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Understanding place-based adaptation of women in a post-cyclone context through place attachment

Highlights

- Women's place-based adaptation is explored through place attachment theory.
- Livelihood capitals were transformed in post-cyclone context.
- The social connections between women and NGOs enhanced place-based adaptation.
- An analytical people-place-process framework is conceptualized to summarise key findings.

Abstract

This paper explores place-based adaptation by women in the coastal settlements of Gabura, Bangladesh through the lens of place attachment theory in the post-cyclone Aila context (after 2009). Place attachment refers to the relationship between people, place and processes in which place-based livelihood resources may be a central consideration. Place attachment is relevant because, unlike men, Gabura women are constrained by their socio-cultural context to remain in place following a natural disaster, in this case cyclone Aila, and therefore must rely on a limited range of local resources to support adaptation through the construction of place-based livelihoods. Drawing on a mixed method approach, we explore women's place-based adaptation (a set of livelihood outcomes) as resulting from multilevel social connections among 'people' (e.g. women and NGOs), the 'place' (i.e. Gabura, located adjacent to Sundarbans) and its natural resource endowments, and the 'process' of transformation of capital from one form (social and natural capital) into other forms (physical and financial) via knowledge sharing (human capital). This paper highlights women's place-based adaptation that reinforces their place attachment (through place dependency and identity) in a post-cyclone context. Rather than seeing the inability of women to leave a place after a disaster as a disadvantage, a place-attachment approach revealed the capacity of women to transform in place where the post-cyclone necessities and constraints were drivers for change.

Key words: Place attachment, women, place-based adaptation, place dependency, livelihood capitals, post-cyclone recovery.

Introduction

This paper will examine place-based adaptation of women in the coastal settlements of Gabura, Bangladesh in a post-cyclone Aila context (after 2009) using Scannell and Gifford's conceptualisation of 'place attachment' theory (Scannell & Gifford, 2010). The concept is useful to examine the specific localised strategies of women in the development of place-based adaptations. There is a significant research gap in the lack of recognition of the unique contribution of women to responses at household level in post-cyclone context of coastal Bangladesh, in light of the socio-cultural restrictions that constrain women's adaptation (Ayeb-Karlsson et al., 2020; Jordan, 2019). Through the lens of place attachment, we consider the question: 'How does place-attachment contribute to women's use of livelihood capitals for adaptation in a post-cyclone context?' We focus on how 'forced' attachment¹ to place (through socio-cultural constraints) encouraged women to access and combine in novel ways place-based resources in the construction of livelihoods that are better adapted to a changing environment.

¹ In the context of Bangladeshi coastal settlements, women's mobility outside is not "normalised" due to socio-cultural restrictions (Alam et al., 2020b); therefore, women are unable to 'escape' from the places compared to their male counterparts. Women are forced to stay in place (Ayeb-Karlsson et al., 2020) and adapt with the place-based resources (Roy, 2012).

In Gabura, following cyclone Aila in 2009, the migration of male household members to cities for employment caused a disruption to the traditional domestic roles of women in the village and inspired them to explore opportunities for place-based adaptation within the island's landscape (Khalil et al., 2020; Roy, 2012). For example, women became actively engaged in fish cultivation and some groups participated in training on salt tolerant farming activities to secure food for their families in the post-cyclone context (Khalil et al., 2020). Some women travelled to the nearby Sundarbans mangrove forest to collect fish and crabs or started fishing in local rivers and canals and engaged in a range of food-for-work programmes (Roy, 2012). Overall they began to take on the roles that their husbands used to perform before the cyclone (Ayeb-Karlsson et al., 2020).

Post-Aila², the intersection of the long-term waterlogging of Gabura's farmlands, the agricultural-based background of villagers (Bernier et al., 2016), the relocation of male community member's outside the village (Mallick, 2011), and the interventions of aid organizations that recognized women as active agents of change (Boserup, 2007) heightened the significance of place dependence and attachment for women. However, the ability of women to use and transform their stocks of local resources, often through NGO support (e.g. Khalil et al., 2016; Khalil et al., 2020), was largely unacknowledged by male household family members and policy makers (Djoudi & Brockhaus, 2011). Given women's roles are influenced by the strong connections they have with the island ecology, this paper adopts the concept of 'place attachment' as a

² 'Post-Aila' refers to the aftermath and recovery from Category 1 Cyclone Aila that hit the South-western Bangladesh in May, 2009.

theoretical lens to analyse how the attachment of women to Gabura Island has enabled them to adapt 'in place' in a post-cyclone context.

In the following section, the concept of place attachment is discussed using Scannell and Gifford's (2010) framework of 'person, place and process' dimensions as a tool to conceptualize place (i.e. Gabura) affected by cyclone Aila in 2009 (the driver of change) and the responses of local actors (i.e. women in Gabura) in this context. The data for this study was collected in a mix method approach and synthesized into a conceptual framework to show how livelihood capitals can be seen as place-based resources for a coastal community (especially for women) who may not be able to relocate in a post-cyclone context. Place attachment is important for place-based adaptation of women in a post-disaster adaptation process.

Place attachment

Scholars have conceptualized place attachment in multiple ways; such as, 'sense of place' (Hay, 1998; Lynch, 1960), 'place identity' (Lalli, 1992; Ujang, 2012), 'place making' (Lynch, 1980), and 'place dependence' (Dixon & Durrheim, 2000). Place attachment is a dynamic concept with its theoretical foundations borrowed from multiple disciplines. Researchers have long attempted to describe the different attributes and opportunities of the concept in rethinking people's relationship to particular places, and its impact on social life and environmental outcomes. Place attachment can be defined as 'an affective bond or link between people and specific places' (Hidalgo & Hernandez, 2001 p. 274). Altman and Low (1992) developed a conceptual basis for place attachment by drawing on a diverse body of research that describes concepts such as, topophilia (emotional attachment), place identity, genres

of places, sense of place, rootedness, community sentiment and identity, etc. (Altman and Low, 1992 p. 3). Place attachment as defined by Rollero and De Piccoli (2010) has links to perception of the environment.

We consider the concept of place attachment according to Scannell and Gifford (2010) as consisting of three dimensions: 'person, place and process'. The person dimension can involve both individuals and social groups. At the individual level, a person can develop personal connections to a place, while at the group level, place attachment may refer to the symbolic meanings triggered by religious sentiment, historic events or ethnic rituals of a place that keeps the community members tied to that particular place (Low, 1992). The 'process' dimension refers to the way in which individuals and groups are emotionally related to a place, and the nature of the psychological interactions that occur in relation to the particular setting (Kelly & Barsade, 2001). For example, people may experience a strong emotion or 'affect' (i.e. pride) or a general sense of well-being by being at a particular place (Kelly & Barsade, 2001). A person's bond may contain cognitive elements, such as memories, beliefs, meaning and knowledge that make the place particularly important (Blunt & Varley, 2004). As explained by Rose, 'a sense of place develops from every aspect of an individual's life experience' (Rose, 1995 p. 88).

The most important dimension of place attachment is the place itself – the 'content' of a place that invokes the connection and includes multiple locations (Kyle et al., 2004). These connections are made up of two dimensions: social and physical (environmental) place attachments. Social place attachment resides in the strong social ties and kinship of the family and surroundings (Storie et al., 2019), while physical attachment is 'the rootedness among those who do not hold close attachment'. Women in Gabura, our study site, for example, have both belongingness

to family and are 'stuck' in place - as they are unable to 'escape' because of socio-cultural restrictions. Furthermore, Brandenburg and Carroll (1995) defined place using two factors – the social and cultural context of a given space, where people transform space into place. Sometimes, specific physical attributes of a place (e.g. pristine) can invoke particular sentiment to guide actions such as wilderness protection or better environmental behaviour by a community member (e.g. Devine-Wright & Clayton, 2010). Places may also be constructed through many years of social practices and the social relations these generate, which keep individuals bonded with the place and guide pro-environmental actions (Ruming et al., 2012). For example, Australian Aboriginal communities have place-based social and environmental practices that have existed for thousands of years. In this instance, places and practices are embedded in each other to inform "caring with" the place as 'Country' and for the people living in it (Suchet-Pearson et al., 2013).

Some scholars have suggested that there are several dimensions of place attachment that can be understood through the concepts of place identity and place dependence (Kyle et al., 2004; Ujang, 2012). Place identity leads to self-identity (Proshansky, 1978), rootedness (Tuan, 1980) and a sense of belonging to a place (Williams et al., 1992), including the physical, cultural and emotional contexts that shape the identity of a place (Ujang, 2012; Williams et al., 1992). People who have lived in a particular place for a long-time, may develop an attachment to that place; those people form a strong place-based identity (Dixon & Durrheim, 2000). Behavioural consistency among people-place relationships is also described as place-dependence (Altman & Low, 1992; Williams & Vaske, 2003). Behavioural consistency is thought to reinforce individual psychological attachment to a particular place and it enables specific place-based actions and long-term retention in a particular place (Florek, 2011; Williams et

al., 1992). Alternatively, people with low levels of psychological attachment may leave the place for better opportunities elsewhere (Florek, 2011).

Both 'place identity' and 'place dependence' can co-evolve and trigger post-disaster adaptation actions by understanding the values of a particular place's resources in two ways: first, through an individual's dependence on the available resources (e.g. natural capital) of a given place, which leads to an individual's understanding of place values and care for the resources and surroundings (Kruger & Williams, 2007). For example, in the coastal areas of Bangladesh, the mangrove forests of the Sundarbans are a sign of place values, a valuable symbol of livelihood resources and a strong support for coastal settlements (Getzner & Islam, 2013). Second, some migrants, especially female household heads from migrant families, mobilise their farmer identities as specific competencies to negotiate their adaptation in new urban settings (Alam et al., 2020). In the case of Gabura following cyclone Aila, most male household members migrated to the city for new livelihood opportunities (Mallick & Vogt, 2014; Mallick & Siddiqui, 2015), whereas women remained in place suggesting that there may be a gendered dimension to place attachment.

In this paper, we will use Scannell and Gifford's (2010) articulation of place attachment to understand the attachment of women to Gabura that facilitates a number of ways to rethink more gender sensitive adaptive actions in the face of post-disaster adaptation challenges reliant on place-based resources (Fig. 1). The women in Gabura occupy the 'people' component of the model, which helps us consider the ways in which individuals or groups relate to a place. Gabura and the nearby Sundarbans, occupy the 'place' component that acts as a domain or 'container' of existing natural resources that are transformed by the 'people' through their social and physical settings (Williams et al., 1992; Patterson & Williams, 2005). The process

dimension refers to how the behaviours/actions of these actors are processed through psychological components (e.g. behaviour, knowledge, and emotion) for potential adaptation outcomes (Williams et al., 1992), such as changes in physical and financial capital in support of alternate livelihoods. A preliminary model (see Fig. 1) attempts to integrate these elements by drawing on the findings of the previous research by the authors (see Khalil et al., 2016, Khalil et al., 2020) and will be populated and refined using the results obtained in the current paper.

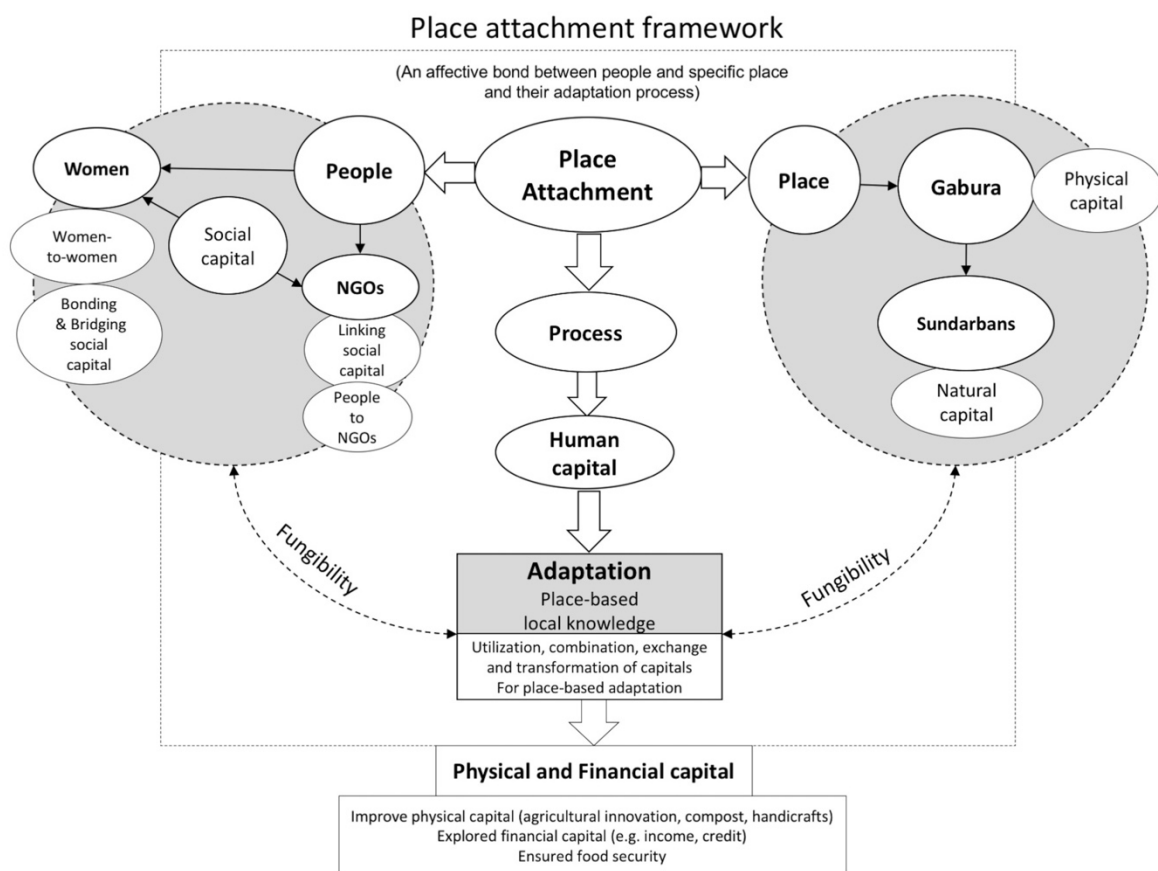


Fig. 1. A conceptual framework of place attachment.

Source: Drawn by lead author.

In the next section, the relationship of place attachment to the use and transformation of livelihood capitals is discussed as resources that are the product of a place and that reinforce place identity and dependence between women and Gabura. These aspects

of livelihood capitals and place attachment are important in considering place-based adaptation of women in the post-cyclone recovery context.

Livelihood capitals and place-based resources

The concept of livelihoods refers to 'making a life living' in order to secure the basic needs of everyday life (Allison & Ellis, 2001; Dehann & Zoomers, 2005), including material and social resources (Rakodi, 2002). People often migrate from one place to another to secure livelihoods (Olwig & Sorensen, 2003). For example, in the context of climate change in Bangladesh, people are influenced to migrate by various pull and push factors (such as food, water, paid employment, housing) (Alam & Miller, 2019; Mallick & Vogt, 2014; Mallick & Siddiqui, 2015) and to seek safety from environmental hazards (Black, 2001; Myers, 2002). Roy et al. (2016) estimated that every day at least 4,000 Bangladeshis move to cities seeking a safer life from extreme weather events. However, the ability to migrate is mediated by gender (Alam et al., 2020a). In many cases, husbands take migration pathways to the city for their livelihoods and economic opportunities, and often leave their families behind (Mallik et al., 2003). In the absence of their husbands, rural women struggle to make a living and rely on a limited range of local natural and livelihood resources (Alam et al., 2020b; Roy, 2012).

'Livelihood capitals' are place-based resources, consisting of five types of capitals (i.e. human, natural, physical, social and financial) (DFID, 1999; Ellis, 1999; Ellis, 2000; Scoones, 1998). Place-based values form over time in individuals and communities and develop into important environmental relationships that lead to an attachment to a place (Scannell & Gifford, 2017). In the context of poor rural households, access to place-based resources ensures that the basic needs are met (e.g. food security) to

secure their livelihood outcomes (Allison & Ellis, 2001; Ellis, 1999, 2000; Scoones, 1998). Of particular importance to rural households is natural capital, which refers to the supply of natural resources provided by nature (e.g. soil, water, biodiversity). Human capital refers to the knowledge, education, skill, experience and empowerment of individuals and communities and can incorporate indigenous knowledge (Scoones, 1998 p. 8). Social capital includes social connections, relationships and networking among actors (Islam and Walkerden, 2015; Scoones, 1998 p. 8). Other capitals, which may be more or less important depending on the context, are physical capital, which refers to the stock of manufactured 'production' produced by a transformation process that creates new forms of capital (e.g. housing, water supply, sanitation infrastructure) (Costanza & Daly, 1992 p. 41); and financial capital, which refers to money and access to the economy (Allison and Ellis, 2001; DFID, 1999; Scoones, 1998). In relation to five livelihood capitals, the 'Sustainable Livelihoods Approach' (SLA) is an important framework (Allison & Ellis, 2001; Chambers & Conway, 1992; DFID, 1999; Scoones, 1998) to address development in developing world contexts. Five types of livelihoods capitals and their roles are described in Table 1.

Table 1. Types of livelihood capitals and roles.

Types of capitals	Roles
Natural	Natural capital refers to stock of natural resources provided by nature (e.g. land, water, biodiversity, fish, shrimp, crab, honey)
Physical	Physical capital refers to stock of production; transformed natural capital into new forms of production by human capital (e.g. house, embankment, roads, water supply (pond-sand-filter), sanitation, fish traps, weaving materials for handicrafts, compost from natural resources)
Social	Social capital refers to social relationship (e.g. networks, bonds, norms and trust relationships among a community insiders (person-to-person, household members) and outsiders (i.e. NGOs).
Human	Human capital refers to the knowledge, skill, experience, capabilities and for action based labour in a community (e.g. education, knowledge, training, skills)
Financial	Financial capital refers to wealth and access to economy (e.g. income, credit, savings/debt etc.)

Source: Bourdieu, 1986; DFID, 1999; Scoones, 1998

An important aspect of the livelihoods approach is understanding how people use and manage livelihood capitals at household level through their relationship to place and through the interchange of capitals from one form into another to achieve livelihood outcomes (e.g. economic success and improved social wellbeing) (Ellis & Allison, 2004; Scoones, 1998). This interchange of livelihood capitals can be explained by ‘fungibility’ conceptualized by Lipton (1984), and synonymous with ‘fungible’, ‘interchangeable’ or ‘exchangeable’. The term ‘fungibility’ is often used by economists (e.g. Ellis, 1993; Lipton 1984) to describe a product that can be interchanged to economic benefit without being reduced in value. Following the concept of ‘fungibility’, place-based adaptation may be explained as a combination of livelihood capitals that

may be transformed in support of new ways of making a living that can reduce vulnerability (Fig. 1).

Livelihood capitals of a place can be transformed in two ways: first, the direct connections to a specific place through the care and management of available natural resources (e.g. care of trees, land, pond, fish, landscape, soil and ecology). Second, indirect connections among actors that influence access to forms of capital, requiring social capital relationships and networking, and exploitation of natural capital that can be transformed into other forms of capitals (e.g. financial and physical capital) through this social capital (Adger, 2003; Chambers and Conway, 1992; Scoones, 1998). Physical capital is the outcome of interacting social and human capital (DFID, 1999). Education is an important dimension of human capital through increasing access to information and knowledge. People and place dimensions of place attachment can be seen in the transformation of livelihood capitals and are shaped by the 'process' dimension leading to livelihoods outcomes (Ellis, 1993; Lipton, 1984).

For instance, people living in the coastal areas of Bangladesh, have access to a range of ecosystem services to sustain local livelihoods and other income generation opportunities. 'Sundarbans ecosystems' are the source of local livelihood capitals and place-based resources (Shameem et al., 2014). Coastal ecosystems reduce the impacts of disaster, regenerate after disasters, and continue to produce resources that may be transformed into new forms of livelihood capitals for human wellbeing (Adger et al., 2005). For the Gabura community, the natural capital of the Sundarbans ecosystem is not only a source of diversified livelihood capitals (e.g. fishing, crab, shrimp collection and honey harvesting) but a source of physical resources (e.g. for construction of household resources) and economic wellbeing (Shameem et al., 2014; Uddin et al., 2003). Before the cyclones (Sidr and Aila) only male household members

accessed the Sundarbans resources for livelihoods; whereas, after Aila women had to rely on their access to local resources and their ability to transform those resources into other forms of capital, a process facilitated through support from the NGOs (Roy, 2012; Roy et al., 2013, Khalil et al., 2020). Following Aila, the livelihoods trajectories of women had changed and exploitation of the natural capital of Sundarbans became a source of place-based resources and their best hope for the survival after their husbands relocated.

Intersection of place and women's adaptation

Place attachment theory enables exploration of the intersections between place-based livelihood capitals and place-based adaptation. Climate change act as a driver of adaptation and contributes to the establishment of place attachment, which is directly linked to factors such as physical, social, and environmental conditions (Amundsen, 2015; Rose, 1995). From a gender perspective, women are important actors in place-based adaptation and landscape management. In general, research has established that women play an important role as conservationists of natural resources (Agrawal, 1992, 2001; Jackson, 1993; Mies and Shiva, 1993; Moore, 2008; Roy, 2012; Shiva, 1986; Warren, 2000). For instance, women in India play an important role in land conservation and contribute to agricultural development (Narayanan & Kumar, 2007; Prasad & Singh, 1992) and can contribute to decision making about livelihoods transition through their engagement with nature (Bhandari, 2013). Women's involvement in household roles influences domestic planting of food crops and biodiversity conservation that could enhance place-based adaptation (Howard, 2003; Colfer and Minarchek, 2013 p. 418).

Traditionally women in coastal Bangladesh were engaged in the natural resource-based activities (such as, collection of wild food, fodder and fuelwood) (Bernier et al., 2016). After Aila due to the impacts of soil salinity on food production, women's engagement in horticulture activities was reduced (Bernier et al., 2016), rather they became involved in training programs to secure livelihoods opportunities through utilizing existing natural resources. In the post-cyclone context, in contrast to male household heads who often migrated to urban areas (Mallick & Vogt, 2014; Mallick & Siddiqui, 2017), women were tied (attached) to place due to social-cultural restrictions, (Ayeb-Karlsson et al., 2019; Rahman, 2013). For example, in most cases women were not permitted to evacuate in response to imminent tropical cyclones (Ayeb-Karlsson, 2020); only a third of women in coastal settlements routinely receive the evacuation orders (Parvin et al., 2019). Only after men had left were women able to play a decision-making role in resource management and contribute to economic wellbeing through empowerment and support for social capital (Ahmed et al., 2012; Boserup, 2007; Djoudi and Brockhaus, 2011). However, the resources available to support women's place-based adaptation were largely limited those available from the Sundarbans ecosystem as a source of economic well-being (Iftekhar and Islam, 2004; Iftekhar, 2006; Shameem et al., 2014). The role of natural capital in combination with forms of social capital (bonding ties with family, friends and community) (Brown et al., 2015; Cox and Perry, 2011) could be seen as central to strengthening place attachment (Lewicka, 2005) and reducing vulnerability.

In this paper, women's place-based adaptation is explored using place attachment theory in light of the activation of social capital through support networks, women's strong connection with the island ecology and the requirement for them to adapt in place in post-cyclone context.

Study area and methodology

The study area of Gabura Union (see Fig. 2) is located in Shyamnagar Upazila³ of Satkhira district⁴ under Khulna division, Bangladesh (Gabura Union, 2015). The Union covers an area of 85.5 square km and consists of 15 villages, and the total population is about 38,825 comprising approximately 7,500 households with an almost equal male-female ratio (male-19,307 and female-19,518) (Gabura Union, 2015). Due to the low-lying coastline landmass (i.e. almost 65% of the landmass is flood plain of total land) (Mallick et al., 2005), Gabura is frequently subject to storm surges, cyclone and annual flooding (Mallick et al, 2011; Parvin & Johnson, 2012). It was one of the most affected unions in Shyamnagar during cyclone Aila (category 1 cyclone) in 2009 (Gabura Union, 2015). The settlement is more than 100 years old and people are believed to have been living here for up to five generations (Parvin & Johnson, 2012).

³ The Upazilas are the second lowest tier of administrative unit of local Government in Bangladesh (Administrative geography of Bangladesh, 2020; Mallick et al., 2011). Shyamnagar Upazila is mostly affected during cyclone Aila.

⁴ The Districts are the first tier of administrative unit of local Government in Bangladesh (Administrative geography of Bangladesh, 2020; Mallick et al., 2011).

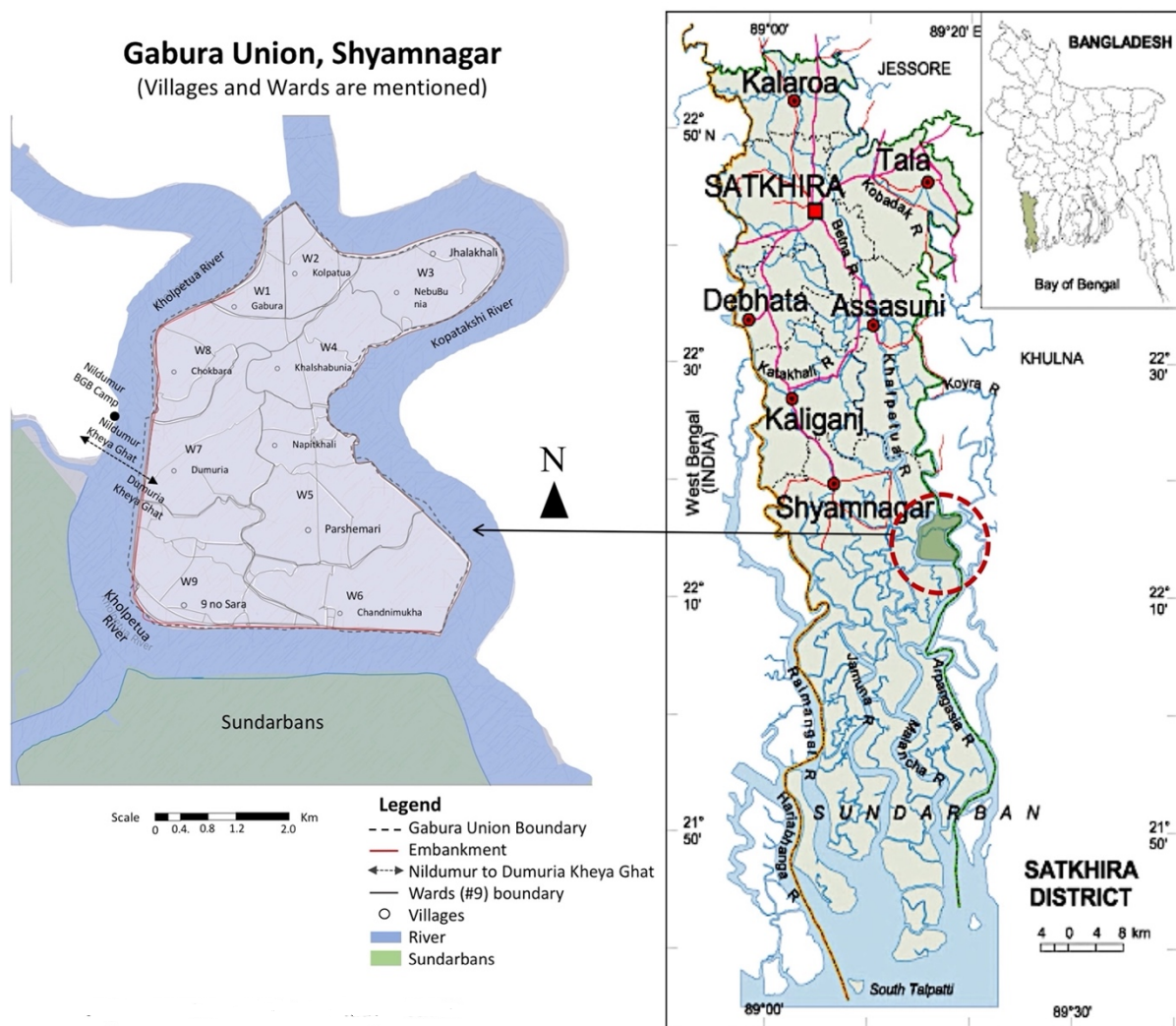


Fig. 2. Gabura Union, the study location is in Shyamnagar Upazila, Khulna Division, Bangladesh.

Source: Map adapted from Banglapedia, 2014 and drawn by lead author.

Gabura Union is completely surrounded by water and isolated by two rivers, i.e. Kholpetua and Kopatakshi located on the northern and western boundaries, and an embankment. To the south-west is Sundarbans⁵ (enlisted as UNESCO World Heritage

⁵ Sundarbans, occupy a large landmass and a dense forest, stressed across Bangladesh and India, covered an area of approximately 6,000 km² in the Bangladeshi part (Uddin et al., 2013 p.153). Sundarbans ecosystems served wildlife and mangroves (Iftekhara, 2006). Mangroves serve as a bio-shield protection to the coastal settlements and reduce climate disaster (i.e. cyclones and tidal surges) (Dasgupta et al., 2019; Irfanullah, 2020). More than three million coastal people's livelihoods are directly or indirectly relied on the ecosystem services of the Sundarbans (Uddin et al., 2003; Roy et al., 2013). Two major cyclones (i.e. Sidr in 2007 and Aila in 2009), reduced mangrove

Sites), one of the largest mangroves forests in the world (Iftekhar & Islam, 2004, see Fig. 3). Livelihoods here are closely connected to seasonal and place-based resources, mostly from the Sundarbans (e.g. fishing, shrimp and crab cultivation, honey collection) (Getzner and Islam, 2013; Mallik et al., 2011; Parvin & Johnson, 2012; Roy, 2018).

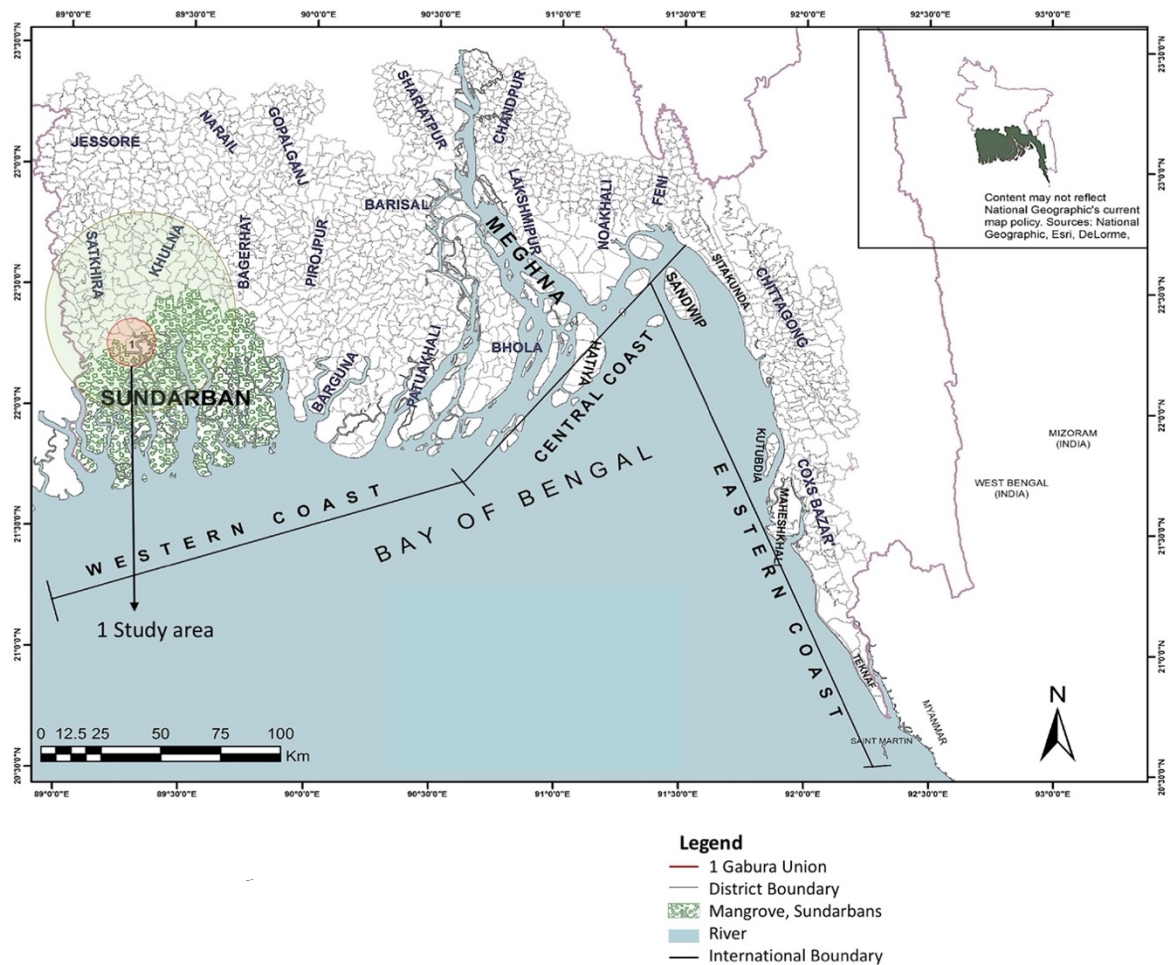


Fig. 3. The Sundarbans, adjacent to the study location of Gabura Union.

Source: Map adapted from Banglapedia, 2014 and Quader et al. (2017)

forestations and Increased soil salinization poses threats to coastal settlements and affect ecosystem services (Mallick et al., 2005; Shameem et al., 2014).

Historically, Gabura Island and its populations have been both socio-economically and biophysically vulnerable. The major sources of vulnerability stemmed from a failure of local authorities to prioritize health issues, with poor water quality through salinization, a lack of proper sanitation, and flooding frequently disrupting food production causing food insecurity (Roy et al., 2009). Increased soil salinity through inundation by seawater during Aila devastated coastal people's lives and livelihoods and completely destroyed their houses and household belongings (Gabura Union, 2015; Mallick et al., 2005). Parvin & Johnson (2012) reported that the natural process of sedimentation could not take place in Gabura due to construction of a high elevation embankment. Therefore, the island became lower than sea level and the green terrain in Gabura was turned to a salinity-affected grey island after cyclone Aila (Alam et al., 2015).

The increased soil salinity and changing climate patterns transformed coastal livelihoods with mixed outcomes. These changes included a shift from agriculture to greater reliance on water-based livelihoods practices (e.g. fishing, catching shrimp and crab farming etc.) in the Sundarbans and employment of local labour as seasonal wage workers (Moumita et al., 2015; Islam, 2006). Bernier et al. (2016) indicated that increased soil salinity after Aila resulted in an expansion of shrimp farming replacing agricultural practices. With male household member's migration to urban areas (Mallick et al., 2005) female household members began to work outside of their traditional roles to support their families financially (Khalil et al., 2020). Through their engagement with the Sundarbans ecosystem, this place provides an opportunity to study women's engagement in post-cyclone climate adaptation through the lens of place attachment (Roy, 2012).

This paper is a part of the lead author's PhD thesis⁶ from which it uses a section of analysis that is relevant to the understanding of women's place attachment and their adaptation processes in the post-cyclone context. The fieldwork took place from January to April in 2016. Data were collected through a mixed method approach (Creswell, 1999; Creswell and Clark, 2007) using face-to-face and semi-structured interviews with two group of participants: Gabura households (25) and NGO officials (18), household questionnaire survey (110), focus group discussions (04), and participant observations. Out of 110 household interviews, male members were absent in 66 cases, through migration to the nearest town or regional centre for employment. The fieldwork also involved key informant interviews (43) including the Chairman of Gabura Union and members of local government, local village leader (Morol), senior citizens, some selected local actors (e.g. local service provider, local trainer), international NGOs staff and some selected disaster practitioners and university academics. Participant households were selected purposively through snowball sampling (Atkinson & Flint, 2004). Some household participants (03) and an NGO staff also involved in walking and talking interviews to have a deeper understanding of their work settings and the networks and actors involved (Alam et al., 2020b; Anderson, 2004; Clark & Emmel, 2010; Kinney, 2017). Participant observations (Jorgensen, 2015) allowed to observe the villages and the community's actual settings closely without disturbing their normal life. The observations were continued through taking photographs. The issues were documented include the actions that were taken through NGOs in post-disaster recovery phase, and challenges faced by participant women, livelihoods conditions of the women and their adaptation processes. Following

⁶ The PhD thesis titled "women's role in adaptation to climate change in Bangladesh" was submitted in January 2021 and is now under examination.

ethics protocols provided by UTS, HREC (Human Research Ethics Committee), all interviews were audio recorded with participant's consent and data anonymized with participants identified through a self-selected pseudonym. Interview data were transcribed and translated into English from the native language (i.e. Bangla) for qualitative thematic analysis.

Results

The following statement illustrates the need to understand the place-based adaptation of women through place attachment:

"My husband lost his agricultural lands and travelled to the nearest city for a job after Aila. It was difficult for all five family members to move to the city. We can't afford to rent a single room or buy foods in the city. The NGOs helped to rebuild the damaged house. I get fish from local rivers and vegetables from my yard. I took some training on vegetable gardening and fish cultivation. My eldest son (18-year-old) started working outside. So, I'm here with my children."

[Alo, 43 years old female household]

The above statement is a common story of survival of many coastal women since 2009, when the category 1 cyclone Aila hit south western coastal Bangladesh. The extent of devastation to the social lives of the island communities in the south-western coastal areas, such as Gabura, caused by Aila was unimaginable. Aila devastated life, livelihoods and properties (Dasgupta et al., 2019; Kartiki, 2011). Most notably for these island communities, after the cyclone, most of the income-earning male members of

the community left their family members in the villages and moved to regional urban centres for alternate livelihoods (Mallick et al., 2005, Mallick & Siddiqui, 2015). For example, in Alo's case, it was a rational choice for her husband to leave the family in the village and explore economic opportunities in nearby cities. A significant portion of women faced such kinds of climate related impacts (e.g. economic hardship) in Bangladesh (Mallick & Siddiqui, 2015). However, for many female household heads like Alo, the decision to stay in the village and support her family was enabled through the utilisation of place-based livelihood resources.

For most of the female participants (n=66), husbands (about 60%) had migrated to urban centres (e.g. Satkhira, Khulna, Dhaka) for employment, which left these women alone with children and other extended family members (e.g. in-laws, brothers and sisters). In the absence of the main income earning members of the family, typically the male head of the household, the women struggled to provide for the family.

Place

People have been living in Gabura for many generations. Because of this long-term occupation, participating women were typically found to have extensive knowledge about the context and surroundings, the availability of natural capital (e.g. soil, landscape, water), and traditional livelihood techniques (e.g. from agriculture to shrimp and fish cultivation), the patterns of changes in the local weather over years and above all the resources available from the Sundarbans. For example, Tara, a household head, has been living in Gabura for the past 41 years. Her deep knowledge of the local environment helped her adapt after Aila. She explained:

“My husband was in the Sundarbans during Aila and didn’t return home. We even don’t know if he is alive or not. But I didn’t leave my village, my home. I am from here. I know every corner of the village - the rivers, the trees, this island - these all are my home. I can get fish from the local rivers and grow vegetables in my backyard. The house was rebuilt with NGO’s support, and I started living here again with my two children. I don’t need to pay house rent; it makes me feel relieved. I got some training from NGOs to get involved in works.”

[Tara, 41 years old female household head]

Tara’s statement describes her deep relationship to the place. Like other women in her village, she was comfortable to remain in place rather than face the uncertainty of an unknown place by migrating to the city. This place-based ‘belongingness’ is shaped by their experience, memories and attachment to the place. This finding is consistent with Blunt and Varley (2004) and Heywood (2005) who described how a place can be considered ‘home’ through physical experience and relevant memories.

Besides this emotional bond with the place, Gabura community’s livelihoods are ingrained in the natural capital of the Sundarbans ecosystem, that contributes diverse livelihoods resources. Similar findings were observed by Roy (2012) and Roy et al. (2013) in other contexts. Rekha, a household head, highlighted her livelihood dependency on the Sundarbans:

“If the Sundarbans survives, my family will survive, and we will sustain in this troubled place. My elder son (20 years old) started to catch crabs from the Sundarbans and sell them in the market;

it makes some money and reduces some burden on my shoulder. There are some seasonal opportunities in the crab fattening farm that I occasionally take. Sometimes I catch fish from the local rivers with my younger son. Materials for making a house are collected from the Sundarbans. NGOs helped plant mangroves on our lawns and near embankments to protect our house from future cyclones. The Sundarbans is our hope for survival.”

[Rekha, 39 years old female household]

Sundarbans hold a unique place value and contribute to life in Gabura by meeting a range of dependencies. The availability of natural resources supported the production of local handicrafts (Khalil et al., 2020), which were then sold and contributed to the financial capital of the community and ensured food security. The natural resources of Sundarbans ecosystems also contributed to physical capital for Gabura settlements by providing building materials (e.g. wood, straw, leaves) used to construct and maintain village shelters and dwellings. Kibria et al. (2019) described similar findings that coastal people’s wellbeing and livelihoods are linked to Sundarbans ecosystem services. Overall, place and the attachment of women to place plays a significant role in supporting a range of adaptations in the post-cyclone period.

People

Women in Gabura are central in family bonding relationships. Women sustained their households through their emotional attachment to family and the strong bonding ties with family members (e.g. Khalil et al., 2020). Participants revealed that the ability of women to secure basic needs from their surroundings (e.g. food, homestead fuel,

fodder and wild fruit) strengthened connections to their domestic setting at a time when these connections were stressed or disrupted through the deaths or absence of family members. This dependence on and knowledge of place reinforced women-to-women attachments, that in turn created an intimate feminine landscape at neighborhood level where material resources, information and local knowledge were shared with each other. These activities were considered critical supports for the community in the post-cyclone period. Moni explained her experiences:

“Alo, Tara, Rubi - we are living close and working together. Alo is my next-door neighbour. She has created a women’s platform, an opportunity for all of us with supports from NGOs. We have received credit on a turn basis by maintaining these relationships. Material supports also benefitted us. Rubi bought a sewing machine and started to make handicrafts. Alo and Tara maintained regular contact with NGOs and shared new ideas of livelihoods at monthly meetings. Through this relationship, I have benefitted financially and learned various farming knowledge. These and have given me psychological strength in my husband’s absence. These women’s platform strengthened our neighbourhood relationship after Aila.”

[Moni, 38 years old, female household]

Before Aila, women were constrained to the home and rarely went outside to seek economic opportunities, partly because of social and cultural restrictions but also because there was little need to seek outside employment as their husbands reserved the role of supporting the family. The absence of male household members influenced women to step outside of home for work and to establish and maintain links with

outsiders (i.e. NGOs). These linking relationships with NGOs reinforced women to become active, move forward and develop some novel adaptation strategies through engagement in training programs with NGOs (Khalil et al., 2020). Rubi stated:

“In the absence of my husband, my neighbour Alo involved me in their shared group and kept me alive by showing some livelihood sources. I took some training from a local NGO and started salt-tolerant vegetable gardening in my yard. The production was much slower but met my daily needs. Besides, I bought a sewing machine by receiving loans from an NGO and could secure alternate income sources. I sell products in the local market with the help of an NGO.”

[Rubi, 32 years old, female household]

In Gabura, women like Alo, Tara, Moni or Rubi are living next to each other. They meet in a regular monthly meeting (sometimes weekly) to stay connected to other household women. Similar findings by Lewicka (2005) illustrate that people in villages or small towns have a high level of interactions within their communities and neighbourhoods compared to an urban area. Their established social platform for women mobilized and enhanced bonding and bridging social capital, which in turn ensured the success of their decision to remain in place. The role of place-based support through connections to NGOs such as access to small loans (e.g. microcredit) to generate household business opportunities was also critical in allowing women to stay in place. The success of some women then also inspired other women to work together. These women-to-women social ties not only strengthened bridging and linking relationships but also reinforced the bonding relationships (Islam and Walkerden, 2014) within

families and led to successful adaptation capacity building in post-cyclone context (Khalil et al., 2020).

Process

People and place combined to promote the process of adaptation in the post-cyclone context. Underpinned by a number of studies (e.g. Johnson and Ruttan, 1992; Lebel, 2013) successful adaptation may be supported by place-based traditional or local knowledge. Gabura women possess place-based local knowledge and are geographically connected to changing climate patterns such as cyclone frequency and intensity (e.g. Aila in 2009 and Sidr in 2007). Moreover, the island ecosystem (i.e. Sundarbans) is a critical support system for women and reinforced place-based dependency. While Aila's impact forced male community members to move to cities, some women began a process of knowledge acquisition, inspired to explore the surrounding resources driven by the need to support surviving family members, the search for alternative livelihoods and their inability to relocate. For example, Alo stated her adaptation process in the post-Aila period:

"I had faced hardship during Aila. But I didn't lose hope and turned around again. After Aila, I started mending Nakshi Kantha (handcrafted mats). I had this knowledge from an early age. I started selling some of them in the weekly local market. But it wasn't enough to survive with three children in the absence of my man (husband). Then I took some training from a local NGO. Now I am working as a local trainer in an NGO. We have created a women's platform with NGOs' help, where we have 25 women

working. I recently bought a sewing machine with some financial support from that platform. It became my source of income. My neighbourhood women have benefitted and followed my success.”

[Alo, 43 years old female household]

Previously whereas women were seldom participating with outsiders, the post-cyclone context changed the traditional gender roles, influenced women to work outside of home, leveraged their social capital and involved them in building a meaningful relationship with community insiders (i.e. households and neighbourhoods) and outsiders (i.e. NGOs) (Islam and Walkerden, 2015; Khalil et al., 2020). This linking relationship empowered women to build on their traditional local knowledge and develop new skills (human capital).

The use and conversion of available livelihood capitals (social and natural capital) coupled to enhanced human capital helped women adapt in place. In search of alternative livelihood options, many women like Alo, Tara, and Rubi started learning through training facilities supported by NGOs about localised processes to convert available natural resources from Sundarbans. In understanding how adaptation in post-Aila period involves place-based resources, an NGO officer stated:

“I have been working with women in Gabura for the last five years and have noticed that these women have a more profound attachment to the place and surroundings. They know their culture, traditional knowledge and patterns of climate change. Their livelihoods are linked to the Sundarbans' resources. After Aila, the women started to explore these Sundarbans-based

livelihoods more to ensure food security. We (NGOs) supported them with various livelihoods training (e.g. salt-tolerant farming method). Some women, such as, Alo, Rubi succeeded by applying these methods. We believe that more positive results can come with proper application.”

[NGO officer]

One of the main drivers of new agricultural practices was soil salinization following Aila. The process of adapting to salinized soils transformed the typical agricultural practices to a greater reliance on ‘water-based’ livelihoods. These included small-scale fisheries and crab cultivation and have contributed to food security and economic wellbeing of these coastal women. Socio-ecological alteration is the reason for this transformation of livelihoods practice from land-based to water-based food production (Bernier et al., 2016). An NGO staff member in Gabura explained his experience of connections with these coastal women after Aila:

“It wasn’t easy to connect with these affected women initially due to different socio-cultural constraints. Aila changed the pre-existing situation. Women needed to secure food while their husbands were away. We had to establish trust for these women’s involvement. We had selected several women in leading roles who had the potential to train up other women. At the monthly meeting, we noticed that 80% of the participants were women. If we can regularly connect with these women with training and material support; their livelihoods and food security will be ensured.”

[NGO officer]

Findings revealed that the women in Gabura are tied to place with a long history (over four or five generations). Parvin and Johnson (2012) mentioned the settlement at Gabura Union is more than 100 years old. This long-time relationship influenced them to remain attached to the island and encouraged the process of acquisition of new skills to supplement their traditional knowledge of the island ecology in support of post-cyclone adaptation strategies.

Discussion

In this paper, women's place-based adaptation in the post-cyclone recovery context of Gabura was examined by using the lens of place attachment. Place attachment is conceptualized following the tripartite model, 'person-place-process' (Scannell & Gifford, 2010). Underpinned by previous studies on place attachment (Amundsen, 2015; Fresque-Baxter & Armitage, 2012; O'Brien et al., 2004) we argue that both the processes of place attachment and place-based adaptation are interlinked and there is value in looking into their intersections to understand post-disaster adaptation. In Gabura, following the cyclone Aila, place-based adaptation occurred through a number of interconnections of context and scale: 1) attachment to home; 2) attachment of people-to-people (e.g. neighbourhood and outsiders); 3) attachment to the natural resources.

Traditionally, women in Gabura have deep attachment to their families associated with their domestic responsibilities within home and surrounding landscape. Considering the people dimension of place attachment, Gabura women's interconnectedness with home promoted relationships at the neighbourhood level, a similar finding to that of Anton and Lawrence (2014) in an Australian context. These attachments created an

intimate 'bridging' relationship at the neighborhood level that influenced women to engage in other livelihood activities by forming groups with other women, in the absence of key wage-earning male members of the family. These bridging relationships at the neighbourhood level strengthened other relationships (e.g. bonding relationship) among the family members that held families together and strengthened attachment to place; similar findings were explored by Prezza et al. (2001) and Lewicka (2005). These women-to-women neighbourhood relationships influenced the establishment of knowledge sharing platforms and work outside of home through connections with outsiders (i.e. NGOs) and enhanced place-based adaptation based on local natural resources. Local NGOs played a supportive role for Gabura women in post-cyclone context in the use and transformation of local resources (capitals). Similar examples drawn by Goodrich et al. (2017) and (2019) in the context of Hindu-Kush Himalayas explained how the contextual situations lead to gender vulnerability and changes, such as the migration of male members forcing women to take on new roles and responsibilities with supports from NGOs.

With the help of NGOs, trust and linking relationships were established, and women trained in alternate and natural resource-based livelihood opportunities (Khalil et al., 2020). Women's shared local knowledge coupled with NGO training resulted in social transformation at the neighbourhood-level where women used their limited but accessible, place-based resources to secure livelihoods. These contributions deepened women's attachment to Gabura. Similar examples are also documented by Narayanan and Kumar (2007), the relationship of women to the natural resources of their surroundings and their traditional knowledge influenced place dependence.

The application of place attachment theory helped explain how these marginalised women could achieve place-based, post-disaster adaptation (e.g. salt tolerant

agricultural innovation) by capitalising on place specific resources and knowledge. Gabura is an important place for this coastal community in two ways: first, the natural resources of Sundarbans ecosystems play a direct and indirect role in providing livelihoods to these climate-marginalised people. The livelihoods resources of the Sundarbans, such as fish, shrimp, crab, honey, food, firewood and habitat resources (e.g. timber, wood, straw, golpata⁷ [*Nipa fruticans*] etc.) (Getzner & Islam, 2013; Shameem et al., 2014; Uddin et al., 2013) contributed to the 'place' dimension of place attachment. The availability of resources from the island's ecosystem has reinforced place dependence as critical support systems for women to remain in place. The finding echoes with previous studies (Ahammad et al., 2013; Uddin et al., 2013) that argued for the importance of place-based eco-systems (e.g., mangrove forests and the river system) in protecting exposed coastal communities from natural disasters.

Additionally, many local and international NGOs are working in Gabura (e.g. local NGOs: Dhaka Ahsania Mission, Susilon, World Vision, NGF, JCF; NGOs: CREL, CNRS, BRAC)⁸ have helped the coastal communities explore opportunities to utilise and transform the natural capital of the Sundarbans to improve livelihoods. These interventions by aid organisations have led to success in the cultivation of salt-tolerant vegetables, crabs and shrimp cultivation in saline water. These innovative approaches involve a combination of social, natural and human capitals that ultimately transform into physical and financial capitals that ensure food security and form the basis of place-based adaptation for women. This observation is consistent with previous

⁷ Golpata, a species of nipa palm (*Nypa fruticans*), grows in the Sundarbans. The leafy plant is used for thatching and fencing.

⁸ NGF-Nowabanki Gonomukhi Foundation, JCF-Jagoroni Chakra Foundation, CREL-Climate-Resilient Ecosystems and Livelihoods, CNRS-Centre for Natural Resource Studies, BRAC-Bangladesh Rural Advancement Committee and NGOs-Non-Government Organizations.

findings on the contribution of different types of capital to economic development and social wellbeing (Dakhli and De Clercq, 2004; Mulder et al., 2006).

Inspired by the findings, an analytical framework is conceptualised (see Fig. 4) following the tripartite model of the 'person-place-process' dimensions, which describes how women as the 'people' dimension are attached to Gabura villages and surroundings (e.g. the Sundarbans) as the 'place' dimension. The framework illustrates place-based adaptation (including a set of livelihood outcomes), as resulting from multilevel social connections among 'people' (e.g. women and NGOs), the 'place' (i.e. Gabura, located beside Sundarbans) and its natural resource endowments, and the 'process' of the transformation of capital from one form (social and natural capital) into other forms (physical and financial capital) via knowledge sharing (human capital).

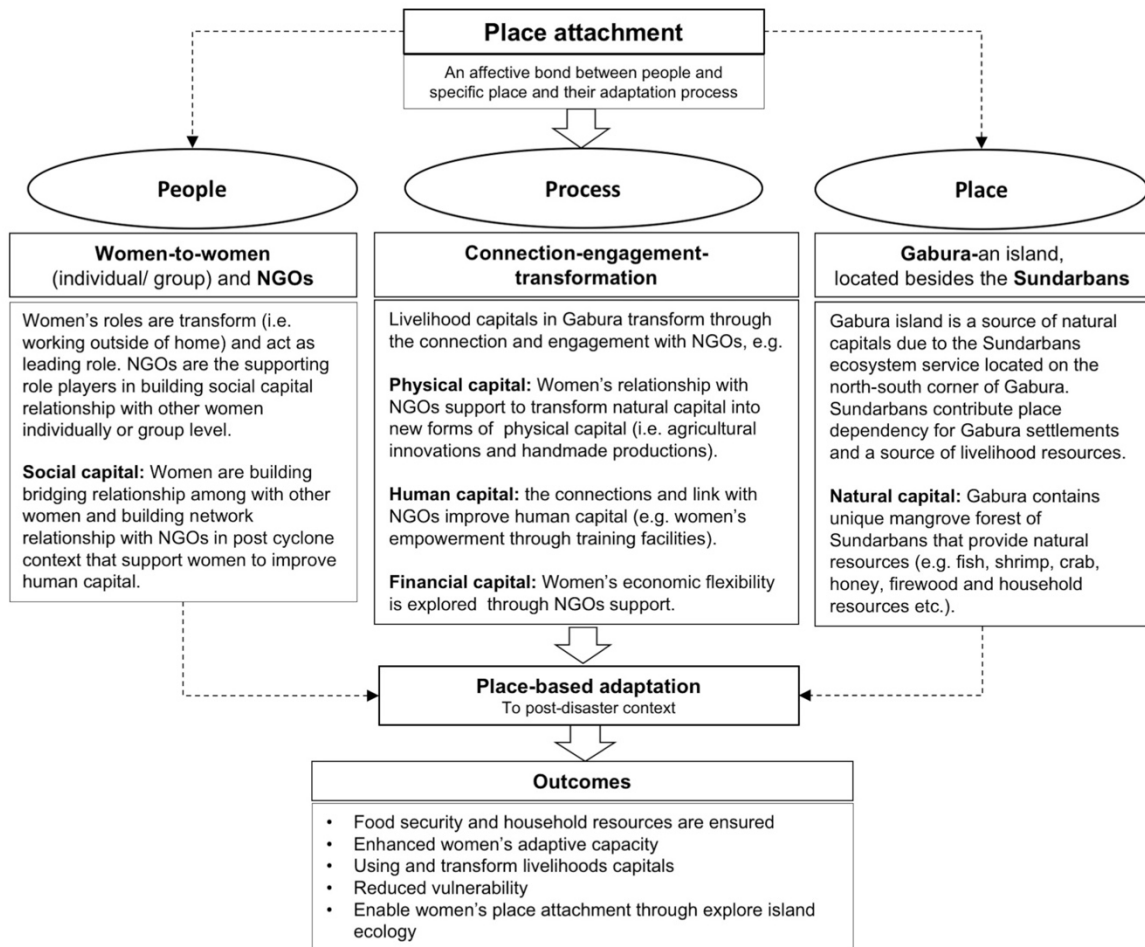


Fig. 4. The role of place attachment for place-based adaptation in post-cyclone context.

Source: Drawn by lead author.

NGOs are supporting these women in this transformation in two ways. First, the NGOs often helped women gain access to the natural capital collection of the Sundarbans, then helped them transform natural capitals into physical and financial capital (i.e. agricultural innovations and handmade productions). Thus, food security, household resources and economic well-being were ensured. Second, NGOs supported women's empowerment through training in livelihoods programs (e.g. salt tolerant agricultural cultivation, fish or shrimp farming etc.) and thereby improved human capital (i.e. women's empowerment through training facilities) and enhanced social

capital (e.g. bonding and bridging relationship). With the NGO support women's financial capital was ensured through handmade production that was not previously a commercial activity.

The coastal women of Gabura (e.g. Alo, Tara or Moni) have been attached to this place since birth and the continued residence of their families over generations. The long-term connection of women with the local context has transformed their ways of thinking about the island ecology, increased their potential in the search for livelihoods based on traditional knowledge and understanding of climate. This knowledge of landscape, biodiversity and surroundings was important for these women to recover from the effects of the cyclone and adapt to the dramatically altered environment in the post-cyclone context. Similar findings were described by Mugambiwa (2018) that traditional knowledge, place-based resources, social relationships and kinship are important components in the process of adaptation. Consistent with other literature (e.g., Howard 2003; Narayanan and Kumar, 2007), the integral connection between women and biodiversity can enhance place-based adaptation through the use of traditional knowledge and resources from the surrounding landscapes. These findings are particularly significant because it is beyond this poor coastal community's capacity to move to cities with 5-6 family members and pay for shelter and food. Research by Mallick et al. (2017) and Mallick and Siddiqui (2015) reported the value of non-migration in successful in-situ adaptation emphasising the utility of place attachment as a tool to understand adaptation changes in communities. Thus, this paper makes an important contribution in highlighting the role of women's place attachment in understanding their place-based adaptation in the post-cyclone recovery context because of their relative inability to migrate following a natural disaster.

Conclusion

The study examined how place attachment played a role in enabling women's adaptation in a post-cyclone context. The findings suggest that although socio-cultural norms restricted Gabura women from migration, they could manage to adapt through the use, conversion and transformation of place-based livelihood resources. Of these resources, forms of social capital were critical for these women to embark on alternative livelihoods and innovations, such as the change from land-based to water-based livelihoods and adapt to salt-tolerant agricultural innovations and commercial production of traditional handicrafts. Women's place dependence, a component of place attachment, was demonstrated through the necessity to utilise the local natural capital of the Sundarbans (as one of the few resources at their disposal). Their knowledge of the island ecology enabled their survival in the absence of the male household heads. Women were able to take on less traditional leadership roles at the village level. Rather than seeing their inability to leave a place after a disaster as a disadvantage, a place-attachment approach revealed women's capacity to transform in place, where the post-cyclone necessities and constraints were drivers for such transformation.

As practical implications, the findings highlight the need for greater consideration of gender inclusive pathways for post-disaster recovery that focuses on in-situ potentials to include the place-based natural capital (e.g., the Sundarbans) and those immobile actors, women in our case who are often deemed incapable of changing their circumstances. We argue that the local government actors, NGOs and INGOs who work with these coastal communities should focus more on enabling and empowering women household heads for post-disaster recovery. A key lesson from this study, reinforced by previous studies (Khalil et al., 2016, 2020), is that NGOs and traditionally

marginalized actors (typically women), can build successful partnership that encourage innovation in the use of natural capital. There should be diversification of supports (e.g. financial, physical and social capital) to cater to both women and men. Appropriate place-based livelihoods support may discourage male members' out-migration, thereby reducing the disruption to the community's demographic fabric.

As a point of departure, we highlight some specificities of the present study and future research agenda. We acknowledge that this study is based on a unique coastal settlement because of its geographic proximity to the Sundarbans, which significantly enabled women's place-based adaptation through the availability of natural resources. The findings may not be generalised for other coastal settlements that lack similar natural capitals making place-based adaptation difficult. Future studies could examine the contribution of remittances by male members to women's adaptation in origin. There could be a comparison of adaptation pathways by families with absentee male members and those where both male and female household heads are present. Longitudinal studies could focus more on if the women's successful place-based adaptation encouraged the male member's return to the origin and how both male and female members could enhance adaptation by utilising their social networks within the village. We conclude by highlighting the importance of employing the place attachment lens for more gender-inclusive pathways for place-based adaptation in a post-cyclone context.

References

Adger, W. N. (2003). Social aspects of adaptive capacity. In *Climate change, adaptive capacity and development* (pp. 29-49). UK.
https://doi.org/10.1142/9781860945816_0003

- Adger, W. N., Hughes, T. P., Folke, C., Carpenter, S. R., & Rockström, J. (2005). Social-ecological resilience to coastal disasters. *Science*, 309(5737), 1036-1039.
- Administrative geography of Bangladesh (2020). Retrieved from, https://en.wikipedia.org/wiki/Administrative_geography_of_Bangladesh
<http://www.bangladesh.gov.bd/?q=en>
- Agarwal, B. (1992). The gender and environment debate: lessons from India. *Feminist Studies*, 18(1), 119-158.
- Agarwal, B. (2001). Participatory exclusions, community forestry, and gender: An analysis for South Asia and a conceptual framework. *World Development*, 29(10), 1623-1648.
- Ahmed, M. K., Halim, S., & Sultana, S. (2012). Participation of women in aquaculture in three coastal districts of Bangladesh: Approaches toward sustainable livelihood. *World Journal of Agricultural Sciences*, 8(3), 253-268.
- Ahammad, R., Nandy, P., & Husnain, P. (2013). Unlocking ecosystem based adaptation opportunities in coastal Bangladesh. *Journal of Coastal Conservation*, 17(4), 833-840.
- Alam A, Asad R and Parvin A. (2015). Climate change adaptation through grassroots responses: learning from the “Aila” affected coastal settlement of Gabura, Bangladesh. In: Leal Filho W (ed) Handbook of Climate Change Adaptation. Springer-Verlag Berlin Heidelberg, 2011-2034.
- Alam, A., McGregor, A., & Houston, D. (2020a). Neither sensibly homed nor homeless: Re-imagining migrant homes through more-than-human relations. *Social & Cultural Geography*, 21(8), 1122-1145.
- Alam, A., McGregor, A., & Houston, D. (2020b). Women’s mobility, neighbourhood socio-ecologies and homemaking in urban informal settlements. *Housing Studies*, 35(9), 1586-1606. DOI:10.1080/02673037.2019.1708277
- Alam, A., & Miller, F. (2019). Slow, small and shared voluntary relocations: Learning from the experience of migrants living on the urban fringes of Khulna, Bangladesh. *Asia Pacific Viewpoint*, 60(3), 325-338.
- Allison, E. H., & Ellis, F. (2001). The livelihoods approach and management of small-scale fisheries. *Marine Policy*, 25(5), 377-388.
- Alam, K., & Rahman, M. H. (2014). Women in natural disasters: a case study from southern coastal region of Bangladesh. *International Journal of Disaster Risk Reduction*, 8, 68-82.
- Altman, I. & Low, S. M., & (1992). Place attachment. In I. Altman & S. M. Low (Eds). *Human behaviour and environment* (V. 12). Springer, Plenum Press, New York and London.
- Amundsen, H. (2015). Place attachment as a driver of adaptation in coastal communities in Northern Norway. *Local Environment*, 20(3), 257-276.
- Anderson, J. (2004). Talking whilst walking: a geographical archaeology of knowledge. *Area*, 36(3), 254-261.
- Anton, C. E., & Lawrence, C. (2014). Home is where the heart is: The effect of place of residence on place attachment and community participation. *Journal of Environmental Psychology*, 40, 451-461.

- Atkinson, R., & Flint, J. (2004). Snowball sampling. In M. S. Lewis-Beck, A. Bryman, & T. F. Liao (Eds.). *The Sage encyclopedia of social science research methods* (pp. 1043–1044). London, England.
- Ayeb-Karlsson, S., Kniveton, D., Cannon, T., van der Geest, K., Ahmed, I., Derrington, E. M., ... & Opondo, D. O. (2019). I will not go, I cannot go: cultural and social limitations of disaster preparedness in Asia, Africa, and Oceania. *Disasters*, 43(4), 752-770.
- Ayeb-Karlsson, S., Kniveton, D., & Cannon, T. (2020). Trapped in the prison of the mind: Notions of climate-induced (im) mobility decision-making and wellbeing from an urban informal settlement in Bangladesh. *Palgrave Communications*, 6(1), 1-15.
- Bernier, Q., Sultana, P., Bell, A. R., & Ringler, C. (2016). Water management and livelihood choices in southwestern Bangladesh. *Journal of Rural Studies*, 45, 134-145.
- Bhandari, P. B. (2013). Rural livelihood change? Household capital, community resources and livelihood transition. *Journal of Rural Studies*, 32, 126-136.
- Blunt, A., & Varley, A. (2004). Geographies of home: introduction. *Cultural Geographies*, 11(1), 3-6.
- Black, R. (2001). Environmental Refugees: Myth or Reality? New Issues in Refugee Research Working Paper 34, United Nations High Commissioner for Refugees, Geneva.
- Bourdieu, P. (1986). "Forms of Capital", in John G. Richardson (ed.), *Handbook of Theory and Research for the Sociology of Education*. Greenwood, New York.
- Boserup (2007). *Woman's role in economic development*. Earthscan, London, New York.
- Brandenburg, A. M., & Carroll, M. S. (1995). Your place or mine?: The effect of place creation on environmental values and landscape meanings. *Society & Natural Resources*, 8(5), 381-398.
- Brown, G., Raymond, C. M., & Corcoran, J. (2015). Mapping and measuring place attachment. *Applied Geography*, 57, 42-53.
- Brown B.B., & Perkins, D.D. (1992). Disruptions in Place Attachment. In: Altman I., Low S.M. (eds). *Place Attachment. Human Behavior and Environment (Advances in Theory and Research)*, vol 12. Springer, Boston, MA.
- Chambers, R. and Conway, R. (1992). Sustainable rural livelihoods: Practical concepts for the 21st century. *IDS discussion paper*, 296, 127-130.
- Clark, A., & Emmel, N. (2010). Using walking interviews. *Realities*, 13, 1-6.
- Costanza, R., & Daly, H. E. (1992). Natural capital and sustainable development. *Conservation Biology*, 6(1), 37-46.
- Colfer, C. J. P., & Minarchek, R. D. (2013). Introducing 'the gender box': a framework for analysing gender roles in forest management. *International Forestry Review*, 15(4), 411-426.

- Cox, R. S., & Perry, K. M. E. (2011). Like a fish out of water: Reconsidering disaster recovery and the role of place and social capital in community disaster resilience. *American Journal of Community Psychology*, 48(3-4), 395-411.
- Creswell, J. W. (1999). Mixed-method research: Introduction and application. In C. Ciznek (Ed.), *Handbook of educational policy* (pp. 455-472). San Diego, CA: Academic Press.
- Creswell, J. W., & Clark, V. L. P. (2007). *Designing and conducting mixed methods research* (3rd ed.). London, Sage publication.
- Dasgupta, S., Islam, M. S., Huq, M., Huque Khan, Z., & Hasib, M. R. (2019). Quantifying the protective capacity of mangroves from storm surges in coastal Bangladesh. *Plos One*, 14(3), e0214079.
- Dakhli, M., & De Clercq, D. (2004). Human capital, social capital, and innovation: a multi-country study. *Entrepreneurship & Regional Development*, 16(2), 107-128.
- Dehann, L., & Zoomers, A. (2005). Exploring the Frontier of Livelihoods Research. *Development and Change*, 36, 27-47.
- Denton, F. (2002). Climate change vulnerability, impacts, and adaptation: Why does gender matter? *Gender & Development*, 10(2), 10-20.
- Devine-Wright, P., & Clayton, S. (2010). Introduction to the special issue: Place, identity and environmental behaviour. *Journal of Environmental Psychology*, 3(30), 267-270.
- DFID. (1999). *Sustainable livelihoods guidance sheets*. Department for International Development; London: UK.
- Dixon, J., & Durrheim, K. (2000). Displacing place-identity: a discursive approach to locating self and other. *British journal of social psychology*, 39(1), 27-44.
- Djoudi, H., & Brockhaus, M. (2011). Is adaptation to climate change gender neutral? Lessons from communities dependent on livestock and forests in northern Mali. *International Forestry Review*, 13(2), 123-135.
- Ellis, F. (1999). *Rural livelihood diversity in developing countries: evidence and policy implications*, Overseas Development Institute London.
- Ellis, F. (2000). The determinants of rural livelihood diversification in developing countries. *Journal of agricultural economics*, 51(2), 289-302.
- Ellis, F., & Allison, E. (2004). *Livelihood diversification and natural resource access*. Overseas Development Group, University of East Anglia.
- Florek, M. (2011). No place like home: Perspectives on place attachment and impacts on city management. *Journal of Town & City Management*, 1(4), 346-354.
- Fresque-Baxter, J. A., & Armitage, D. (2012). Place identity and climate change adaptation: a synthesis and framework for understanding. *Wiley Interdisciplinary Reviews: Climate Change*, 3(3), 251-266.
- Gabura Union. (2015). At one glance, Gabura. Retrieved from <http://gaburaup.satkhira.gov.bd/site/page/59f665e7-1c4b-11e7-8f57-286ed488c766/একনজরেগাবুরা>

- Getzner, M., & Islam, M. S. (2013). Natural resources, livelihoods, and reserve management: a case study from Sundarbans mangrove forests, Bangladesh. *International Journal of Sustainable Development and Planning*, 8(1), 75-87.
- Giuliani, M. V. (2003). Theory of attachment and place attachment. In M. Bonnes, T. Lee, & M. Bonaiuto (Eds.), *Psychological theories for environmental issues* (pp. 137-170). Aldershot, UK: Ashgate.
- Gosling, E., & Williams, K. J. (2010). Connectedness to nature, place attachment and conservation behaviour: Testing connectedness theory among farmers. *Journal of Environmental Psychology*, 30(3), 298-304.
- Goodrich, C. G., Prakash, A., & Udas, P. B. (2019). Gendered vulnerability and adaptation in Hindu-Kush Himalayas: Research insights. *Environmental Development*, 31, 1-8.
- Goodrich, C. G., Manjari, M., & Suman, B. (2017). Status of gender, vulnerabilities and adaptation to climate change in the Hindu Kush Himalaya: impacts and implications for livelihoods, and sustainable mountain development (2017). ICIMOD Working Paper, (2017/3). Kathmandu.
- Heywood, F. (2005). Adaptation: Altering the house to restore the home. *Housing Studies*, 20(4), 531-547.
- Hidalgo, M. C., & Hernandez, B. (2001). Place attachment: Conceptual and empirical questions. *Journal of Environmental Psychology*, 21(3), 273-281.
- Howard, P. (2003). The major importance of 'minor' resources: Women and plant biodiversity. London, UK: International Institute for Environment and Development (IIED).
- Iftexhar, M. S., & Islam, M. R. (2004). Managing mangroves in Bangladesh: A strategy analysis. *Journal of Coastal Conservation*, 10(1), 139-146.
- Iftexhar, M. S. (2006). Conservation and management of the Bangladesh coastal ecosystem: overview of an integrated approach. *Natural Resources Forum*. 30(3), 230-237. Oxford, UK: Blackwell Publishing Ltd.
- Irfanullah, H. M. (2020). It's time for the Sundarbans. World Environment Day, Daily Star. Retrieved from, <https://www.thedailystar.net/opinion/news/its-time-the-sundarbans-1908989>.
- Islam, R., & Walkerden, G. (2014). How bonding and bridging networks contribute to disaster resilience and recovery on the Bangladeshi coast. *International Journal of Disaster Risk Reduction*, 10, 281-291.
- Islam, R., & Walkerden, G. (2015). How do links between households and NGOs promote disaster resilience and recovery?: A case study of linking social networks on the Bangladeshi coast. *Natural Hazards*, 78(3), 1707-1727.
- Johnson, M., & Ruttan, R. A. (1992). Traditional environmental knowledge of the Dene: A pilot project. In *Lore: capturing traditional environmental knowledge*. IDRC, Ottawa, ON, CA.
- Jordan, J. C. (2019). Deconstructing resilience: why gender and power matter in responding to climate stress in Bangladesh. *Climate and Development*, 11(2), 167-179.

- Jorgensen, D. L. (2015). Participant observation. *Emerging trends in the social and behavioral sciences: An interdisciplinary, searchable, and linkable resource* (pp. 1-15). New York: John Wiley.
- Kartiki, K. (2011). Climate change and migration: a case study from rural Bangladesh. *Gender & Development, 19(1)*, 23-38.
- Kelly, J. R., & Barsade, S. G. (2001). Mood and emotions in small groups and work teams. *Organizational behavior and human decision processes, 86(1)*, 99-130.
- Khalil, M., Jacobs, B., & Kuruppu, N. (2016). 'Grassroots Technologies and Community Trust in Climate Change Adaptation: Learning from Coastal Settlements of Bangladesh' in Leal Filho, W (ed), *Innovation in Climate Change Adaptation* (pp. 297-311). Springer, Hamburg, Germany.
- Khalil, M. B., Jacobs, B. C., McKenna, K., & Kuruppu, N. (2020). Female contribution to grassroots innovation for climate change adaptation in Bangladesh. *Climate and Development, 12(7)*, 664-676. DOI: 10.1080/17565529.2019.1676188
- Kibria, A. S., Costanza, R., Groves, C., & Behie, A. M. (2019). Does higher access ensure greater wellbeing? In the perspective of forest ecosystem services of the Sundarbans mangrove forest, Bangladesh. *Ocean & Coastal Management, 177*, 22-30.
- Kinney, P. (2017). Walking interviews. *Social research update, 67*, 1-4.
- Kruger, L. E., & Williams, D. R. (2007). Place and place-based planning. In: Kruger, L. E.; Mazza, R; Lawrence, K. (eds) (pp.83-88). *Proceedings: National workshop on recreation research and management*. Gen. Tech. Rep. PNW-GTR-698. Portland.
- Kyle, G., Graefe, A., Manning, R., & Bacon, J. (2004). Effects of place attachment on users' perceptions of social and environmental conditions in a natural setting. *Journal of Environmental Psychology, 24(2)*, 213-225.
- Lalli, M. (1992). Urban-related identity: Theory, measurement, and empirical findings. *Journal of Environmental Psychology, 12(4)*, 285-303.
- Lebel, L. (2013). Local knowledge and adaptation to climate change in natural resource-based societies of the Asia-Pacific. *Mitigation and Adaptation Strategies for Global Change, 18(7)*, 1057-1076.
- Lewicka, M. (2005). Ways to make people active: The role of place attachment, cultural capital, and neighborhood ties. *Journal of Environmental Psychology, 25(4)*, 381-395.
- Lipton M. (1984). Family, Fungibility and Formality: Rural advantages of informal non-farm enterprise versus the urban-formal state. In: Amin S. (eds.), *Human Resources, Employment and Development* (Vol. 5, pp 189-242). *Developing Countries*. International Economic Association Series. Palgrave Macmillan, London. https://doi.org/10.1007/978-1-349-17461-4_10
- Low, S. M. (1992). Symbolic ties that bind. In: Altman I., Low S.M. (eds), *Place attachment. Human behavior and environment (Advances in theory and research)* (Vol. 12, pp. 165-185). Springer, Boston, MA.
- Mallick, B., Rahaman, K. R., & Vogt, J. (2011). Coastal livelihood and physical infrastructure in Bangladesh after cyclone Aila. *Mitigation and Adaptation Strategies*

for Global Change, 16(6), 629-648.

Mallick, B., & J. Vogt (2014). Population displacement after cyclone and its consequences: Empirical evidence from coastal Bangladesh. *Natural Hazards*, 73(2), 191-212.

Mallick, B., Ahmed, B., & Vogt, J. (2017). Living with the risks of cyclone disasters in the south-western coastal region of Bangladesh. *Environments*, 4(1), 13

Mallick, B., & Siddiqui, T. (2015). Disaster-Induced Migration and Adaptation Discourse in Bangladesh. In: Hillmann F., Pahl M., Rafflenbeul B., Sterly H. (eds). *Environmental Change, Adaptation and Migration* (pp. 164-185). Springer, Palgrave Macmillan, London.

Mallick, D. L., Rahman, A., Alam, M., Juel, A. S. M., Ahmad, A. N., & Alam, S. S. (2005). Case study 3: Bangladesh floods in Bangladesh: A shift from disaster management towards disaster preparedness. *IDS Bulletin*, 36(4), 53-70.

Marschke, M. J., & Berkes, F. (2006). Exploring strategies that build livelihood resilience: a case from Cambodia. *Ecology and Society*, 11(1), 1-16.

Mies, M., & Shiva, V. (1993). *Ecofeminism*, Zed Books: London.

Moore, N. (2008). The rise and rise of ecofeminism as a development fable: a response to Melissa Leach's 'Earth Mothers and Other Ecofeminist Fables: How a Strategic Notion Rose and Fell'. *Development and Change*, 39(3), 461-475.

Moumita, C., Biswas, B. K., & Muktedir, H. (2015). Nutritional Status of Women Living at South-west Coastal Belt of Satkhira Bangladesh. *Journal of Environmental Science and Natural Resources*, 8(2), 41-46.

Mugambiwa, S. S. (2018). Adaptation measures to sustain indigenous practices and the use of indigenous knowledge systems to adapt to climate change in Mutoko rural district of Zimbabwe. Jàmbá: *Journal of Disaster Risk Studies*, 10(1), 1-9.

Mulder, K., Costanza, R., & Erickson, J. (2006). The contribution of built, human, social and natural capital to quality of life in intentional and unintentional communities. *Ecological Economics*, 59(1), 13-23

Myers, N. (2002). Environmental refugees: a growing phenomenon of the 21st century. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, 357(1420), 609-613.

Narayanan, M., & Kumar, N. (2007). Gendered knowledge and changing trends in utilization of wild edible greens in Western Ghats, India. *Indian Journal of Traditional Knowledge*, 6(1), 204-216.

Olwig, K. F., & Sorensen, N. N. (2003). *Work and migration: Life and livelihoods in a globalizing world*. Routledge.

O'Brien, K., Leichenko, R., Kelkar, U., Venema, H., Aandahl, G., Tompkins, H., ... & West, J. (2004). Mapping vulnerability to multiple stressors: climate change and globalization in India. *Global Environmental Change*, 14(4), 303-313.

Parvin, A., & Johnson, C. (2012). Learning from the indigenous knowledge: towards disaster-resilient coastal settlements in Bangladesh. In Proceedings of the 1st international conference on urban sustainability and resilience, University College London.

- Parvin, G. A., & Ahsan, S. R. (2013). Impacts of climate change on food security of rural poor women in Bangladesh. *Management of Environmental Quality*, 24(6), 802–814. doi:10.1108/MEQ-04-2013-0033
- Parvin, G. A., Sakamoto, M., Shaw, R., Nakagawa, H., & Sadik, M. S. (2019). Evacuation scenarios of cyclone Aila in Bangladesh: Investigating the factors influencing evacuation decision and destination. *Progress in Disaster Science*, 2, 100032. Doi:10.1016/j.pdisas.2019. 10003.
- Patterson, M. E., & Williams, D. R. (2005). Maintaining research traditions on place: Diversity of thought and scientific progress. *Journal of Environmental Psychology*, 25(4), 361-380.
- Prasad, C., & Singh, R. P. (1992). Farm women: A Precious Resources. In: R.K. Punia (ed.), *Women in Agriculture (Vol. 2). Education, Training and Development*. Northern Book Center; New Delhi, India.
- Prezza, M., Amici, M., Roberti, T., & Tedeschi, G. (2001). Sense of community referred to the whole town: Its relations with neighboring, loneliness, life satisfaction, and area of residence. *Journal of Community Psychology*, 29(1), 29-52.
- Proshansky, H. M. (1978). The city and self-identity. *Environment and Behavior*, 10(2), 147-169.
- Quader, M. A., Khan, A. U., & Kervyn, M. (2017). Assessing risks from cyclones for human lives and livelihoods in the coastal region of Bangladesh. *International Journal of Environmental Research and Public Health*, 14(8), 831.
- Rahman, M. S. (2013). Climate change, disaster and gender vulnerability: A study on two divisions of Bangladesh. *American Journal of Human Ecology*, 2(2), 72-82.
- Rakodi, C. (2002). A livelihoods approach: conceptual issues and definitions. In: Rakodi C., Lloyd J. T. (eds.), *A people-centred approach to reducing poverty* (pp. 3–22), Earthscan, London.
- Rollero, C., & De Piccoli, N. (2010). Place attachment, identification and environment perception: An empirical study. *Journal of Environmental Psychology*, 30(2), 198-205.
- Rose, G. (1995). “Place and identity: a sense of place”, in D. Massey and P. Jess (eds.) *A Place in the World?: Places, Cultures and Globalization* (pp. 87–132). Oxford: Oxford University Press.
- Roy, K., Kumar, U., Mehedi, H., Sultana, T., & Ershad, D. M., (2009). Initial Damage Assessment Report of Cyclone AILA with focus on Khulna District. Unnayan Onneshan-Humanity Watch- Nijera Kori, Khulna, Bangladesh, 31.
- Roy, S. (2012). Women Entrepreneurs in Conserving Land: An Analytical Study at the Sundarbans, Bangladesh. *Canadian Social Science*, 8(5), 125-138.
- Roy, S. (2018). Livelihood resilience of the indigenous Munda community in the Bangladesh Sundarbans forest. In W. Leal Filho (ed.), *Handbook of Climate Change Resilience* (pp. 1-22.), Springer Nature, Germany. https://doi.org/10.1007/978-3-319-71025-9_10-1
- Roy, S., Khan, S. H., & Shamma, W. T. (2013). Exploring perceptions of Mangrove Forest “Sundarbans” goers’ women about environmental security. *Macrotheme Rev*, 2(1), 216-32.

- Roy, M., Hanlon, J., Hulme, D. (2016). Bangladesh Confronts Climate Change: Keeping Our Heads Above Water. Anthem press. Retrieved from <https://books.google.com.au/books?isbn=1783086343>
- Ruming, K., Houston, D., & Amati, M. (2012). Multiple suburban publics: Rethinking community opposition to consolidation in Sydney. *Geographical Research*, 50(4), 421-435.
- Saha, S. K. (2017). Cyclone Aila, livelihood stress, and migration: empirical evidence from coastal Bangladesh. *Disasters*, 41(3), 505-526.
- Scannell, L., & Gifford, R. (2010). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology*, 30(1), 1-10.
- Scannell, L., & Gifford, R. (2017). The experienced psychological benefits of place attachment. *Journal of Environmental Psychology*, 51, 256-269.
- Scoones, I. (1998). Sustainable rural livelihoods: a framework for analysis. IDS Working Paper 72.
- Shameem, M. I. M., Momtaz, S., & Rauscher, R. (2014). Vulnerability of rural livelihoods to multiple stressors: A case study from the southwest coastal region of Bangladesh. *Ocean & Coastal Management*, 102, 79-87.
- Shiva, V. (1986). Ecology movements in India. *Alternatives*, 11(2), 255-273.
- Suchet-Pearson, S., Wright, S., Lloyd, K., Burarrwanga, L., & Bawaka Country. (2013). Caring as Country: Towards an ontology of co-becoming in natural resource management. *Asia Pacific Viewpoint*, 54(2), 185-197.
- Sultana, F. (2014). Gendering climate change: Geographical insights. *The Professional Geographer*, 66(3), 372-381.
- Storie, J. T., Uusna, E., Eglāja, Z., Laur, T., Külvik, M., Suškevičs, M., & Bell, S. (2019). Place Attachment and Its Consequence for Landscape-Scale Management and Readiness to Participate: Social Network Complexity in the Post-Soviet Rural Context of Latvia and Estonia. *Land*, 8(8), 125.
- Tuan, Y. F. (1980). Rootedness versus sense of place. *Landscape*, 24, 3-8.
- Uddin, M. S., Shah, M. A. R., Khanom, S., & Nesha, M. K. (2013). Climate change impacts on the Sundarbans mangrove ecosystem services and dependent livelihoods in Bangladesh. *Asian Journal of Conservation Biology*, 2(2), 152-156.
- Ujang, N. (2012). Place attachment and continuity of urban place identity. *Procedia-Social and Behavioral Sciences*, 49, 156-167.
- Warren, K. J. (2000). Ecofeminist philosophy: A western perspective on what it is and why it matters. Rowman & Littlefield Publishers Inc. Lanham. Boulder. New York.
- Williams, D. R., Patterson, M. E., Roggenbuck, J. W., & Watson, A. E. (1992). Beyond the commodity metaphor: Examining emotional and symbolic attachment to place. *Leisure sciences*, 14(1), 29-46.
- Williams, D. R., & Vaske, J. J. (2003). The measurement of place attachment: Validity and generalizability of a psychometric approach. *Forest science*, 49(6), 830-840.