, social, and economic rights, that is, those human rights that are best understood as enjoyed *through* political community are equally worthy of our rights attention because they are essential to climate change adaptation.

Introduction

Climate change is a *global* problem. However, *between* the global forces of climate change and 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 certainly, this has 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 human rights causes to some of this migration as well, 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 that 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.

[1] This essays share insights published in Bangladesh, Brooke Ackerly, Mujibul Anam, and Jonathan Gilligan, "Environment, Political Economies, and Livelihood Change," in *Environment, Migration and Adaptation: Evidence and Politics of Climate Change in Bangladesh*, ed. Bishawjit Mallick and Benjamin Etzold (Dhaka: AHDPH, 2015).

Climate change poses new sources of threats to the most basic of human rights concerns:

> Global warming and extreme weather conditions may have calamitous consequences for the human rights of millions of people… ultimately, climate change may affect the very right to life.
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> - Kyung-wha Kang, UN Deputy High Commissioner for Human Rights[2]

Food, water, health, housing, and life are basic *individual* human rights that are 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 "frontline" of climate change impacts. Moreover, because Bangladesh is currently experiencing environmental conditions that scientists argue will become increasingly prevalent with climate change, by studying the impacts of certain environmental changes on the people of Bangladesh, we can gain a better understanding of the potential impacts of 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 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 environment 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 in them 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 a part 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 affecting 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

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[2] HREOC 2008 Background Paper Human Rights and Climate Change, 1.

[3] United Nations, General Assembly, GA Res A/HRC/10/61 HRC, 10th session, Agenda item2 (15 January 2009).

[4] This research is part of ISEE Bangladesh, http://www.vanderbilt.edu/ISEEBangladesh/about.php, a multi-disciplinary project, 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 U.S. 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 is still ongoing. Other persons whose efforts significantly contributed to the data analyzed 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.

those findings related to one particularly pernicious and anticipated to be wide-spread consequence of environmental and climate change, threats to populations 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 taking on 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 impacts of climate change depend on how we understand their effects on the physical environment in dynamic relationship with the local social, economic, political, and engineered environment. Therefore, our research is transdisciplinary across social and physical sciences and focuses on identifying the dynamics among these forces rather than on the consequences of these dynamics at a moment in time and 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 organized our study around any number of environmental changes which are expected to be accelerated or exacerbated by climate change, we focus on those relevant to low-lying populations.

Southwestern Bangladesh is a globally relevant site for studying the localized ways in which certain global trends are experienced because it is a site of enduring poverty, of environmental stresses 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 also become more severe with climate change.[5] During the decade of advancement toward the Millennium Development Goals, the southwest of Bangladesh did not see the same improvements that other regions did. Moreover, even the successes Bangladesh claimed in advancing toward those goals become dubious when national averages are disaggregated to reveal severe deficiencies at the seasonal, regional, and local levels.[6] Additionally, when countries discuss the impacts of climate change globally, they often cite the populations of the low-lying river delta of Bangladesh as those at the greatest risk of being significantly affected. In these two ways the region of southwest Bangladesh is already important on the global stage.

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[5] See, e.g., 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), pp. 253-271.

[6] L. Benneyworth et al., "Drinking Water Insecurity: Water Quality and Access in Coastal South-Western Bangladesh," *Int J Environ Health Res* (2016); Thushara Gunda, Laura Benneyworth, and Emily Burchfield, "Exploring Water Indices and Associated Parameters: A Case Study Approach," *Water Policy* 17, no. 1 (2015).

In the 1960s and 70s, following recommendations from the United Nations, and with financing from the United States Agency for International Development (USAID) and the Asian Development Bank (ADB), the government built embankments or "polders" around the river islands. While each island's boundaries were originally defined by the rivers' 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 embankments constructed to protect the land from saline inundation during the dry season and from storm surges generated by tropical cyclones typical to the region.

The findings presented here come from integrated social and physical science research across thirteen communities on one diamond shaped island of less than 62 square kilometers in southwestern Bangladesh. Much of the variation in political, economic, and social experience found across the region generally could be witnessed in this one island. These included differences in changes in land use related to shrimping and political activity related to resisting shrimping. They included variability in the national response to the impacts of low-mortality, high-damage cyclones and the impact the storms and recovery efforts had on local economies. Most graphically, satellite imagery of our region of study before and after a major storm (cyclone Aila May 2009) drew us to focus our initial study on a place where, affected by the same storm, some communities were left exposed to inundation from tidal waters for more than a year following Aila.

The area of study sits just north of the Sunderbans mangrove forest, the largest mangrove forest in the world. The UNESCO World Heritage Site covers parts of Bangladesh and the Indian state of West Bengal. It contains valuable natural resources that communities abutting the Sunderbans have relied on for years, including crabs, honey, fish, wood, and *golpata* palm which locals use to build their roofs. Access to these resources is generally controlled now through permits, although unregulated use continues and is often highly organized.

Social methods

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

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

[7] Generally, the meso-level is between large scale macro forces such as economics, politics, and social norms, and the microscale 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 are enjoyed or not in community, Brooke A. Ackerly, "Human Rights Enjoyment in Theory and Activism," *Human Rights Review* 12, no. 2 (2011); Brooke A. Ackerly and Jose Miguel Cruz, "Hearing the Voice of the People: Human Rights as If People Mattered,"

We used three other qualitative methods designed to provide us with a rich understanding of the community dynamics. Key informants were defined broadly as those with particular knowledge of an aspect of village life, including each form of livelihood that community members relied upon. Migrants, day laborers, 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' perspectives.

Physical methods

There are two scientific claims functioning in the background of this chapter. The first is that the environmental conditions in the region are like those anticipated to be more broadly experienced with climate change (we discussed this argument in the section above on climate change, community and Bangladesh). The second is that these changes affect the living conditions of people. So for example, while there is a general view that sea level is rising with climate change, we need to know what that means for the dynamics of the 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 southwest Bangladesh is dynamic and self-organized,[8] changing perpetually with the supply of water and sediment from the rivers, the energy of tides and storms, and the strong overprint of seasonal and annual variability of the regional monsoon climate. 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, 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 level. To

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New Political Science 33, no. 1 (2011); Brooke A. Ackerly, Jonathan Gilligan, and Steven Goodbred, "From Coastal Bangladesh: Climate Change, Migration and the Importance of Community Level Analysis for Using Human Rights to Guide "New" Legal Frameworks," *Prepared for the Climate Change and Migration: Knowledge, Law and Policy, and Theory, ISCH COST Action IS1101* (2012).

[8] Hugh Brammer, "After the Bangladesh Flood Action Plan: Looking to the Future," *Environmental Hazards* 9, no. 1 (2010); "Bangladesh's Dynamic Coastal Regions and Sea-Level Rise," *Climate Risk Management* 1 (2014).

place in perspective this recent snapshot of the physical environment, we also collected sediment cores that record longer-term decadal to millennial-scale behaviors of the natural landscape. Further, our ground-based observations regarding channel erosion, infilling, and changing land cover, are supported by spatiotemporal analysis of agriculture land use and coastal processes from a complete 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. In this chapter, we focus on those dynamics 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 wide spread and to effect areas previously unaffected. 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 that suggests that our findings are relevant beyond of our particular area of study. The import of these findings for human rights, livelihoods, and migration is not the *particular* findings related to consequences of these dynamics on specific people but rather the generalizable findings about the dynamics themselves.

Slow-onset changes in a dynamic landscape

There are multiple forces effecting the height of the local landscape relative to water levels in their adjacent rivers or channels. Without polders, this depends on how much sediment is being carried by the rivers and the ways the rivers and tides determine where these sediments accumulate or erode. Outside the polder high tide levels due to a complex set of river dynamics and due to the polder system which prevents 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 changes the erosion, transport and deposition of sediment. In the natural landscape, the twice-daily inundation by tides constantly 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 m higher above sea level than many polders that have been embanked. With permanent embankments, seasonal inundation is prevented. Without the annual supply of sediment, the landscape cannot adjust to subsidence or rising seas and may thus end up more vulnerable to catastrophic flooding should the embankments breach (as in 2009). In the course of this century, sea-level rise is expected to exceed the capacity of the natural sediment supply, thus creating conditions of low land relative to water levels even in unpoldered lands. Man-made sources can

[9] http://landsat.usgs.gov/.
[10] John Pethick and Julian D. Orford, "Rapid Rise in Effective Sea-Level in Southwest Bangladesh: Its Causes and Contemporary Rates," *Global and Planetary Change* 111 (2013).
[11] Leslie Auerbach Wallace et al., "Flood Risk of Natural and Embanked Landscapes on the Ganges-Brahmaputra Tidal Delta Plain," *Nature Climate Change* (2015).

contribute to this process in other ways as well. For example, India's planned diversion of the Ganges river is expected to substantially reduce the natural sediment supply, thus threatening sustainability of the coastal lands even more acutely.

Outside and between the polders, southwestern Bangladesh has been experiencing on-going river migration and saltwater intrusion. This means that some people report that present-day agricultural fields used to be part of the river channel, whereas others note that the river has eroded their land and family homestead. These changes have taken place within the living memory of young people and are confirmed by satellite-based observations.[12]

Rapid-onset changes in a dynamic landscape

In addition to the steady dynamics of change over time, experiences cyclonic storms. Severe cyclones strike the coast of Bangladesh an average of once every three years. The communities of this study felt the impact of cyclone Sidr (2007) and were severely affected by cyclone Aila (2009). Breaches in the external embankments let in river water and the force of the storm and subsequent tidal flows eroded internal embankments as well. Because the embankments were put in decades ago, the land within the embankments had subsided and, without renewal of sediments from seasonal flooding over those decades, was significantly lower than the river or channel, particularly at high tide. Until the embankments were rebuilt, people could resume neither agriculture nor aquaculture. Satellite imagery reveals that in some communities affected by Aila, land was intertidal and, therefore, inundated with tidal water for up to 10 hours a day more than two years after the storm.

The disaster response to Aila was not immediate, but once it started it included a range of construction projects: embankment reconstruction, road reconstruction, new homes, and a planned community comprised of families relocated from a portion of the interior of the polder that would not be restored. All of these construction projects required day labor, much of which was able to be done by women and became an important part of many families' livelihood strategies. As we will see in the next section, the availability of day labor is an important piece of human-environment coupling in a disaster-prone area.

Changing political economy

While migration is part of the 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; these manifest differently across the communities.[13] We describe them

[12] Ibid., details in supplementary data. Wilson. C., Goodbred, S., Small, C., Gilligan, J., and Sams, S., submitted. Widespread infilling of tidal channels and navigable waterways in human-modified deltaplain of southwest Bangladesh. submitted to PNAS Sustainability Science.

[13] Our observations are consistent with a longitudinal study in one village on land use Abu Muhammad Shajaat Ali, "Rice to Shrimp: Land Use/Land Cover Changes and Soil Degradation in Southwestern Bangladesh," *Land Use Policy* 23, no. 4 (2006). and comparative study of two villages on disaster and migration C. L. Gray and V. Mueller, "Natural Disasters and Population Mobility in Bangladesh," *Proceedings of the National Academy of Sciences* 109, no. 16 (2012). 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," *Environmental Justice Foundation, London. ISBN No. 978-1-904523-26-0* (2012).. Due to

and their dynamic relationship 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 and *increasing reliance* on seasonal migration, local day labor in construction, long-term migration to urban settings usually for factory work, cash crops (in the communities in the north), shrimp cultivation (in the communities in the south), and seasonal high-yield fishing (for one community in the south). These trends in declining of 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 building and management of the embankments. Although for the purposes of highlighting the relationship of the changing environment to migration and human rights, we focus on those relating to changing land use and migration, the other dynamics are also important to human rights and migration as 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-environmental coupling. We used qualitative data and analysis to understand the dynamics of this coupling.

Under normal conditions, the difference in the height between the land and the rivers is such that people can control the flow of water onto the land with sluice gates which, when opened at high tide, let water run onto the land and when opened at low tide, let water run off the land. Note the tidal amplitude in much of the region and around polder 32 is between 2.5 m and 4.5 m depending on the season, lunar cycle, storm conditions, and location within the channel network.

This difference produced opportunities to expand agriculture or aquaculture. Initially, the embankment system allowed the islands of an estuary to become part of the green revolution farmland. During the monsoon season rain catchment in ponds and internal canals (created by the embankments' closing off small channels that formerly allowed tidal water to move on/off the landscape) enabled people to have the necessary sweet water for drinking and irrigation throughout the year.

Declining reliance on rice cultivation. As in many parts of Southwestern 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. 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 irrigation for rice (and more recently, cash crops discussed below) and which aquaculture ponds had access to brackish water. In the late 1980s, the south converted to shrimp after a storm damaged the embankment and local land owners, afraid of their land being washed away, invited shrimp industry leaders to lease their land for shrimping in exchange for reparation of the embankment. In the north, other outsiders sought to convert land adjacent to a large interior canal to shrimping. This yielded shrimp dependent economies in the north and south. However, laborers and land owning elites collaborated to end leasing for shrimping in the north. Thus, at

the combination of physical and social data, we are able to provide insights into these dynamics as they relate to each other.

the time of our research, the communities of the northeast had cash crop economies and no more shrimping.

Shrimping and rice cultivation affect different populations differently. For some, shrimp production is lucrative, higher than that for rice; it is unclear how it compares with cash crop cultivation. Outsiders sought to lease land for shrimp production, often using physical threats or other intimidation to secure the leases and not returning to the land owner the full promised returns. Landowners then sought to do shrimp farming independently with the goal of securing the returns for themselves. Disputes around entitlement to land use were not conflict-free, though in the interest of protecting our respondents we do not include details. In brief, relative political power influenced how disputes were adjudicated.

Further, shrimp production changed the political economy in ways that exacerbated inequalities among people in poverty. Shrimp aquaculture is much less labor intensive than rice or cash crop cultivation. Additionally, one of the jobs required in shrimp cultivation is guarding the shrimp ponds from theft. Concerned about the inability of shrimp guards to accuse fellow villagers, family members, or local elites lead shrimp farmers (particularly industrial scale shrimp farmers) to hire people who are not from the community. Thus low-wage workers from outside of the village are brought into do the low-wage labor of shrimp farming, displacing locals who would have worked the same fields had they been engaged in rice or cash, crop cultivation. Further, the shrimp industry has a supply chain that did not favor those doing most of the labor. Some people work for wages, which are comparable to day wages in other work, 200 to 250 taka (~$3US/day). However, at the bottom of the supply chain, those who collect and sell shrimp fry generally sell to middlemen on a per-shrimp basis and earn less than the typical day wage. In short, among people in poverty, shrimp provides employment for some (though mostly not for locals) and forces others to find other sources of livelihood.

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

Increasing reliance on seasonal migration, local day labor in construction, long-term migration. Those displaced may shift to wage labor 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 cities.

Shrimp 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 Gopalgonj, Dumuria, and Norail for which they are paid in rice. These husbands enable their families to have rice even though at home they cannot cultivate rice or earn enough money to buy rice.

While Cyclone Aila further reduced the range of livelihood options in the region by reducing the availability of day labor in shrimping and agriculture in all but a few communities in the north east which were able to be restored to cash crop production in one season, through an indirect effect, it increased the possibility of seasonal migration as a 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. Without savings to cover both of these, a family cannot send a husband to labor.

As we saw in the previous section, after Aila construction projects introduced new day labor opportunities of which women were able to take advantage. The availability of local work for women facilitated seasonal migration for men, making it possible even for families with limited savings. With a wife earning a day wage enough to feed the family, some families without savings can then send a husband or son for seasonal agricultural employment, generally returning with payment in the form of rice. Though the jobs created by post-disaster construction and foreign aid more generally are needed, when part of external aid, these employment opportunities are parasitic on or exacerbate the community power dynamics related to the distribution of aid and work opportunities.

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 employment opportunities locally. Opportunities for employment through migration are part of these dynamics. Therefore, as we argue in the next section, it is 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 experiencing environmental conditions that mirror those anticipated by climate change. 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 threatenhomes 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 – food, water, health, housing, and life – are threatened by the anticipated impacts of climate change, lack of democratic and economic rights exacerbate those threats. In this section, 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 this now commonplace[14] by arguing that the human rights implications of climate change are more fully understood if we consider the *context* of right enjoyment.

[14] Simon Caney, "Human Rights, Responsibilities, and Climate Change," in *Global Basic Rights*, ed. Charles R. Beitz and Robert E. Goodin (Oxford: Oxford University Press, 2009); Environmental Justice Foundation, "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/, last accessed August 15, 2016.

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

Likewise, we have also 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 also are indirect as when cyclone Aila destroys embankments, which with aid creates the opportunity for local employment, which creates the opportunity for a husband to migrate for seasonal agricultural work which enables him to be paid in rice so that they can feed their family rice despite the transformation in the local economy from rice farming (to shrimp in the south and cash crops in the north) and regardless of the fluctuations in the price of staples.[15]

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

In southwestern Bangladesh embankments themselves have no political power, but they can exacerbate the relative power of land owners and political elite to control the range of employment opportunities in their communities, depending on the way 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 will live, travel, farm, and fish. By supporting embankment-based climate change mitigation and economic development, the Government of Bangladesh and their international donors are creating economic opportunities and environmental protection. However, the benefits of these are distributed through existing power structures such that these might ameliorate or exacerbate existing economic and political power inequalities surrounding the construction, maintenance, and control of the embankment.

Both elites and villagers within our study communities interpret the decision-making related to the construction and use of the embankments as controlled by political elites locally and nationally and by economic elites locally and in the shrimp industry. Let's review the range of actors influencing these dynamics. Outside of the community are government officials, foreign donors and lenders, economic elite who lease shrimp ponds, employ workers in factors or in large scale agriculture, and courts that adjudicate land title. Inside the community there are local government leaders, formal local administration and leadership, water committees, informal adjudicatory bodies, money lenders and other middlemen, and land owners.

[15] On the rights-based dimensions of changes in the global food economy see Brooke A. Ackerly, *Just Responsibility: A Human Rights Theory of Global Justice* (Oxford: Oxford University Press, 2017 forthcoming).

The point for human rights considerations is to recognize that the embankments, combined with complexity of the 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 Bangladeshi's 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, particularly on the advantages and disadvantages *within the local populations*, as well as across the nation. How these plans are implemented and to whom their management is accountable will have an impact on local livelihoods, perception of political security, and migration.

Whereas sea level rise over the past half-century has been slow enough that sediment deposition on unpoldered lands can 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 in the coming century are likely to be very different from those of today.

As sea level rise accelerates, embankments may not be sufficient to preserve many of the coastal islands, and their 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 will 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 southwestern 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 expected to exacerbate with climate change. By pushing us to focus 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 taking on climate change as a matter of development and justice and not consider these as separable areas of expertise or policy design. Climate change policy that does not take into account the justness of the development plans they include will exacerbate the human rights violating consequences of climate change, not ameliorate them. Migration will be a part of this story, but not an unmediated solution to the problems associated with climate change.