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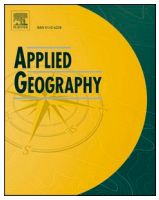

Explaining mobility using the Community Capital Framework and Place Attachment concepts: A case study of riverbank erosion in the Lower Meghna Estuary, Bangladesh

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A B S T R A C T

Information collected from Focus Group Meetings (FGMs) and key informant interviews (KIIs) from Ramgati Upazilla of Lakshmipur District, Bangladesh, shows that once household members have lost their homes to riverbank erosion, they rarely migrate to distant places and stay in their immediate vicinity. The overwhelming majority of the victims rebuild their homes in nearby places on the lands of their relatives, friends, and neighbors, while some rebuild homes on government properties. This action is explained using the Community Capital Framework (CCF) and Place Attachment or Sense of Place concepts. The CCF asserts that overall resilience in the face of a disaster comes from focusing on the assets in place prior to the exposure to danger across multiple dimensions such as human, social, political, financial, built, natural, and cultural capitals. These capital assets overlap each other. For example, abundant natural capital can easily translate into financial capital, which, in turn, creates a strong set of built capital, if there is political capital to administer resources. The displaced people in the study area tend to remain in the local area because of strong ties to the surrounding communities and abundant natural resources in terms of availability of potential to re-establish river-based livelihoods, access fresh and formalin free fish and vegetables, and breathe pure air. Local people are known to generously provide free land for building homes, and displaced households often receive financial support from local and national governments. All these resources make for strong ties to the locality, and therefore survivors hesitate to move to distant unknown places.

1. Introduction

Riverbank erosion in inland and coastal areas of Bangladesh poses a serious threat to people living near major rivers and coasts. In addition to mounting evidence of climate change, including rising air temperature, frequent and intense flooding, extreme rainfall variability, and saltwater intrusion, riverbank erosion has become increasingly detrimental to low-lying coastal areas of the country (e.g., Paul & Chatterjee, 2019; Rashid, 2013 & 2013b; Walsham, 2010). More than 100 of the 462 sub-districts in Bangladesh are subject to riverbank erosion (PCB, 2011). On average, approximately 34 square miles (88 square km) of homestead and farmland are lost to riverbank erosion each year (Alam et al., 2017), a loss that subsequently contributes to decreased employment opportunities for members of uprooted households. Thus, riverbank erosion not only damages standing crops, infrastructure, and other property while posing a severe threat to livelihoods, but it also displaces approximately 200,000 people per year (Alam, 2017; Ferdous et al., 2019).

Riverbank erosion in inland areas in Bangladesh primarily occurs during the summer or monsoon season (June–September) when excessive monsoon rains trigger riverine flooding (Ferdous et al., 2019). However, riverbank erosion in coastal areas is a perennial hazard. Although erosion intensifies during the rainy season, coastal areas are inundated regularly by diurnal high tides. Rapid riverbank erosion takes place if high tides occur during a full moon and/or are accompanied by strong winds and waves (Rahman et al., 2015; Rashid & Paul, 2014). In contrast to inland areas, coastal areas are also exposed to tropical cyclones and associated storm surges. The extent of riverbank erosion

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increases with the height of storm surge, which depends on whether the surge occurs during a high tide (Paul, 2009). Cyclone and storm surges are predicted to become more frequent and severe as climate change impacts are likely to become more visible in the future (Rashid & Paul, 2014).

While population displacement caused by riverbank erosion in inland areas has been widely studied (e.g., Alam, 2017; Hutton & Haque, 2003; Zaman, 1991), little to no research has investigated the movement or relocation of people due to riverbank erosion in coastal Bangladesh. The present study used a mixed-methods design, including focus group meetings (FGMs) and key informant interviews (KIIs), and a representative household survey to address this research gap. This design method allowed for context and depths of analysis of information collected from the field. The study aimed to explore the extent of migration or non-migration from an estuary exclusively due to riverbank erosion. In addition, qualitative information collected through FGMs and KIIs was used to explore motivations for migrating or refusing to migrate within the country. This research represents a case study, and its purpose is not to understand the effects of riverbank erosion compared to socio-economic, environmental, and other relevant factors. The principal research questions focused on the actions and motivations of people displaced by riverbank erosion in coastal Bangladesh.

2. Environmental migration discourse: A literature review

Since publication of the first Intergovernmental Panel on Climate Change (IPCC) report in 1990, migration and climate change researchers (e.g. Bardsley & Hugo, 2010; Gray & Mueller, 2012; Hugo, 1996; Leckie, 2009; Massey, 1999; Mortreux & Barnett, 2009; Tacoli, 2009; Warner & Afifi, 2014) have asserted that environmental degradation is a prominent motivation for human migration from ancestral homes. Some researchers have also claimed that such mobility has a straightforward relationship with environmental stress, ignoring the fact that people may initiate short-term *in situ* adaptation to environmental change before they decide to migrate. Critics (e.g., Black, 1998 & 2001; Hulme, 2008; Hunter et al., 2015; Kibreab, 1997; McGregor, 1994; McLeman, 2014; Paul & Ramekar, 2018; Piguet, 2010, p. pp73 & 2013; Wood, 2001), however, have argued that the migration itself and the decision to migrate is often multifaceted. In the international discourse on the effects of climate change, researchers such as Hugo (2012), Penning--Rowsell et al. (2011), and Piguet (2010, p. pp73 & 2013) have considered migration as a last resort (i.e. migration occurs after all adaptations fail).

The New Economics of Migration theory posits that households typically deploy one or more family members to work elsewhere to diversify family income, improve livelihoods, alleviate poverty, reduce household vulnerability, and ensure food security (e.g., Ezra & Kiros, 2001; Renaud et al., 2011; Stark & Bloom, 1985). This argument implies that the poor generally migrate due to limited access to resources in origin and inability to cope with post-disaster situations, which act as "push factors." Contrary to this, "pull factors" such as better wages in destinations compared with livelihood options in rural areas encourage poor people to migrate (Carr et al., 2009). However, a growing amount of literature claims that the poor are often unable to move because of migration costs, and lack of social support at destinations (e.g., Chen et al., 2017; Gray & Mueller, 2012; Kartiki, 2011; Khan et al., 2018; Lein, 2000; Mallick, 2019; Penning-Rowsell et al., 2011).

Researchers who maintain that the relationship between human migration and environmental stresses is linear completely disregard the possibility of limited economic resources and employment opportunities in unfamiliar destinations, including challenging and dangerous working conditions (Adams, 2016; Ferdous et al., 2019). Furthermore, they underestimate the potential of abundant natural resources or natural capital at the place of origin, which may discourage migration. They also often ignore the influence of powerful emotional factors such as strong attachment to place, a durable sense of belonging, and place-based social networks or social capital as determinants of post-disaster mobility decisions (e.g., Aldrich & Meyer, 2015; Carrico & Donato, 2019; Haney, 2018; Mallick & Vogt, 2012; Massey & Riosmena, 2010).

The resources or assets at a place of birth can be resiliency factors, such as very solid personal and societal bonds, strong social networks (e.g., Akhter and Baurer, 2014: Gray et al., 2024; Haney, 2018) and associations with *samaj* (traditional Bangladeshi social coalition), termed "social connections" in Fig. 1. The figure also highlights adherence to place of birth/residence, which binds individuals to their places of residence due to an enduring passion for the environment in which they were raised.

Irrespective of economic conditions, these positive factors prevent people from permanently abandoning their places of birth or residence (Kandel & Massey, 2002; Koubi et al., 2012). When people live many years in one place, they build strong social networks that are closely associated with the concept of place attachment (Smith, 2018; Tuan, 1974, Tuan, 1977). These networks are relationships that develop between individuals and groups via friendships, familial ties, similar interests and beliefs, organizational life, and other types of social connections (Carpenter, 2013). Thus, even though many places, including coastal areas, are concurrently at risk from various natural hazards, residents resiliently face these events in part due to attenuating benefits provided by natural and social capital (Fig. 1). In other words, if assets or resiliency at origin outweigh the risk, then no migration will occur. Risk and resiliency are comparable to push, or pull factors, respectively, of the place of birth or residence (Paul 2011).

Social networks or social capital for individuals and households are commonly differentiated into bonding, bridging, and linking networks (Aldrich, 2011; Szreter & Woolcock, 2004). Bonding social networks describe the intracommunity connections among individuals who are emotionally close, such as family, kin members, and close relatives. The strong connections provide social support and personal assistance, especially in times of need and crisis (Aldrich & Meyer, 2015). Bridging and linking networks represent intercommunity ties between socio-demographically different actors, including acquaintances or individuals loosely connected in social groups (e.g., neighbors and friends). Bonding and bridging networks complement each other, and members of both networks provide financial and nonfinancial resources and support (Elliot et al., 2010).

Linking networks, however, describe individual or household connections with differing levels of power such as government and nongovernmental organizations (GOs and NGOs), which can be considered political capital. NGOs, which aim to improve the circumstances of their members, are restricted to marginalized groups (Woolcock, 2001). The bonding and bridging networks represent horizontal relationships, while linking networks represent vertical relationships (Patulny & Svendsen, 2007). Additionally, resources of origin include alternative employment opportunities, risk-sharing abilities, and local community resiliency, all of which may impede human migration (Adger et al., 2013; Black et al., 2011; Ellis, 2000; Gray & Muller, 2012; Mortreux & Barnett, 2009).

2.1. Community Capital Framework (CCF)

Although migration from environmentally challenged areas has been studied using frameworks such as the sustainable livelihood framework (SLF) and a socio-ecological system (SES) (e.g., Adams et al., 2018; Folke 2006; Mallick, 2019; Martin et al., 2014; Ostrom, 2009), minimal attempt has been made to analyze migration in community capitals framework (CCF). However, several studies (e.g. Bernzen et al., 2019; Carrico & Donato, 2019; Hunter & David, 2011; Sultana et al., 2019) have considered selected capitals of the CCF (e.g. financial, natural and social capital) to explain migration as an adaptation strategy in the context of environmental stressors. Integrating the concept of place attachment with the CCF framework can capture the full range of environmental migration or non-migration behavior. Such integration is

Note: Natural disasters written in italic letters strikes only coastal areas; others can strike both coastal and non-coastal areas.

Fig. 1. Both coastal and non-coastal communities are vulnerable to natural disasters. but are also resilient for presence of different resources and place attachment.

beneficial because researchers such as Aldrich & Meyer (2015), Carrico & Donato (2019), Haney (2018), Mallick & Vogt (2012), Massey & Riosmena (2010) have emphasized the importance of functional attachment to place on the migration/non-migration decision. In fact, social bond and place attachment, or place satisfaction, often foster place resiliency, resulting in frequent decisions to stay (Adams, 2016; Logan et al., 2016).

Although CCF has the potential to study migration decisions from environmentally stressed areas, the framework has only been applied to examine disaster response and recovery efforts (e.g. Aldrich, 2012; Jedd et al., 2018; Stofferahn, 2012). Despite their relevancy, until now no one has combined CCF and place attachment concepts to explain migration propensity. Thus, this research integrates a sociological framework with a core geographical concept to study drivers of migration (or immobility) from a vulnerable river estuary to other locations in Bangladesh. Considering the importance of place attachment and its close relationship with community (Vaske & Korbrin, 2001), place attachment is included in the center of the CCF in Fig. 2.

Although CCF is based on community-level assessment and place attachment is individualized, both concepts are related because CCF attributes such as social, political, and financial capitals exist in a community, but their presence or absence is perceived by individual residents of the community. For example, if a person feels that social capital is weak in a community and that person is not strongly attached to the place, then the person is more likely to migrate. This is likely the most common case for short-term residents of the community, while long-term residents may have different perceptions and act accordingly. Thus, CCF and place attachment concepts influence individual-level migration decisions.

CCF, initially developed by Cornelia Flora and Jan Flora (2004), categorizes seven types of capital (human, social, political, financial, built, natural, and cultural) to assess overall resilience to disaster based on the assets in place prior to the exposure to danger (Fig. 2). Human capital, which includes residents' skills and knowledge, levels of education, and leadership abilities within households and communities, represents abilities of community members to access outside resources and knowledge. Social capital refers to the community connections and networks that develop within a community and organization, or the social glue that binds a community together (Carpenter, 2013). This capital encourages community members to work together and promotes trust, commitment, and loyalty to the community.

Political capital encompasses the power of a community to secure external resources and the ability to engage external entities to accomplish local goals, including GO and NGO programs to improve living conditions of marginalized community members. Effective political capital assists with disaster mitigation, preparedness, response, and recovery. Financial capital is the level of wealth and income of residents and businesses in a community. In addition to annual household income,

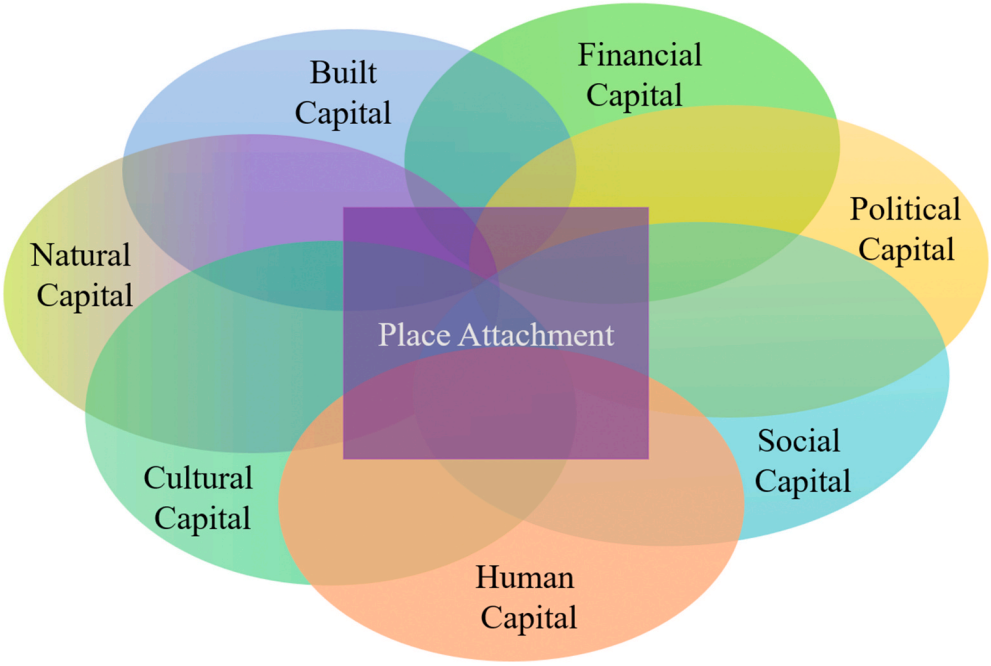

Fig. 2. Seven capitals of the CCF model along with place attachment. *Source*: Modified after Flora and Flora (2013).

landholding size in rural communities is an important indicator of this capital. Built capital, on the other hand, refers to a community's infrastructures, such as roads, parks, banks, school buildings, homes, and marketplaces (*bazar/hat*), that are vulnerable to damage or destruction during a natural disaster.

Natural capital includes available location assets such as natural resources, trees, natural beauty, quality of air and water, animals, forests, biodiversity, water features, and fertile soils that are positive (pull) or negative (push) factors in a community or surrounding localities. Cultural capital reflects the way people of a community know the world and act within it, including assets such as common dialect, heritage, ethnicity, tradition, rituals, religion, and local knowledge (Flora & Flora, 2013; Jedd et al., 2018).

Capital types are not mutually exclusive, however. For example, abundant natural capital can easily translate into financial capital, which, in turn, creates strong built capital if political capital is available to administer resources. Financial capital is often closely associated with natural and built capital. CCF posits that displaced households tend to remain within an affected community if all or most of the community capitals are strong; otherwise, residents are likely to migrate. The existence of a strong CCF at the origin means individuals have strong attachments and affinity to a community, so they consequently resist migration.

3. Methods

3.1. Study area

Based on geomorphological and ecological conditions, Bangladesh's coast is broadly subdivided into three zones: the southwest, which is dominated by the mangrove forest of the Sundarbans; the Meghna estuary and the vast active delta zone in the central portion of the country; and the eastern zone, which has a narrow, straight-line coast that is parallel to the geologically young (Tertiary) folded hill ranges (Rashid & Paul, 2014). The study area was in the central zone, which has been experienced rapid geomorphological changes, meaning the study area was subject to recurrent erosion and sediment deposition.

The study area (Fig. 3) was comprised of four unions (Char Alexander, Char Algi, Char Badam, and Char Ramiz) and 15 villages of Ramgati Upazila in the Lakshmipur district of Bangladesh. A district, which contains several upazilas, is the second largest administrative unit in Bangladesh, with an average population of 2.5 million people. A upazila is the third largest administrative unit, comprised of several unions, while a union is comprised of several villages. The study area encompassed 27 square miles (70 sq. Km), with an approximate population of 40,000 people according to the 2011 population census of Bangladesh (BBS, 2011). This area was situated along the eastern (right) bank of the Lower Meghna River, the main outlet of the Ganges-Brahmaputra-Meghna (GBM) drainage basin, a transboundary river basin totaling more than 700,000 square miles (1.7 million sq. Km). Bangladesh contains only 7% of the GBM's area but more than 90% of basin discharge (Rashid & Paul, 1987).

Riverbank erosion is a persistent problem in Ramgati Upazila. Geospatial analysis revealed that 94.3% of the approximate 13.3 miles (20 km) of shoreline experienced erosion from 2008 to 2018 (Crawford et al., 2020). The mean annual erosion rate was −291 feet/y (−88.7 m/yr) with a standard deviation of 137.8 feet (42.0 m) ranging from −491.5 feet/y to −30.5 feet/y (−149.8 m/yr to −9.3 m/yr). Negative values indicate inland erosion from the riverbank. Net shoreline erosion from 2008 to 2018 (total distance of shoreline movement) had a mean of −2926.6 feet (−892.0 m) with a standard deviation of 1386.5 feet (422.6 m) ranging from −1506.1 feet to −275.6 feet (−1506.1 m to −94.0 m). This study area was chosen because geospatial analysis showed that Ramgati Upazila is one of the locations with most significant riverbank erosion in Bangladesh and it is representative of dynamics in the Meghna estuary (Crawford et al., 2020).

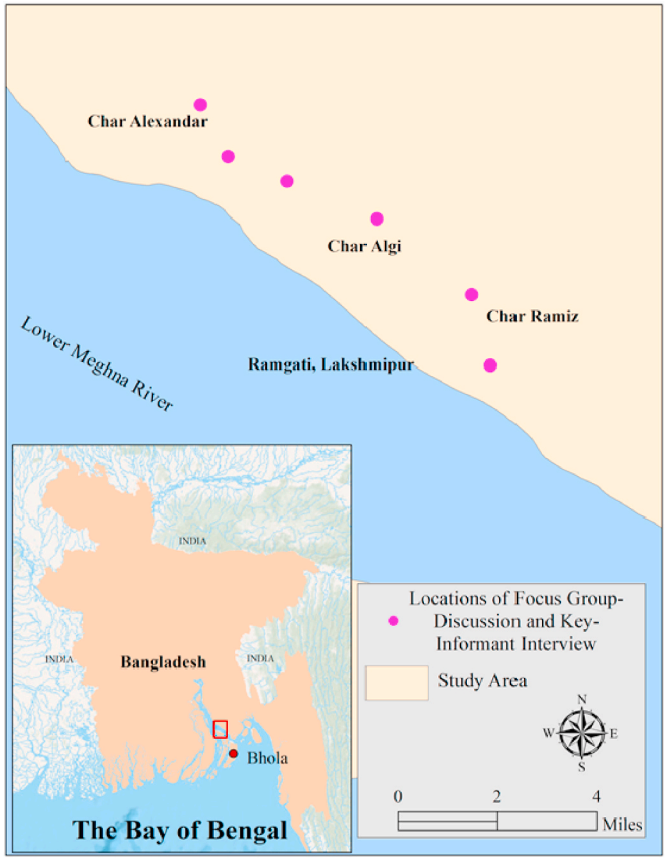

Fig. 3. Study area.

3.2. Sources of data

The primary sources of this qualitative study were drawn from information collected through FGMs and KIIs. These two sources were supplemented by a household questionnaire survey conducted among 407 randomly selected heads of households living in the study area. Use of the three methods provided crucial insights into riverbank erosion and displacement, and the results of each approach were triangulated to verify the veracity of all findings and provide richness and depth to the study's conclusions (Creswell & Clark, 2017).

FGMs are a strategy of collecting data in qualitative research where participants can express their thoughts and opinions toward an issue through open discussion (Morgan, 2001). Six FGMs were conducted in the study area during the summer of 2018; five FGMs were moderated by three members of the research team, and attended by both males and females. One FGM was moderated by a local woman for a female-only session to ensure gender representation. The FGMs had 67 participants who represented all socio-economic backgrounds. The participants were from local villages, surrounding each FGM site. They were recruited by the field investigators after consulting with local leaders and government officials. Per restrictions imposed by the Institute of Review Board (IRB), Virginia Polytechnic Institute and State University (VPISU), Blacksburg, Virginia, United States, all participants were older than 17 years. Nearly 50% of the participants were females.

FGM participants represented a wide range of professions, including farming, fishing, teaching, and business. All FGMs were held in local primary schools and lasted for approximately two hours. Participants granted permission prior to the FGMs, and each participant was briefed about the content of the meeting. Discussion focused on riverbank erosion, including its extent, causes, and impacts, with emphasis on movement or migration. Twelve questions were asked in each FGM, and participants were given time to introduce themselves and ask questions.

These questions were approved by the IRB, VPISU, Blacksburg, Virginia, United States.

Fourteen key personnel interviews were conducted at different levels (national, sub-district, and the village level) during the summer of 2018. Interviewees included males and females from a wide range of professions: teachers, local leaders, businessmen, farmers, fishermen, government officials at upazila level, and elected representatives, including one parliament member from the area. Similar to participants of FGMs, field investigators were responsible to select all personnel for interviews after consulting local leaders and officials. Each semi-structured interview lasted approximately 90 minutes and was guided by a set of 15 questions pertaining to issues associated with Lower Meghna riverbank erosion. Several questions were common to both FGMs and key personnel interviews, others were different. For example, more questions were asked to the latter group about the Bangladesh government's programs and plans to prevent riverbank erosion in general and in the study area in particular. Informants also shared personal experiences and perceptions about riverbank erosion in the study area.

The FGMs and KIIs were recorded using a digital audio recorder, and all the voice recordings were transcribed at the Department of Geography at Virginia Tech . All transcripts were saved as Microsoft Word documents for further processing using qualitative software. Field notes and the research team's personal observations greatly enhanced the descriptive analysis of FGM and KII information.

Additionally, a household survey was conducted via a structured questionnaire in the study area during April–June of 2018 to collect quantitative data on the vulnerabilities and adaptive response of the residents of the study area, including public responses to the disaster. Face-to-face interviews with randomly selected heads of households were administered by three Bangladeshi field investigators who had prior experience conducting field work and were intensively trained for this research project. An initial set of 420 random latitude/longitude points was generated using GIS software and plotted on large format field maps to aid field navigation and household recruitment. If a household head declined participation, the next nearest household was invited to participate.

The household survey consisted of 95 fixed choice and open-ended questions. In addition of riverbank erosion, the questionnaire survey sought information regarding the type of natural hazards and disasters experienced by the people of the study area, their coping strategies, public responses to the disasters, extent of displacement along with relocation and migration choices. In December 2017, the questionnaire was pretested in the study area with 12 respondents to avoid ambiguity by the members of the research team (see Adams et al., 2007). Based on the feedback, necessary modifications were done before the final investigation. Although the questionnaire was in English, the field investigators, who were graduate students, translated each question into the local language (Bengali). Because the field investigators were involved in similar research projects in the past, most likely they did not lose any important information in the translation process. The questionnaire was also approved by the IRB, VPISU, Blacksburg, Virginia, United States. Verbal consent of the selected households was sought before participating in the survey, and the survey was conducted at the homes of each head of household. Other adult members of the families contributed information during the survey, which lasted between 90 and 120 min.

However, similar to most other empirical studies that investigated migration from coastal Bangladesh (e.g., Bernzen, et al., 2019; Call et al., 2017; Carrico & Donato, 2019; Chen & Mueller, 2018; Gray & Mueller, 2012), this questionnaire survey was not designed to focus on the migration patterns of households that emigrated from the study area. In addition, this study was not representative of all coastal areas in Bangladesh.

4. Results

Data collected from FGMs, KIIs, and the household survey revealed that riverbank erosion is the most common natural disaster in the study area. Other natural hazards and disasters such as tropical cyclones and associated storm surges in pre-monsoon and post-monsoon seasons, tornadoes in winter season, and river floods in summer season occur infrequently in the study area. For example, the last cyclone occurred in the area in 2007, when Cyclone Sidr made landfall approximately 120 miles southwest of the study area. In contrast, riverbank erosion can occur any day of the year, causing residents, particularly those close to the Meghna River, to live with the constant threat of displacement.

The study showed that riverbank erosion causes two unique impacts not reported by earlier inland riverbank erosion studies (e.g., Alam, 2017; Hutton & Haque, 2003; Zaman, 1991). First, according to the local proverb, "if the fire burns houses, it keeps land, but when the riverbank erodes, it does not keep anything – not house and land," riverbank erosion devastates all surrounding areas. Second, riverbank erosion destroys ancestral burials sites, which is an inconsolable tragedy for residents who traditionally visit (*ziarat*) burial sites or graveyards at least once a year.

4.1. Extent of migration or non-migration

A careful review of literature on out-migration from environmentally challenged areas in Bangladesh reveals that different authors (e.g., Bernzen et al., 2019; Carrico & Donato, 2019; Chen & Mueller, 2018; Gray & Mueller, 2012; Lu et al., 2016; Mallick & Vogt, 2012) used different definitions of migration. So, we used the formal migration definition of the Bangladesh government, which considers migration as the movement of persons who change their place of residence, for reasons other than marriage, for a period of six months or more. Movement within a district is not considered migration by the government's definition (BBS, 2011). Some studies (e.g., Bernzen et al., 2019; Carrico & Donato, 2019; Gray & Mueller, 2012) considered movement within the same district as migration as well as movement due to marriage.

FGM participants and results from KIIs indicated no (i.e., zero) out-migration from the study area to other districts, as supported by results of the household survey. Ferdous et al. (2019), Hutton & Haque (2003), Islam et al. (2010), Subhani (2020), Sultana et al. (2019) and Zaman (1991) reported similar findings when they studied riverbank erosion in the inland areas of Bangladesh. Likewise, early migration studies by Koubi et al. (2012), Mallick and Vogt (2012 & 2014), and Piguet (2010) claimed that limited to no migration is common for rapid onset events like riverbank erosion, while slow onset events induce long-term migration.

The household survey data from this study showed that 135 (33%) of the 407 respondents had experienced a residential move due to riverbank erosion since 2008. Most of the respondents moved within the same village, others moved to neighboring villages, but within the same union. According to Gary and Mueller (2012), this residential move is "local mobility," defined as residential moves within the district of origin in contrast to "long-distance mobility," defined as moves outside the district of origin.

A total of 135 households surveyed had moved 177 times since 2008, meaning 42 households moved more than once, typically ranging from two to five moves. The year 2008 is used as a reference year because the study area was affected by Category IV Cyclone Sidr in October 2007, and all respondents vividly remember the event. Although this study investigated residential moves between 2008 and 2017, most households moved between 2014 and 2016, but no household or any member moved outside the study area, suggesting that displaced and non-displaced households in the area have strong emotional, social, and economic attachments to their place of birth, and do not perceive considerable risk in living in that area. According to Dynes and Quarantalli (1976), the "risk image" of a specific place is a key factor for

people's willingness to stay in that location. Similarly, Lein (2000) found that residents did not perceive a risk to living in an environmentally vulnerable inland char and did not consider migrating.

Several households in the study area relocated because they feared losing their houses in the future due to riverbank erosion. Although most were relatively wealthy households and could afford to build houses within or outside the study area, these households did not move outside Ramgati Upazila or the Lakshmipur district. Some of them had reasonable amount of land property and others had established business within the study area. These relatively wealthy people who own more assets were less likely to migrate and choose to stay in the place of origin to look after these assets (Akhter and Baurer, 2014; Mallick and Vogt, 2012; Subbani, 2010). Some of them constructed improved houses at a safe distance from the Meghna River. Overall, however, most displaced households built new houses only to survive.

4.2. Drivers of non-migration

Study results showed that victims of riverbank erosion often seek to remain near their previous homes for several reasons. First, they prefer to stay close to relatives, neighbors, and friends, thereby demonstrating strong social bonding among residents within the study area. As proven by researchers who have examined migration patterns in other countries, living in the same area over a lifetime results in strong personal bonds within a community (Kandel & Massey, 2002; Koubi et al., 2012).

Another reason for the enduring social bond is that people in the study area came from one source area. Due to intense riverbank erosion in the western (left) bank of the Lower Meghna River in the early or mid-twentieth century, parents and grandparents of most current residents crossed the 10-mile (15 km) wide river and migrated from the neighboring Bhola district to the study area in the Lakshmipur district. FGM and KII participants reported that no riverbank erosion was present along the eastern (right) bank of the Lower Meghna River at the time of their ancestors' migration. Consequently, established lineage has created a strong feeling of community among the residents of the study area, and they consider themselves as belonging to the same clan, or *gusthi*. Additionally, their social bonds are solidified because they speak the same dialect and follow the same traditions, which differ from the rest of the inhabitants of the Lakshmipur district. These strong social and cultural capitals make it very difficult to abruptly sever relationships with the people and place of residence.

A lack of money to buy land and construct houses in new locations was the third reason for living in a locale perpetually vulnerable to riverbank erosion. This suggests that financial inability is one of the principal factors in determining if displaced households migrate away from the study area, thereby supporting the resource theory, which posits that lack of funding and limited resources act as intervening obstacles to migration, particularly among poor populations (Chen et al., 2017; Gray & Mueller, 2012; Mallick, 2019; Penning-Rowsell et al., 2011). As noted, few wealthy people in the study area did not migrate because they wanted to look after their relatively large assets. A similar finding was also reported by Akhter & Bauer (2014), Gray et al. (2014), Mallick and Vogt (2012), and Subbani (2020).

However, FGMs participants revealed high social capital when they informed moderators that, irrespective of socio-economic conditions, local residents provide support to help resettle in the same or adjacent villages/unions, including free land and building materials from neighbors, friends, relatives, or kinship members. Sometimes kin members allow displaced families to build houses and stay for a limited time, such as two or three years. In addition, displaced families are often allowed to build homes on others' properties either on a rental basis or simply as a gesture of human kindness (Rashid, 2013a, 2013b). The household survey revealed that 94 (or 53%) of the 177 households who relocated due to riverbank erosion built their houses on land offered by members of social networks and connections. The remaining 83 (or 47%) households built their houses on their own land away from the river.

Another reason that people in the study area remained or relocated close to the Meghna River was the hope that they could eventually recuperate their lost land. Rashid, 2013 examined people displaced by riverbank erosion in northern part of the present study area and reported that most of the individuals did not leave the area because they hoped that the land would accrete inside the river giving them the opportunity to claim that land in the future. Brouwer et al. (2007), Carpenter et al. (2018), Hutton & Haque (2003), Mamun (1996), Sultana et al. (2019), and Zaman (1991) found similar results when they examined migration patterns in inland riverine and other coastal areas in Bangladesh.

Finally, many FGMs participants claimed a deep love for the study area, or strong place attachment that prevented them from moving to other upazilas or districts after losing their homes to perpetual riverbank erosion. In fact, one FGM participant said, "I strongly feel that my existence is intimately linked with the locality and the Meghna River" (also see Aulakh, 2013). When the emotional bond between person and place is very firm and community and social ties are very strong, leaving can be next to impossible (Gray et al., 2014; Haney, 2018; Kandel & Massey, 2002; Koubi et al., 2012; Mallick & Vogt, 2012).

Study participants also said they did not migrate due to lack of work opportunities away from the Meghna River. The river provides primary and alternate livelihoods for many residents, such as fishing in the river and the nearby Bay of Bengal, carrying and selling fish in local and distant markets, manufacturing boats for fishing, and making and repairing fishing nets. The river is ruthless, but it is also benevolent, leading residents to accept "living with the river" just like the people of Bangladesh accept "living with floods" (Shaw, 1989; Zaman, 1993). Disaster literature refers to this choice as risk acceptance, meaning people often bear losses caused by natural disasters because of cultural preference or when hazard mitigation measures are not cost effective (Coppola, 2007).

Although riverbank erosion destroys household resources, the study area contains an array of accessible natural resources to residents. One interview participant said the area "has fertile soil, chemical fertilizer-free crops, arsenic-free water, formalin-free fish and vegetables, fresh, pollution-free air, and beautiful natural scenery." These are attributes of the natural capital of the CCF, and some of these are considered by Sultana et al. (2019) as advantages of home areas. Poor soil quality and low agricultural yield, however, have been shown to trigger migration (Gray, 2011).

In addition to the natural capital, the study area contains roads, several marketplaces and schools, one college, and satisfactory public transportation system as built capital. Another feature of the built capital of the study area is a 2.3 miles (3.5 km) long embankment (Fig. 4), constructed in 2017, to protect the Ramgati Upazila headquarters (Rahman, 2020). However, results of field visits, FGMs, and KIIs

Fig. 4. Embankment along the eastern (right) bank of the Lower Meghna River.

revealed that the local leaders are well connected with upazila, district, and national level government officials as well as political leaders in Bangladesh.

Several local and national government programs that provide cash and food to destitute families demonstrate the political and financial capitals of CCF in the study area. For example, when new homes are built after displacement due to riverbank erosion, people commonly receive financial assistance from local and national governments. Although the national government of Bangladesh does not provide funds to buy land, it has a nationwide project to permanently resettle landless and homeless households on public land. This project, initiated in 1988, is known as the *Guchha Gram* (Cluster Villages) Project. In coastal districts, the main purpose of the project is to resettle landless residents whose houses were destroyed by tropical cyclones and storm surges. After losing homes due to riverbank erosion, some destitute households also become residents of these cluster villages (Rahman, 2020). In addition, a component of a Bangladeshi government program started in 1975 and named Vulnerable Group Development (VGD) in 1987 issues Vulnerable Group Feeding (VGF) cards that provide fishermen with 66 pounds (30 kg) of rice per month for three months during the *jatka* (juvenile hilsa fish) preservation period. Fishermen also are permitted to buy rice at a reduced price through this program. The VGF program was originally initiated nationwide to help poor families, particularly women (Rahman 2020).

Surprisingly, however, no NGO programs in the study area provide any housing loan to help the people displaced by riverbank erosion. In general, many NGOs are present in environmentally stressed areas in Bangladesh to enhance the resiliency of residents of vulnerable areas (see Alam et al., 2017; Ferdous et al., 2019; Kabir et al., 2018; Sultana et al., 2019). Although several NGOs in Bangladesh exclusively help people in coastal areas, only one (COAST Trust) has an office in the study area. Conversely, GOs provide a strong linking network in the study area.

The presence of various capitals of CCF in the study area and its residents' strong place attachment were the two main reasons for their unwillingness to move to unknown destinations with uncertain futures. Table 1 lists the characteristics of each CCF capital in this study; some of these characteristics arguably belong to more than one capital. For example, two of the three attributes of social capital (i.e., renting land from friends, relatives, neighbors and wealthy families; and obtaining free land from friends, relatives, neighbors, and wealthy families) are also attributes of cultural capital. Moreover, the table reveals that natural capital has the largest number of characteristics, followed by political capital with five characteristics. FGMs, KIIs, and field visits and observations revealed that social, cultural, and natural capitals were strongest in the study area.

Table 1
List of characteristics of different capitals (in italics) of the CCF Model.

Characteristic
Social Capital
Availability of free land to build home in the land owned by friends, relatives, neighbors, and kin members
Availability of rent land to build home in the land owned by friends, relatives, neighbors, and kin members
Strong social bond and network
Cultural Capital
Free land to build home in the land owned by friends, relatives, neighbors, and kin members
Rent land to build home in the land owned by friends, relatives, neighbors, and kin members
River culture
Financial Capital
Allow to build homes in properties of others
Some residents owned relatively large land and/or business
Human Capital
Strong leadership
Connections with upazila, district, and national governments
Political Capital
Ashrayan Project
Cluster Village Program
VGF
Rice at reduced prince
Financial assistance to build homes
Natural Capital
River Meghna
Fertile soil
Arsenic free crops
Formalin free fish and vegetables
Pollution free fresh air
Beautiful natural scenery
Built Capital
Adequate infrastructure
Embankment

5. Conclusion

Despite great suffering, anxiety, sorrow, and constant threats of forced displacement, the information collected from the field through multiple methods clearly showed that residents in the study area have a strong desire to stay in their own communities. This desire is primarily attributed to abundant natural resources, alternative employment opportunities or alternative income sources, strong kinship support (i.e., social capital) and emotional place attachment, and enduring river culture. In addition to prevalence of various capitals, these reasons significantly influence residents to avoid leaving the area or settling far from the study area.

The government of Bangladesh currently has no national policy for resettlement of people displaced by riverbank erosion, but such policy is urgently needed to further strengthen local CCF and place attachment. Any public resettlement policy should be locally based because the residents are not willing to move from their place of birth. In addition, FGMs and KIIs participants recommend the construction of embankments (each 9 miles or 16 km long) south and north of the existing embankment along the entire Ramgati shoreline. Like most residents of other areas in Bangladesh that are vulnerable to riverbank erosion (e.g., Carrico and Donato, 2019; Dewan et al., 2015; Sultana et al., 2019; Thompson, 1996), they believe this is the most effective way to prevent riverbank erosion in the study area. Study participants also recommended dredging the river, which is required to permanently prevent or reduce erosion, to sustain the integrity of the embankment, and direct the river current downstream to prevent formation of *char* lands (bars) in the river. They further recommend planting of trees along the riverbank and prohibiting the extraction of sand from the river. Local leaders have reported that the current number of shelters in cluster villages is inadequate to accommodate destitute families, and so additional shelters should be constructed. Some participants also recommended public loans at low interest rates for uprooted families.

The study clearly shows that, despite environmental stressors, strong CCF and durable place attachment reduces migration from the study area. One contribution of this study is to provide an evidence of non-migration decisions of the residents of a disaster-prone coastal area in Bangladesh. This finding opposes widespread contention of environmental migration and supports non-migration, which is a new area of migration research in Bangladesh and this research is still in infancy stage.

Using a mixed-methods research design, a similar study should be repeated in other coastal areas of Bangladesh to investigate the importance of CCF assets and place attachment in migration decisions for other hazards and disasters, including riverbank erosion. Such a study will provide valuable insights regarding out-migration from environmentally degraded coastal areas in Bangladesh.

Author statement

Paul, B. K.: conceptualization and writing original draft; Rahman, M.

K.: analyzing focus group meeting (FGMs) and key personnel interviews (KPIs), and drawing diagrams; Crawford, T.: grant supervision, methodology, and editing; Curtis, S.:methodology and editing; Miah Md. G.: conductig the household survey, and helping FGMs and KPIs; Islam, M. R.: conducting household survey, and helping FGMs and KPIs; Islam, S. Md.S.: data creation and supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this work.

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Appendix A. Supplementary data

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