

# Climate-related migration in rural Bangladesh: a behavioural model

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**Abstract** Research into the climate change and migration nexus has often focussed solely on how people move in response to the impacts of variability and change in climate. This notion often ignores the nature of migration as a tried and tested livelihood choice amid a variety of socio-economic and environmental opportunities and limitations. This paper closely looks at the behavioural aspects of migration decision-making in Bangladesh in the context of changes in its economy, and, increasingly, exposure to the impacts of climate variability and change. We find that villagers in areas particularly affected by increasing climatic stresses and shocks are diversifying their traditional livelihood strategies by migrating. Environmental factors, including climatic stresses and shocks, often make such shifts even more necessary. Although the migrants' primary motivation is better income, in effect, migration becomes an effective form of adaptation. Based on a qualitative study in three geographically distinct places of Bangladesh, we propose that migration is a socially acceptable behaviour that occurs in the context of perceived environmental change and climate variability. Migration decisions are mediated by a set of 'behavioural factors' that assesses the efficacy of different responses to

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opportunities and challenges, their socio-cultural acceptance and the ability to respond successfully. This understanding has policy relevance for climate change adaptation, in terms of both how migrants are perceived and how their movements are planned for.

**Keywords** Climate change · Hazards · Cognitive model · Adaptation · Decision-making · Planned behaviour

## Introduction

In the past decade, different aspects of the climate change–migration nexus have received international academic attention. Research has focused on numbers and patterns of future migration (Conisbee and Simms 2003; Renaud et al. 2007; Warner et al. 2009), the role of migration as an adaptation to climate change (Tacoli 2009; Foresight 2011) and mobility outcomes of environmental stresses and shocks, including extreme events (Findlay and Geddes 2011; Black et al. 2013; Penning-Roswell et al. 2013). However, looking for a linear and deterministic relationship between environmental changes and migration can be misleading (Curran 2002). Understanding the effects of changing climatic patterns on migration cannot on its own provide a convincing basis to predict future migratory behaviour (Black et al. 2011). Such prediction, even in the form of rough estimates, requires a much broader understanding of socio-economic realities and behavioural aspects of people moving in the context of environmental change.

Among the intertwined strands of migration research, one that has gained particular currency in poorer countries is the sustainable livelihoods approach (Scoones 1998), which acknowledges the role of five kinds of capital, namely human, financial, physical, social and natural, in influencing migration decisions and outcomes (Hunter and David 2011; De Sherbinin et al. 2008). While engaging in farming, fishing, herding, hunting or off-farm work, people address their livelihood risks through diversification, investing for future security. Changes in the environment, along with demographic shifts, work opportunities and the vulnerabilities of the people, influence livelihood patterns. Nang Rong studies (e.g. Entwisle et al. 2005, 2008, 2011) have shown that resource shortages, coupled with population pressure, could evoke a range of behavioural responses, including migration. Processes such as loss of forests, soil degradation, depletion of watersheds or drought could undermine livelihoods and prompt individuals to choose a set of strategies, including migration (Bilsborrow 2009). People diversify their income sources to reduce risk and ensure food security (Ellis 2000). ‘Pull factors’ such as better wages in cities compared with livelihood options in villages encourage people to migrate (Carr et al. 2009).

In such a context, migration decision-making involves a reasoned response embedded in livelihood patterns, cultural expectations, gender, historical contexts, values and individual choices in the migrants’ life course (Gardner 1981, 2009). Differences in age, stages in the migrant’s life course, gender and human capital, including social networks, determine migration patterns. Under different

environmental outcomes, migrants tend to follow culturally appropriate behavioural patterns by adopting acceptable and desirable activities (De Sherbinin et al. 2008). Thus, while the utilitarian value of place and wage differentials across geographies contributes to the push and pull factors, decision-making could also involve environmental stresses, place utility, locational characteristics and imperatives and expectations of modernisation (Hunter 2005). Social relations as well as behavioural responses mediate how communities respond to environmental pressures, including changes in land-use practices (Bilsborrow and Okoth-Ogendo 1992).

While shortages, hazards and population pressure are relevant in the case of Bangladesh, this paper focuses on the decision-making process when migration is foremost a livelihood strategy undertaken amid multiple opportunities, stresses, shocks and above all, uncertainties. This paper does not probe the extent to which climate change and variability contribute to migration decisions, but instead examines the whole process in a dynamic setting, in which environmental changes and climate variability are entwined with livelihood opportunities and limitations. Conceptually, this perspective follows research on non-equilibrium systems in which social patterns of behaviour co-evolve with a physically, demographically, economically, socially and politically changing environment (Scoones 2004; Rammel et al. 2007; Kniveton et al. 2012). In a nutshell, it acknowledges that climate change and migration are interwoven with other societal processes (McLeman and Smit 2006).

The place chosen for the study is Bangladesh (Fig. 1), recognised as a country highly vulnerable to stresses and shocks associated with climate variability and change, yet also with a rapidly growing economy (World Bank 2012). Its geographical position, low altitude, exposure to tropical cyclones and sea-level rise, a high population density and widespread poverty, with a heavy dependency on natural resource-based livelihoods (Agrawala et al. 2003), make the country unique for such a study. Past climate shocks have affected lives and livelihoods here on a large scale (Narayan et al. 2000). Future climate shocks and stresses are predicted to increase flooding, riverbank erosion and salinisation of water and soil (Laczko and Aghazarm 2009; Sarraf et al. 2011). The country is prone to cyclones and flooding. Eighty per cent of its land area consists of floodplains of major rivers, including the Padma, Brahmaputra and Meghna. There have been catastrophic floods in 1974, 1987, 1988, 1998, 2004 and 2008. In 1998, the flood affected 69 % of the total land area (Sarraf et al. 2011). Multiple displacements are common characteristics of the riverine islands formed of silt, called chars (Zaman and Weist 1991).

Past studies in Bangladesh have focused on how the process of migration helps people escape from seasonal deprivation (Chowdhury et al. 2009), offsetting the impacts of natural hazards (Hunter 2005; Penning-Rowsell et al. 2013), gaining better social and economic status (Gardner 2009) and the projected effects of climate change (Tickell 1989; Hassan 1991; Homer-Dixon and Percival 1996; Myers 2001). Recent studies have examined complexities involved in determining the sensitivity of climatic factors in migration. When village-based farming and fishing are sensitive to climatic stresses and shocks (Rahman and Alam 2003; Rahman et al. 2007) as well as demographic and economic pressures (Black et al. 2011), people resort to short- or long-term migration. The motives and patterns of



**Fig. 1** Map of Bangladesh, showing the study areas

migration could vary—it could be pre-harvest, seasonal migration (Chowdhury et al. 2009; Siddiqui 2009) or short-distance movement following floods (Findlay 2012), riverbank erosion, cyclones, food shortages (Poncelet 2007), freshwater scarcity or soil salinity (Sarraf et al. 2011). A recent finding, however, notes that flooding is not a strong driver of the long-term mobility as crop failure is (Gray and Mueller 2012). Longer-term migration could be driven by livelihood stresses (Findlay and Geddes 2011) or a need to gain better socio-economic status (Gardner 2009). As people in climate-sensitive areas increasingly adopt secondary livelihoods that are not depended directly on natural resources (Ahmad 2012), there is an increasing trend of urban migration (Afsar 2003, Planning Commission 2011). As climate models forecast more rains and an increase in river run-off in Bangladesh,

flooding, riverbank erosion and salinisation of water and soil could increase (Laczko and Aghazarm 2009; IPCC 2012; Sarraf et al. 2011), thus leading to more migration (Foresight 2011).

In such a context, this study is based on the behavioural dimensions of climate-related migration, but moves forward into the realm of cognitive analysis (Leiserowitz 2006, Kuruppu 2009; Kniveton et al. 2011, 2012; Reckien et al. 2013). A study of perceptions and cognitive processes that shape responses of climatic stresses and shocks can contribute to an understanding of differential responses to the same stimuli by different population groups. People's response to hazards is often determined by the way they perceive the risks involved they pose (Hunter 2005).

Yet, given the characteristic of climate change as something that moves beyond current trends of variability to a fundamentally different state characterised by extremes and uncertainties, there is a gap in understanding how people will respond to longer-term and more persistent pressures on livelihoods. In many situations, such a shift has not yet occurred, or where it has, it implies a different reaction to one in which 'bad' years are followed by 'good' ones. In such a context, the opportunity no longer exists to buffer household capacities to withstand shocks and stresses in one year with the benefits of another. Thus, the phenomenon of climate change raises issues for migration on two fronts. In real time, the impacts of climate could influence the economic, social, political, demographic and environmental drivers of migration (Foresight 2011) and the ability of individuals and households to respond to these drivers. On another plane, longer-term concerns about the consequences of climate change, especially about the sustainability of local livelihoods, could spur adaptive or pre-emptive action. In this context, qualitative data collection allows a relatively stronger psychological exploration of the possible implications of the future influence of climate change on migration through an attitudinal and psychological lens (Piguet 2010). It reveals the villagers' own perceptions about their vulnerabilities (Miller et al. 2010) and the options open to them.

In this paper, we outline the findings from a set of qualitative field surveys in Bangladesh designed to elicit facts, behavioural patterns and attitudes of people who are exposed to high levels of environmental stresses and shocks, but also increasingly to potential opportunities from a growing economy. In particular, the paper explores the attitudes towards climate threats and livelihood choices in a transforming world. In the following '[A behavioural approach to migration and climate change](#)' section, we look at the role of cognition in understanding the climate change–migration nexus and in shaping behavioural responses. '[Study area and research methods](#)' section covers the methods used to gather the qualitative information, followed by the findings of this study in '[Findings](#)' section. Finally in '[Discussion and conclusions](#)' section, we summarise these findings and point at their relevance to policy-making.

## **A behavioural approach to migration and climate change**

This paper uses the behavioural framework, partly influenced by the new economics of labour migration theory (Stark and Bloom 1985). It postulates that migration decisions are not made by migrants acting alone, but by collectives like families or households to

maximise expected income, minimise risks, offset market losses and leverage labour opportunities (Stark and Levhari 1982; Stark 1984; Massey et al. 1993). Migration involves a decision-making process to change the future; it is influenced by the variability in the environment as well as characteristics of the migrant, including his/her position in the life cycle along with factors such as gender and socio-economic status (Wolpert 1965). While migration could involve a household-level decision to improve income, a quest for social mobility, search for a better place to live, it is determined by a perceived linkage between migration behaviour and rewards in a new location (De Jong and Fawcett 1981). Though migrating from a village to a city may not always lead to formal jobs or comparatively better living conditions, it still helps the migrants deal with temporary disruptions or reduction in earning back home (Stark and Levhari 1982). Individual values and attitudes (Ritchey 1976), feelings and an exercise of independent will or agency (Stark and Bloom 1985) play a role in migration decision-making. Social structure of communities, and individual migrants' characteristics and status within the structure also have an effect on migration (Ritchey 1976).

Building on earlier behavioural research, this study more closely looks at socio-cognitive variables that influence people's motivation and their decision-making patterns under uncertainties (Grothmann and Patt 2005). This line of research draws from behavioural economics and social psychology (e.g. Tversky and Kahneman 1991; Ajzen and Fishbein 1980). While cognitive research tends to focus on individual-level decision-making, it could also explain human systems such as households, communities, cities or even developing countries adapt to climate change (Grothmann and Patt 2003). In terms of people's response to climate change, Grothmann and Patt (2005) presented the model of private proactive adaptation to climate change (MPPACC). It separates out the psychological steps involved in the responses and identifies factors that enable or inhibit adaptive action or safety responses in the face of threats. The model identifies risk perception and perceived adaptive capacity as key factors in this regard. Kniveton et al. (2011) developed this model further to produce the conceptual model of migration adaptation to rainfall change (MARC) to represent the individual migration decision-making and related input components that shape an agent's decision to migrate under changing rainfall conditions. The MARC model was divided into four component levels: structural, institutional, individual and household.

Further developed to explore the nexus of migration and climate change (Smith et al. 2010), this conceptual approach takes its theoretical basis from the social psychological theories of reasoned action and planned behaviour (Grothmann and Patt 2003). First proposed by Ajzen and Fishbein (1980), the theory of reasoned action recognises attitudes as just one determinant of behaviour within a network of predictor variables. It proposes that the proximal cause of behaviour is behavioural intention, a conscious decision to engage in a certain behaviour. Making up this behavioural intention is the attitude towards the behaviour and the subjective norm (defined as the belief that a significant other thinks that one should perform the behaviour and the motivation to please this person or persons). By extending the theoretical model to incorporate the additional parameter of perceived behavioural control, Ajzen (1991) created the theory of planned behaviour. Intended to aid

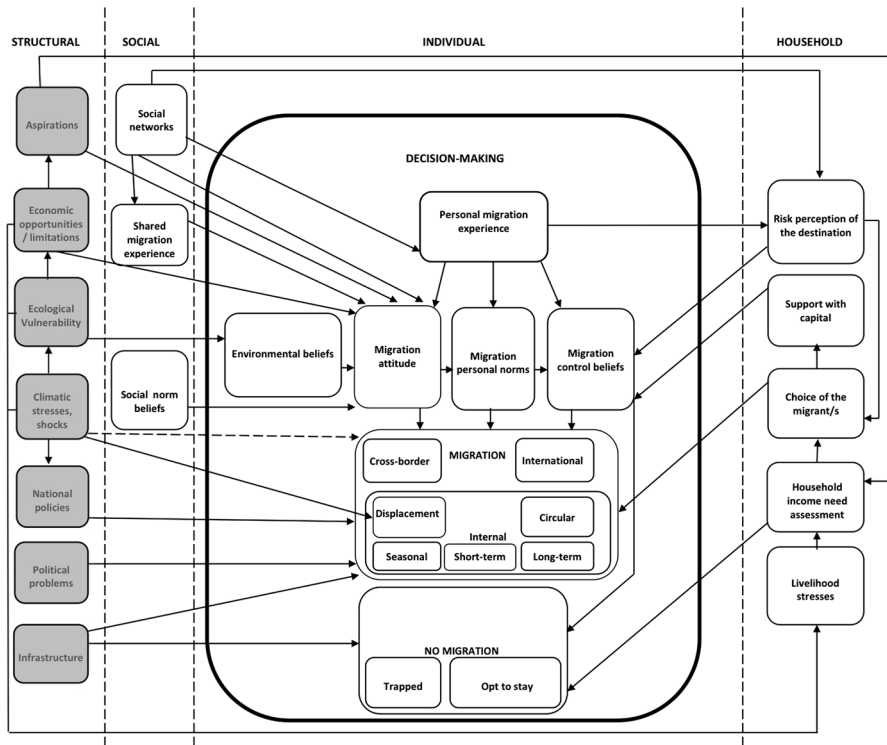
prediction of behaviours over which a person does not have complete voluntary control, perceived behavioural control was conceptualised as the expected ease of actually performing the intended behaviour.

Including attitudes towards a behaviour, a subjective norm and perceived behavioural control (as well as the beliefs held by an individual that make up these components), the theory of planned behaviour can be used to effectively break down the reasoning process relating to the development of a behavioural intention making migration decisions. Thus, within the theory of planned behaviour, the intention to perform a behaviour is treated as a direct antecedent of the behaviour in question and is driven by an individuals' perceived behavioural control, attitude towards the behaviour and subjective norms. Attitudes are thought to represent an evaluation of the perceived consequences of behaviour and likelihood of outcomes, whereas social norms can be thought of as accepted standards conveyed by peers, family, community or society.

Based on the literature on cognition discussed above, in this study we look at people's attitudes to both migration and climate change via their perception of environmental threats. However, unlike in the above work by Smith et al. (2010) and Kniveton et al. (2011), we de-emphasise the link between climate change and migration. Instead, we conceptualise migration as a process that can occur with or without environmental stresses and shocks, but possibly influenced by such a context of variability and change. We propose that decisions are made on the basis of a set of behavioural factors, of which the perceived likelihood and severity of environmental threats (environmental beliefs) are possibly one influence. Beliefs broadly denote the attitudes of people, especially when they regard something as true (Schwitzgebel 2011), and involve some description of how people learn, update theorise and model the world they live in (North 2010). The factors considered in the study are described below:

- a. Environmental beliefs: Perceived probability and severity of threat posed by the impacts of climatic stresses and shocks and environmental change.
- b. Behavioural factors:
  1. Migration attitudes: assessment of migration options and their efficacy as a livelihood choice
  2. Migration control beliefs: generalised expectations about the extent to which people think they can control events that affect them (locus of control, as explained in Rotter 1966; Leviston et al. 2011) and the perceived resources available for migration
  3. Migration personal norms: self-concept as opinion leader, perceived level of risk and innovation; and
  4. Social norm beliefs: perceived trust in and influences of sources of advice, traditions and cultural factors

This study thus argues that it is not only a cost–benefit (Massey et al. 1993) or even a risk-resilience (Wisner et al. 2004) calculus that matters in livelihood decision-making, but also the ways in which people perceive changes and response options and act according to the socio-cultural acceptance of choices before them.



**Fig. 2** A model of migration decision-making

To put it succinctly, migration decisions involve multiple causes, influences and individual agency, mediated by social norms, traditions and cultural backgrounds. Behind each individual decision to move out or stay put is a ‘unique combination of experiences, biases, assets and perceptions’ (Kniveton et al. 2011) that explains the heterogeneity of migration decisions across a community. The model we propose (Fig. 2) explains the individual decision-making process that takes into account the environmental beliefs and behavioural factors listed above, along with personal migration experiences. These elements are influenced by household and social characteristics, norms and beliefs as enabling and limiting factors that operate at a broader structural level. The decision to migrate could mean different scales of movement across time and space, and not to migrate could mean choosing to do so, or being unable to move or, to put it bluntly, being ‘trapped’ (Foresight 2011).

## Study area and research methods

### Study area

Three districts of Bangladesh were selected for qualitative data gathering, and 14 villages were chosen in these districts on the basis of their exposure to different



climatic stresses and shocks and environmental change generally prevalent in the area—mainly drought, floods, cyclones, salinity intrusion and riverbank erosion. The field sites were selected on the basis of their exposure to hazards and prevalence of migration, and they are not necessarily representative of the overall ecology of Bangladesh. We drew lessons from the literature that deals with causes, patterns and consequences of migration in Bangladesh and on the diversification of livelihoods (e.g. Amin et al. 1998; Kuhn 2003; Chowdhury et al. 2009; Gardner 2009; Penning-Rowsell et al. 2013). On the basis of the literature, including synthesis reports (Walsham 2010; Foresight 2011), we identified climatic threats and identified three districts with distinct geographies (see Fig. 1). The first district, Chapai Nawabganj, is located in the north-west region of Bangladesh under Rajshahi division, and villages here are exposed to seasonal droughts and floods (Habiba et al. 2011). In the second district, Satkhira, belonging to the Khulna division in the south, the villages selected were severely affected during Aila and Sidr, two most devastating cyclones and storm surges in recent times (DMB 2010; Azad et al. 2011). The third district, Munshiganj, is part of Dhaka division close to the central part of the country, and villages selected here suffer floods and riverbank erosion (DMB 2010) (see Table 1).

Chapai Nawabganj: Two upazilas (subdistricts) were selected in this north-western district for fieldwork—Nachole and Shibganj. Two villages from each

**Table 1** Field study villages and their hazard profile

<i>Munshiganj District</i>	
Lohajong upazila	
Kolma	Riverbank erosion and regular floods in monsoon
Mandra	Flood-prone
Sreenagar upazila	
Bhagyakul	Riverbank erosion plus flood in monsoon
Sirajdikhan upazila	
Charipara	Flood-prone
Char Sonakanda	Flood-prone
Dakerhati	Flood-prone
<i>Chapai Nawabganj District</i>	
Nachole upazila	
Mohanohil	Drought-prone
Kheshba	Drought
Shibganj upazila	
Chorpka	Riverbank erosion, flood and drought
Durlogpur	Riverbank erosion, flood and drought
<i>Satkhira District</i>	
Shyamnagar upazila	
Gabura	Cyclone, coastal erosion and salinity
Khailashbonia	Cyclone, coastal erosion and salinity
Paddapukur	Cyclone, coastal erosion and salinity
Khutikata	Cyclone, coastal erosion and salinity

upazila were taken. Nachole is a part of barine land or natural highlands. The barine land extends to several other districts such as Naogaon and Rajshahi. Being part of barine land, drought is a chronic problem in Nachole. The ground water level here is declining. Currently, water can be found 150 feet down though it was at 70 feet 15–20 years earlier, according to the local people. Local communities in Nachole said they experience water scarcity for at least 6 months from mid-November to mid-June. The other field site, Shibganj, is located on the river Padma. Two villages from a char area were selected for fieldwork. Formed of silt, surrounded by water most of the year, these areas are low-lying and prone to flood and erosion. The villages are located along Bangladesh's border with India on the north-west of the country, 20 km away from Shibganj upazila headquarters, reachable only by a 2-h motorboat ride. Local villagers said that in the last 40 years riverbank erosion has led to serious losses of land, including agriculture fields. The village remains flooded for at least 3 months during the monsoon season, making it impossible to cultivate during this period.

Satkhira: In this southern district, the coastal Shyamnagar upazila was selected for fieldwork. Four villages belonging to two unions, Gabura and Paddapukur, were studied. These unions are located about 15 km away from Shyamnagar upazila headquarters, very close to the largest mangrove forest, Sundarbans, and the Bay of Bengal. Both the unions are surrounded by three rivers, accessible only by boat. They are vulnerable to tropical cyclones, soil salinisation, erosion and coastal flooding. The current level of salinity is too high to cultivate food crops. Cyclone Aila of 2009 had devastated these unions, destroying houses and farms, uprooting trees. They still have a desert-like look with few trees.

Munshiganj: Munshiganj district shares its border with Dhaka. Three upazilas were selected for fieldwork, Lohajong, Sreenagar and Sirajdikhan. Lohajong and Sreenagar stand by the river Padma, highly vulnerable to erosion. The fields here are low-lying and vulnerable to regular flooding. Sirajdikhan stands by the river Dholeshwari. It is also low-lying and vulnerable to regular flooding during the monsoon season.

## Research methods

Data gathering methods included 14 village surveys and focus group discussions followed by 20 semistructured interviews. Village surveys elicited basic information including geographical characteristics of the area, population, livelihood, educational institutions, health care facilities, types of environmental hazards and crop patterns. Focus group discussions covered livelihood patterns of the local people over the past 40 years, climatic and non-climatic events during the period, their impact on livelihoods, current concerns and migration trends. The questions about climatic stresses and shocks included flood, drought, riverbank erosion, salinity of the soil and cyclones, based on recent synthesis reports that dealt with projected impacts of climate change (Walsham 2010; Sarraf et al. 2011). The focus groups comprised community leaders and elders. Individual in-depth interviews elicited detailed information on the migrants and their households, and how their livelihoods changed over the last 40 years. The focus was on factors that drove people to

migrate and to the extent to which climatic stresses and shocks influenced the migration patterns. The interviews probed cognitive aspects of the migration decision-making. They included questions on the problems the interviewees faced, the potential of migration to solve them, the perceived severity of climatic stresses and shocks and the perceived effectiveness of responses, including migration. They also covered family and social attitudes to migration, social networks that facilitated movement, locus of control, risk-taking and trust in advice given by family, friends and official as well as private organisations.

It may be noted that these questions are largely about people's perceptions of changes around them and their impact on their lives and livelihoods. There has been no attempt to verify these observations against actual climate data or test their validity as it is beyond the scope of this study. However, we refer to the literature to give the bigger picture of changes and responses. This study is limited to recording and analysing perceived changes that influence migration decision-making. Similarly, no attempt has been made to discern long-term trends that could be proven as climate change—we have clustered year-to-year variability in hazards and longer-term trends to understand their impact on migration decisions. These observations may not be considered as proof for climate change impact or otherwise.

## Findings

In this section, we cluster the findings from the village information, focus group discussions and individual interviews under two broad categories, namely environmental beliefs and behavioural factors. The first section involves people's perceptions about changes in their environment and climate, stresses and shocks therein. This narrative is followed by further analysis of the way people see the impact of these changes on their livelihoods. The idea here is not to test the climate sensitivity of migration, but to get a nuanced picture on how migration decisions work under perceived changes in the environment. The second section elaborates further on the behavioural aspects by analysing the migration decision-making process. We break up the process, as described above, into migration attitudes, migration control beliefs, migration personal norms and social norm beliefs, based on focus group discussions and individual interviews. Modifying the MARC model (Kniveton et al. 2011), we conceptualise individual migration decision-making process with input components and influences from structural, social and household levels (See Fig. 2).

### Environmental beliefs

#### *Perceptions of environmental change, stresses and shocks*

There are certain similarities across the three geographies studied in the way people felt about environmental changes, including climate variability and possible signs of climate change. One common feature is irregular rainfall that interferes with

farming. Focus groups in two villages each in Chapai Nawabganj and Satkhira and three villages in Munshiganj mentioned this aspect as something that ‘affects’, ‘damages’ or ‘threatens’ farming. The perception in general is that rainfall is insufficient for agriculture, even in places that are threatened by floods. The respondents used the terms ‘unpredictable’, ‘irregular’ and ‘decreased’ to describe the rainfall trends. Rain gauge observations show irregularities—an increase in March–May rainfall by 3.4 % and a decrease in June–August rainfall by 1.7 % between 1960 and 2003 (Karmalkar et al., n.d.). Looking into the future, heavier and more erratic rainfall in the Ganga, Brahmaputra and Meghna system during the monsoon season is likely to make floods and erosion worse even as most models predict a wetter future for Bangladesh (Sarraf et al. 2011; Dasgupta et al. 2011; Immerzeel et al. 2013).

In the three regions studied, people reported that they felt the temperature is rising, especially during summer. ‘This year heat is extremely intolerable’, said a villager in Chapai Nawabganj. Thermometric observations show an increase in the number of hot days and nights with mean minimum and maximum temperatures increasing by 0.15 and 0.11 °C per decade, respectively, from 1960 to 2008 (Shahid et al. 2012). In Chapai Nawabganj, the perception is that drought has become more severe over the past decade with, for example, a number of tube wells drying up. One respondent said: ‘The water level is going down day by day. Now water can be found 160 feet down. Ten years ago the layer of water could be found 100–120 feet down’. In the barine areas, drought is a perennial problem. In Chapai Nawabganj, the villagers called water stress a ‘crisis’, a notion that finds mention in policy documents as well (WARPO 2006). Even while the rainfall patterns change, scientists ascribe the drought in this region also to the reduced inflow of fresh water, the over-extraction of groundwater and prolonged drainage congestion (WARPO 2006). India’s Farakka barrage that became operational in 1975, roughly 16.5 kilometres from the international border close to Chapai Nawabganj district, is also thought to be responsible for restricting the river flow, causing a northward movement of the salinity line and degradation of mangrove forests (WARPO 2006; Swain 1996). In the delta areas of Satkhira, the villagers said that Cyclone Aila left fields waterlogged for many months leaving soil and aquifers salinised. The salinity, they said, is also making farming impossible.

Flood and riverbank erosion are two other common problems that the respondents reported from all the three regions. In Munshiganj and Chapai Nawabganj, the 1998 flood is considered the worst calamity in recent years. The flood affected 15 million people in Bangladesh (EM-DAT 2012a). People in all the three regions felt that there could be more crop failure in the coming decades due to floods. At Bhagyakul in Munshiganj district, people said that riverbank erosion had made floods even more fearsome. For example, local people noted that since 1975–1976 the River Padma has eroded its banks, widening to two miles, submerging almost half of village by 1984. In Kolma, Munshiganj, the villagers said that erosion is a regular feature, leading to migration of 2 % of its population permanently to cities. While in 1987–1988 a few new chars emerged, from 2004 to 2005, erosion became devastating during 2006–2007. In the nearby Charipara, part of village submerged during the same period, displacing 40 households to a neighbouring village, leaving only 100 families in the original place,

as the villagers narrated. According to the literature, riverbank erosion destroys homes and farms (Zaman 1989), displacing 50,000–200,000 people in Bangladesh every year (Mehedi 2010). A mid-1980s study in Kazipur subdistrict showed that two-thirds of the inhabitants of the Jamuna-Brahmaputra floodplain experienced displacement at least once, about 17 % thrice and 15 % ten times (Hutton and Haque 2003). Newer studies suggest that erosion in general is likely to increase (Sarraf et al. 2011).

In Gabura, the villagers said that Cyclone Aila of 2009 was the most devastating event in recent times. It flooded the whole delta village that is surrounded by rivers. The risk perception of those interviewed was that the frequency and/or intensity of cyclones has increased in the last few decades. In the coastal villages, cyclones pose a major threat because of their geographical reach and lingering after-effects. Cyclone Sidr of 2007 caused 4,234 deaths and 55,282 injuries and affected livelihoods of 8.9 million people (EM-DAT 2012b). Aila caused 190 deaths and 7,103 injuries and affected 3.9 million people (EM-DAT 2012b). Aila's wind speeds ranged from 74 to 120 kmph (NASA 2009). Current estimates suggest that cyclonic storm surges might cover an additional 15 % of the coastal area in the next 50 years (Sarraf et al. 2011).

The emerging picture shows that people in different regions of Bangladesh have expressed concern about rising temperature, uncertain rain and dipping groundwater levels. In some cases such as delta islands exposed to cyclones and erosion, people feel that such shifts are drastic. Such observations come in the context of Bangladesh facing gradual onset climate-related stresses and sudden shocks, including water shortage, cyclone, floods and coastal/delta erosion (MOEF 2005). During 1991–2010, it was among the top ten countries in terms of exposure to extreme weather events (Harmeling 2012). The perceptions of local people in this study often tally with published scientific data. It suggests that there is possible confluence between traditional knowledge and scientific assessments (Adger et al. 2011). In the following section, we examine to what extent these experiences and perceptions of risk influence the migration decisions of people.

### Behavioural factors

The question is how the experiences and perceptions of environmental change and the risks they pose to safety and livelihood security shape people responses. We focused on migration as a response that individuals, families and communities undertake. The findings described in the narratives below show that people carefully consider the pros and cons of their responses to climatic and stimuli, though their decisions depend primarily on a set of socio-economic and cultural factors. We break up the behavioural components associated with this decision-making into migration attitudes, migration control beliefs, migration personal norms and social norm beliefs.

#### *Migration attitudes: assessment of migration options and their efficacy as a livelihood choice*

Our focus group discussions and personal interviews probed to what extent migration becomes an option for better livelihoods and the behavioural factors that

influenced the decision to move. Across the study regions, the respondents said there has been a shift away from farming over the past four decades. Their forefathers were farmers, who sometimes engaged in fishing and, in the Sundarbans mangrove areas of Satkhira and elsewhere in the delta region, collection of forest produce. The new generation has adopted livelihoods ranging from shrimp farming and vegetable selling to seasonal migration and commuting daily for casual labour or small trade in a town or a city. One man could work as a farmer, rickshaw puller, seasonal migrant, a daily worker in town, toy seller and so on, depending on the season, the need for money and job availability.

Migration patterns, however, differed across geographies. In the char areas of Chapai Nawabganj, migration has been a way of life, as the villagers narrated. In Chorpka, a village on the river Padma inhabited since the 1980, for instance, annual floods last 3–4 months and erosion affects farming, so job opportunities are limited. At least 10 % of the households depend on internal migration, as the villagers noted. A 35-year-old woman here told her story: ‘In 1998 we were displaced due to flood and riverbank erosion. At first we migrated from Radhakantapur to Sohimullah village. Again we faced the same disasters in 2000, 2004 and 2008 there, so we came to Chorpka village’. Her husband tried to start a ferry service in a village called Dinajpur, failed, moved to Chittagong and then moved to Mymensingh. ‘There is no other way to fight hunger’, she said. ‘Besides, we need good savings for our children’s study... Marriage of three daughters is also a tension for both my husband and me’.

In Chorpka and Durlogpur, villagers said they used to cross the Indian border five kilometres away to work in rice fields or to trade in goods and cattle. The villagers said that a border fence and tighter patrolling since 1995 have restricted this movement and that there has been an increase in migration to other districts within Bangladesh hence. In the barine highlands of Chapai Nawabganj, drought drives migration: ‘Economic hardship is the main reason behind my decision of migration... In the village, in a year jobs are available only for 6 months in the agricultural land due to drought’, a migrant farmer said.

Elsewhere, environmental changes coupled with economic opportunities have led to a shift away from agriculture as the focus groups revealed. In Munshiganj district, affected by frequent floods and riverbank erosion, such a shift can be clearly seen. At Charipara, for instance, the share of farmers in the village population has reduced from 60 to 30 % and fisherfolk from 25 to 15, as the villagers noted. In the nearby Mandra village, the number of farmers has ‘reduced drastically’. Elsewhere in the district, at Dakerhati, 75 % of the people pursue farming, unlike 30 years ago when everybody practiced it as the villagers recalled. At Chor Sonakanda, the proportion of farmers has reduced to 80 % of the total population. The devastation caused by the 1988 flood and continuing riverbank erosion that inundates fields further accelerate such a shift from farming. Erosion leads to displacement too. In 2007–2008 because of erosion, 30 families had to leave Charipara, the villagers said.

However, most people do not acknowledge such a direct link between hazard risks and a shift from farming livelihoods. At Dakerhati in Munshiganj, a village that suffered floods in 1988, 1998, 2004 and 2007, a 30-year-old carpenter said: ‘I

was unemployed before migration. My migration was driven by my desire to lead a better life, not by any natural calamity’. In this village, over the past 10–15 years internal and international migration has been a way of life. In the focus group here, however, people said they did not see migration as a solution to the problem of environmental hazards, except for landless labourers, who move to cities and towns during the lean season. Migration, instead, is seen as a way to improve the household income. The narratives do acknowledge climatic stresses and shocks, their changing nature. The respondents also take into account the need to diversify and enhance income. Though an inference could be made that migration could be indirectly linked to the way people experience and perceive climatic stresses and shocks, they often do not make that linkage. However, in the case of sudden changes—such as loss of land due to erosion or flooding due to a cyclone—people acknowledge migration as a coping strategy.

The distance and duration of migration differ across the study areas. Migration could be internal as in most of the villages studied, or international too as it is prevalent in Munshiganj. In Charipara village of Munshiganj, 10 % of people work abroad, mainly in the Gulf countries, Singapore and Malaysia according to the villagers. In Mandra, about 40 % of the households have one or more migrants working abroad. At Bhagyakul, in the same area, 50–60 % of the households have an international migrant, the local villagers said. In Mandra, the villagers said the most popular destination for day trips is Dhaka, the capital city that can be reached in 20 min by bus. Some people migrate to work in garment factories in Gazipur and Narayanganj districts, networking through those already working there. From Bhagyakul, some men migrate to Chittagong to sell utensils and silver- and plasticware. While internal migration from Munshiganj is not as pronounced as in the other regions, the district also serves as a destination point for migrants from the coastal belt of south-western Bangladesh as well as the drought-prone northern districts such as Kurigram and Rangpur (Ahmad et al. 2012).

The respondents acknowledged that disasters caused abrupt, unplanned movement. For instance, in Satkhira, Cyclone Aila and the storm surge it caused led to sudden displacement of local villagers in 2009, forcing people out of their low-lying delta villages to other places on a higher plane, sometimes to clusters of temporary shacks built on riverbank embankments. A villager in Gabura recalled: ‘My shrimp farm was destroyed. My livestock, utensils and other materials were washed away. One of my relatives died’. Three years hence, Aila’s legacy lingered on as the villagers could not grow paddy in their farms due to salinity left by the storm surge. ‘Food is scarce. We need to buy everything due to salinity of the soil... poverty, monetary crisis, scarcity of fuel to cook...’. Men still spend winter months, when there is no farming in the area, migrating to towns and cities. Earlier, only 10 % of the people migrated, but after the cyclone, 50–60 % of people moved for temporary or seasonal work in other districts such as Gopalganj, Jessore, Khulna, Magura, Bagerhat, Madaripur, Munshiganj and Dhaka, the villagers said. A ban on shrimp farms and irregular rainfall has also contributed to an increase in migration, the villagers said. Some shrimp farmers had let in saline water by breaching the embankments, leading to an even worse impact due to the 2009 storm surge, the villagers added. It led to

a ban on aquaculture in the area. Some of the responses shared visions of a bleak future of the place: ‘Due to regular floods people almost cannot do anything during that time. It has no opportunities to do any business’.

The macrolevel picture of the migration trends described by the respondents is reflected in recent literature. The government of Bangladesh acknowledges a sharp increase in migration to cities (Planning Commission 2010). Even with a range of rural development measures that have made agriculture more productive and rural income generation activities diverse (Planning Commission 2011, 2012), migration still continues in line with an international trend of diversification of rural livelihoods, including mobility (Tacoli 2011). For an average village household, the share of income from farming dropped from 59 to 44 % between 1987–1988 and 1999–2000, with services and remittances making up 35–49 % of income (Afsar 2003), labour force from the countryside driving city-based growth (Toufique and Turton 2002). Transition from poverty in the country still has been dominated largely by higher income within the farming sector, not by shifting (World Bank 2012). Close to 80 % of Bangladesh’s population lives in villages, 54 % working in farms and the rest in rural non-farm sector. Agriculture (including crops, livestock, fisheries and forestry) accounts for 21 % of the national GDP, the non-farm sector, driven largely by agriculture, another 33 % (World Bank 2013).

Set against this socio-economic context, migration is becoming a means to offset losses suffered and to earn more, overall contributing to resilience of rural communities. People living in climate-vulnerable regions, especially, try out secondary livelihoods that are not dependent on natural resources (Ahmad 2012). Faced with price hikes and wage drops during pre-harvest intervals, farm labourers often do other work or migrate to cities (Chowdhury et al. 2009), where jobs are easier to find than in villages (Afsar 2003). Migrants often join the informal economy of cities for casual labour or to pull rickshaws. Sometimes women migrate to work. Garment factory work in cities gives adolescent girls a transition period from childhood, instead of early motherhood as it might happen in a traditional village setting (Amin et al. 1998). In this context, Kuhn (2003) has identified two waves of migration in Bangladesh. Poor village households send a family member to a city, or households that have lost their village-based livelihoods often move out to a new place, migration becoming an adaptive option in both cases. We argue that migration is a planned move for adaptation, except in the immediate aftermath of extreme climatic or environmental events, when it could be a coping strategy.

### *Migration control beliefs: expectations and perceived resources*

The above section showed that migration decisions tend to be adaptive and deliberate; however, the migrants do not always believe that they are in full control of their situation. Uncertainties about the future include reduced scope for farming, changing global markets and financial strain, besides environmental and climatic stresses and shocks. The question is whether people feel in control of their destiny under such circumstances marked by uncertainty and do not feel as if they were mere pawns in the hands of fate. Interviews revealed a rather nuanced pattern of control beliefs. Many of those interviewed said that the success of household lies



mostly determined by factors outside of their control, suggesting an external locus of control. Most of the interviewees strongly agreed to the statement: ‘Many times I feel that I have little influence over the things that happen to me’. There were comments to the effect that ‘God determines everything’. Most of the interviewees also agreed or strongly agreed to a related statement, ‘No matter what things I try to make a living in my village, the drought/flooding etc. prevents them from working’. They tend to more or less agree with all the locus of control statements except the one that said despite short-term difficulties due to weather and commodity prices individual can stay ahead in the game. This result suggests a low locus of control. However, in the context of adaptive action taken by the people—namely the wide basket of livelihood activities, different forms of migration and so on—it seems this sense of helplessness does not prevent people from taking decisive action.

As explained above, migration decisions take into account various socio-economic factors in a context of hazards that are often multiple. A seasonal migrant in his late 40 s from Satkhira district responded: ‘I am still struggling to find (my) livelihood. If I can work I can eat but this is pitiful at this age. Riverbank erosion is taking away my land. Cyclone Aila destroyed my trees and resources. Now I do not have any resources’. Another man in his mid-40 s, also from Satkhira, expressed similar sentiments while engaging in farming, collecting forest produce, selling vegetables and grocery and migrating. Three months after Cyclone Aila, he and his two sons migrated to Munshiganj, looking for wage labour. His father had sold his 33-decimal land to meet family expenses. ‘I tried many ways to become successful in different livelihood activities, but failed. Natural calamities are also a big reason for this failure along with human-made policies’, he said. In the drought belt of Chapai Nawabganj, a migrant rickshaw puller in his early 40 s said: ‘Crops often failed in the drought season. My father was a sharecropper. But due to lack of irrigation facilities he could not grow crops round the year. Over the years he failed to pay his dues to the land owner, was burdened with debt, and started working as a day a labourer. I also do the same’. Even while narrating these stories of helplessness in the face of an uncertain climate, meagre resources, inadequate infrastructure and the lack of a social safety net, the respondents revealed the power of human agency in taking effective adaptive action such as migration. Migration is a choice they make in the face of adversities or opportunities. For a 30-year-old respondent in Munshiganj, leaving the farms in his flood-prone village to become a carpenter was clearly a choice for better earning. ‘My migration was driven by my desire to lead a better life, not by any natural calamities’, he said. These observations are in line with findings reported in the literature. Subjective or perceived adaptive capacity, or what an individual or a community thinks it can do, given the availability and access to resources, is as important as objective adaptive capacity, or what can actually be done (Grothmann and Patt 2005). Specifically, studies in the delta areas of Bangladesh have shown that a belief that disaster occurrence is in the hands of God does not prevent people from preparatory action (Alam and Collins 2010). In the way people frame the narrative of climate, environment and migration, the focus group discussions and interviews reveal a certain ‘can-do’ spirit, despite seemingly insurmountable obstacles.

*Migration personal norms: self-concept as opinion leader, perceived level of risk and innovation*

The interviews showed that migration is a display of agency by villagers who wanted to earn more or offset losses suffered on account of environmental changes. All the interviews showed that the migration decisions are made by the individual migrant. However, there were consultations with family members in the decision-making process, and support for migration came from extended family and friends as explained in detail in the following section. In the case of a 30-year-old man, his mother played a role in decision-making, and for a 25-year-old man, his father and brother contributed to the process. Two women interviewees said their husbands were the migrants and the two men took the decision to move.

Only five out of the 20 respondents considered themselves to be among the first in their area who change livelihood options, showing a level of pioneering spirit in the face of adversities or perceived inadequacies. A 32-year-old migrant in Chapai Nawabganj said that his father and forefathers were farmers, but after his homestead and farms were eroded, he moved to another village 23 km away. 'As I do not have any land and farm work cannot be found all the time I started working outside as a farm labourer, and later as a hawker in other districts of Bangladesh'. However, most of the interviewees did not consider themselves to be among the first to embrace change. A majority (11) of the respondents still said they were trying new livelihoods. None of them, except one, felt that he or she was willing to take more risk than other farmers in the area.

At the same time, the respondents appreciated the risks and hardship involved in migration. Most of them said they could not take their family to their work destinations due to a variety of reasons including the temporary/seasonal nature of migrations, social commitments back home and possible exposure to risks. As a contractor who supplies labourers from his village to a brickfield in Satkhira district summed up the reasons for not taking his wife and two children with him: 'It will be risky if we face any bad situation; social and religious norms; affection to village'.

The narratives of migration also show that people test and tweak their methods on the basis of their own and their peers' experiences. The focus group discussions suggest that it is usually informal networks that recruit and sustain migrants. One of the respondents in Chapai Nawabganj narrated: 'Before migration there was no work in the village. I used to roam around here and there in search of livelihood... First I went to Katapukar, another village... There I met a day labourer named Sadikul, who first told me about rickshaw pulling in Rajshahi'. He also used to work as a seasonal rickshaw puller in Rajshahi. 'Now I work 6 months in the village in the agricultural land and the rest of the time in Rajshahi'. Most of the migrants (13) were 'sometimes' consulted by others on issues regarding migration. One each was consulted 'frequently' and 'all the time'. Five of them had 'moderate' and three had 'significant' influence over the livelihood practices, including the migration of others.

Together, these responses suggest that migration decisions are made independently and the migrants are open to new livelihood options and moving to new places. Though migration is considered a 'new' occupation as opposed to what the

migrants' father and ancestors did, it is not considered a particularly risky or unique venture. Under the changed economic and environmental circumstances, there is a 'business-as-usual' sense to migration despite the uncertainties involved in it. Migration appears to be a reliable option despite the uncertainties and a lack of any formal support by the government.

*Social norm beliefs: sources of advice, traditions and cultural factors*

The narratives of migration show that people followed paths trodden by their family members, peers, friends and community members. Focus groups and semistructured interviews showed that migrants placed a high degree of trust in information from their social networks while deciding where and when to go and what to do for a living, in agreement with the work of Massey et al. (1993). Usually, information of migration is provided by people who also work outside village, family members, relatives or their friends.

Mostly, resources for migration come from family members. In terms of social norm beliefs, the migrants trust members of their fellow households the most. For livelihood responses, 19 out of the 20 respondents declared 'complete trust' and the remaining person 'trust' in information on agriculture management from their fellow households. Only half the respondents placed trust in information given by national and local governments on this matter. At the same time, 13 respondents said they were influenced by the behaviour of neighbouring households, friends and family in their decision to change their livelihoods, though only eight said the influence was moderate and one said it was significant. This finding has policy implications as it is word-of-mouth sharing of experiences among peers and relatives that often influences migration decisions, not formal institutions.

Even within the migrants in a village, people of a clan cluster together. In Gabura, a 25-year-old woman belonging to a minority tribal group said that her husband was discriminated against in wages—now he migrates to town along with other people in his tribe led by a contractor who also belongs to the same tribe. The influence of labour contractors and agents can also be seen. Discussions around the general trends in migration and livelihoods reveal certain other interesting trends about social norms. One commonly expressed socio-cultural factor that influences migration patterns is the determination to protect the family and thus an inability to take spouses and children to the destination of migration. While it suggests that migration could often mean roughing it out, it also means that women and children are not made to move to a new place without adequate facilities. At the same time, women are left back in often risky environments, especially after disasters such as cyclones (Mallick and Vogt 2012) to head households and take care of local livelihoods under trying circumstances.

Survey results from cities and villages from some other studies also show that vulnerability to climate change is gendered, because women are disproportionately vulnerable to natural hazards due to social norms, gender inequality and reproductive responsibilities—factors that limit women's mobility and survival options (Ahmad 2012). Hunter and David (2011) argue that cultural-specific gender norms shape the ways in which households diversify livelihoods, including by

migrating in a changing climate. On the whole, socio-cultural norms and beliefs play a key role in making migration decisions.

## Discussion and conclusions

This study traces the way migration decisions are made in the context of environmental change, including the impacts of climate variability and possibly change. Faced with dramatic changes, people are diversifying their livelihoods from farming and fishing that their ancestors practiced. They migrate to become shrimp cultivators, vegetable vendors, rickshaw pullers, street-sellers, casual labourers, contractors and factory workers. Depending on the availability of jobs, migrants often take up different roles, earning from a basket of livelihoods in any single year. Against a background of economic growth and reduction in farm livelihoods, villagers are confident about making use of the emerging opportunities in cities. They are positive about the efficacy of migrant labour as a way out of the limited job opportunities and the environmental stresses and shocks back home. Migration follows an elaborate decision-making process in which experiences, beliefs, attitudes and other behavioural factors play a role. While these cognitive elements work at an individual level, statements about social norms suggest a strong influence in the decision-making process by family and neighbours. The duration and destination of migration is often determined by social factors.

People see migration—in different patterns across time and space—as a strategy to diversify livelihoods. It works as an effective adaptation strategy to offset the impact of climatic stresses and shocks. They believe that they could make a better living as migrants and contribute to resilience back home by sending remittances, allowing their families to stay back on their land (VanWey et al. 2012). So households often diversify livelihoods by sending one or some of the household members away to work—for different durations—and thus reduce their vulnerability to shocks and stresses, including climatic ones. Though the ‘laboratory of extreme events’ (Grothmann and Patt 2005) provides a backdrop to understand migration as a response to climate change and variability, adaptation works more often as a slow adjustment to livelihood patterns at different levels—community, household or individual. Often, it aids incremental improvements to existing systems, tweaking resource management practices, enhancing livelihoods by income diversification, improving disaster preparedness measures or sustainable development programmes (Huq et al. 2003; Smit and Wendel 2006). In effect, these measures are solving chronic problems in the environment and a lack of development (Schipper 2007).

At the same time, the prevalent narrative about migration is all about improving income, and not escaping from a hostile environment even when environmental stresses and shocks make livelihoods increasingly insecure and unsafe. In short, in a range of time–space combinations, migration contributes to such efforts, though migrants themselves do not call it adaptation.

In this context, migration decisions are often taken firmly and deliberately. Even when there are climatic and environmental threats, the decision-making process

involves weighing the pros and cons of migration against other options such as diversifying livelihood activities at the home base. Though villagers tend to believe that the success of their household is mostly determined by factors outside their control, their creative and bold adaptive actions suggest that they have a sense of control over their destinies. Their belief that disaster occurrence is in the hands of God, however, does not prevent them from taking preparatory and remedial action.

Migration decisions are generally made by the migrant, after consultation with friends, relatives and other members of the community. Migration is not seen as a pioneering or risk-taking venture, but a business-as-usual activity despite all the uncertainties involved in it. The migrants trust their social networks to inform them about opportunities and places to migrate. Usually, the information for migration is provided by people who work outside the village, family members, relatives or their friends—not by government agencies or institutions. Most of the resources for migration also come from family members. In making livelihood choices, people put their trust in fellow households. NGOs and the national government also enjoy their trust, but on a lesser level.

Such a nuanced understanding of how environmental concerns influence internal and international migration has policy implications (Hugo 1996). At the policy level, it is important to understand and acknowledge the subtlety of these linkages and their development implications (World Bank 2010). This is because proactive action against natural hazards requires more than just risk awareness; it also involves helping people cross barriers to adaptive behaviour, and promoting social settings and environments that allow responsible action (Grothmann and Reusswig 2006). This is particularly important considering the urgency for climate change adaptive action in Bangladesh. Firstly, climate extremes and even a series of non-extreme events are occurring against a background of social vulnerabilities and exposure to risks (IPCC 2012). While this trend continues, it is important to understand, model, forecast and disseminate information on how the climate is varying and changing in the long term and how people are responding to such changes—by moving, staying or getting trapped. Secondly, the economic impacts of climate-related disasters on livelihoods continue to be huge. Entire stretches of land are still being eroded, salinised, flooded or kept fallow due to water shortage. People often have to move out of their place of origin for their safety and due to limited livelihood opportunities—but they also run the risk of a new set of hazards and uncertainties in their destinations. An understanding of the migration dynamics and patterns could help in planning for future development and resilience of migrants as well as their home and host communities. Thirdly, while migration works as an effective adaptation strategy to address both current and future environmental stresses and shocks, it is seen as a business-as-usual economic activity by most of the migrants. People in the study areas see migration as a way out of economic difficulties and expect environmental conditions to worsen in the coming decades, which means possibly more migration. If migration is an effective adaptation strategy, it is important to mainstream it into development, climate change and environment policies.

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