



LIVING ON THE EDGE: VANISHING AND VULNERABLE ISLANDS, SUNDARBANS, WEST BENGAL

Aparupa Datta

Y-East, Sustainability Wing of Techno India Group
Topsia Road, Topsia, Kolkata, West Bengal

Review Article

Received: **14.03.2022**

Accepted: **22.03.2022**

Published: **05.04.2022**

ABSTRACT

This article is an excerpt from the study (titled the same) undertaken by the author in 2015 on documenting the community's experience of living in the vanishing and vulnerable islands of Sundarbans – the UNESCO World Heritage Site — a site of multiple ongoing ecological processes. The role, experience and knowledge of the human community living within this biodiversity rich region provides an important opportunity to understand not just the human-nature connection, but also the dynamics of co-existence and competition. This article focuses on Mousuni Island which is vulnerable to the impacts of climate change. The resultant dispossession of the people due to coastal inundation by rising sea levels has been the recurring theme in Mousuni island. By building an oral history of land-cover changes, other climate impacts, and how these impacts shaped/are shaping the lives of the residents in Sundarbans, it helped to chronicle the public memory of witnessing the modification of their lived natural habitat, their struggle to cope with this change especially in context of extreme isolation and deprivation.

Keywords: Sundarbans, Climate Change, Oral Histories, Landscape, West Bengal, Ecosystem, Environment.

INTRODUCTION

Communities derive cultural knowledge from the social landscape that they inhabit and function in which leads to assigning of perceptions and values. These values also attach memories to the landscape transforming it into 'sites of historical identity' (Stewart and Strathern, 2003). Over time, perceptions and values may shift “so that the landscape becomes a form of codification of history itself, seen from the viewpoints of personal expression and experience (ibid). These senses of place serve as pegs on which people hang memories, construct meanings from events, and establish ritual and religious arenas of action (ibid).” Memories such as these formed the basis of the study which drew upon the lived experiences of the community residing in the Sundarbans landscape to understand the environmental challenges faced by them

and their strategies of coping and adapting with the said adversities.

The Sundarbans Landscape

The Sundarbans covers an area of approximately 10,000 sq. km. out of which, “62% lies within Bangladesh and 38% in India, and forms the largest contiguous mangrove forest on Earth”(Ghosh et al., 2015). During the monsoon season, “tropical cyclones and smaller tidal events regularly hit the area, causing severe flooding and wind damage” (ibid).

This unique deltaic mangrove forest is criss-crossed by a complex network of tidal waterways and carpeted by vast stretches of mud. It is an archipelago of islands that is constantly changing, constantly evolving and yet

supporting a delicately balanced ecosystem having a wide variety of fauna notably the Royal Bengal tiger and the estuarine crocodile, over 260 species of birds and the dominant tree species Sundari (*Heritiera littoralis*). A classic example of ongoing ecological processes, the Sundarbans has also been designated as a World Heritage Site by UNESCO.

“The Indian Sundarbans is also home to a large human population of 4.5 million with a population density of 1000 persons per sq. km (Danda, 2010). It is also plagued by developmental constraints like a rapidly growing population, lack of appropriate transportation, modern energy services, basic health care and education (ibid). The primary occupations are paddy cultivation – by raising embankments along the sea ward boundaries to keep salt water at bay and fishing mainly for crabs and prawns (ibid).”

In the fragile landscape ruled by tigers and crocodiles, where the forest plays hide and seek with the tides, the inhabitants of Sundarbans live in harmony braving constant dangers posed by the environment while sustaining their livelihood. Along with frequent attacks from wildlife during forest exploration for sustenance, they face yet another danger – the vanishing islands. The cause is quite well known. Deterioration of the earth's environment is bringing about irreversible changes in the climate; the most pressing problem being the rise in sea levels and submergence of coastal lands. With increasing frequency of cyclones and severe storms, acres of land; land that supported the people with their daily subsistence, land that was home to the mighty flora and fauna, land that would hitherto always re-emerge after a brief period of daily inundation, are being washed away completely never to return. All that remains are memories that aren't an act of nostalgia, but an intelligent interpretation of their lived reality by ordinary people. These can help interpret the present in context of the past and provide important insights into the future.

Memories from Mousuni

Population and Resource Crunch

On the way to the bustling tourist spot of Bakkhali in the serene beaches of Sundarbans, lies Mousuni Island. Hidden from plain sight, one can find this place only if one is actually looking for it. No helpful sign boards mark the turn to this tiny island and neither does it garner so much attention from the tourists thronging the nearby beaches. But it exists; with its population of 30,000 people, a history of lost jungles and a future of rising seas.

Like any other region in the Sundarbans, Mousuni Island too was covered with “dense and tangled vegetation, so thick as to be virtually impenetrable” (Chakrabarti, 2009)

or the 'jungle' as the British would call it. A British traveler, Huggins (1824) had said, “I imagine the period is remote when Saugar Island (one of the islands in the Sundarbans) will be metamorphosed into a Brighton, as many years must elapse before the jungle can be cleared away” (cited in Chakrabarti, 2009). Mantaj Ali Shah (2015), an octogenarian who has been living in Baliara mouza in Mousuni since birth gives an early oral history account of the island. He describes how Baliara got its name and the abundance of animals in the tiny island.

“The name of this village – Baliara means huge heaps of sand. It was named so because of the tall mountains of sand that bordered the sea-side boundary of the island. Some were as high as a coconut tree. As kids we would try to climb up these dunes but end up getting tired mid way and lie down on the sandy slope. But, all that has been lost to the sea. Opposite to the sand dune lay the dense forest and then came the sea. The forest had deer, monkey, tigers and many other animals. We did not have so many settlements in this village at that time. Jungle fowls, wild boars and monkeys were also a menace and they would destroy our crop fields. Herds of deer would come and drink water from our ponds in the day time. Tigers would cross over the boundary and steal cattle from the fields just like a cat captures a mouse.”

Early attempts at reclamation of land in the 18th century would fail disastrously due to depredations by the 'man-eating' tigers (Chakrabarti, 2009). Lethal control seemed to be the only way to defend the workers from attacks. As a young boy of eight, Shah, M. A. (2015) remembers how a certain man-eater was wrecking havoc in the village and how it was brought under control.

“The tiger had crossed the creek and moved over to Patibuniya village. The Government had assigned a hunter from Sagar Island to capture and kill the tiger. Numerous attempts to capture it failed miserably. A strategy was finally chalked out where people from the other side of Mousuni (in the Patibuniya village) would chase the tiger this way and the hunters positioned here would then shoot it. When it was trying to swim back to Mousuni, it was shot and killed. The carcass was displayed in our market for people to see. Prize money of Rs. 25 was given at that time for killing a tiger.”

Permanent human habitation in Sundarbans began in the late 19th century by deforestation “in the low lying tracts through the construction of circuit embankments while the delta was still in a state of immaturity” (Chakraborty, 2005 cited in Ghosh et al., 2015). These tracts were then divided into smaller plots and leased out to “to prospective landlords for timber extraction and the collection of revenues” based on a plan charted out by the British collector general Clod Russell in 1771 (Hunter, 1885 cited

in Ghosh et al., 2015). These zamindars brought in “the poor farming communities from other parts of Bengal as well as from neighboring states to come and settle in the Sundarbans and were put to work clearing the forests and developing the land” (ibid). Hence, the demographic structure of the Sundarbans comprises of “migrant populations from the adjoining districts of Midnapur, and also from central India, predominantly the marginalized and tribal populations who came in search of work and land and who were initially brought in by the British to construct the embankments” (Iqbal, 2011; Danda, 2007 cited in Ghosh et al., 2015). Retired high school teacher, Jalaluddin Shah (2015) of Mousuni recalls how the island was forested when he first came to settle here in 1970s from the nearby Sagar Island. He says,

“Mousuni was surrounded by mangrove forests before and was an extremely fertile island where there was adequate yield of crops especially paddy. The river embankment was hardly taller than 5 feet and never did we face any problems of sea water inundation then. The population of the region was very less and most of them were migrants from other districts of West Bengal like Medinipur. They had settled here during the British rule when Mousuni was still a forested island. Being an island under constant tidal ingress, the British Government had constructed canals after every ten bighas of land to allow excess water to pass during high tides without flooding the area. Gradually, with increase in population, forests were cleared to make way for settlements and cultivation.”

Shah, M. A. (2015) adds on a similar account where he says,

“My father had received 15 bighas of land from the British Government when they started settling people here in Sundarbans. The forests were burnt down and settlements were constructed. I remember in 1935, this island was selected for settling people and the first settlement came up in 1942.”

Sundarbans was not a densely populated region in the colonial times but it increased rapidly in the post-colonial era, especially after the Indo-Bangladesh partition (Ghosh et al., 2015). After 1947, the population here “grew from 1.15 million in 1951 to 4.44 million in 2011, which led to a growing demand for its resources” (ibid). The same can be reflected in the narrative of Arup Mandal (2015), a resident of Baliara. He says,

“People led a very comfortable life earlier on this island. Everything was available to them; every need was catered to by nature. All resources are still there but the value has increased. In my childhood, I remember settlements were dispersed and scattered. During Kal Baisakhi, it would be a frightening sight to see trees swaying in the thunderstorm; rain and darkness everywhere.”

Excerpt from the narrative of Shah, M. A. (2015) serves as a classic example of a correlation that was predicted two centuries ago in the year 1798 by political economist Thomas Robert Malthus. He had warned that unchecked growth of population can lead to severe resource deficiency and it would ultimately lead to a catastrophe.

“It is not that the resources have depleted here. It is the population that has increased.”

Settlements have increased with each division of the family. Earlier what was one family has now become five households. Each new household needs firewood which has put considerable pressure on the vegetation here. Earlier rice and straw would be sent to Kolkata. Now, the same quantity of resources is unable to meet the demand here and along with it land area is decreasing. Years ago, we would lend essentials to each other like rice, firewood etc. but nowadays this practice has stopped because we do not have surplus to share.”

Land Erosion due to Changing Weather Patterns

A study carried out by WWF – India (2010) says – “There is a clear rise in air temperature over both land and sea. The observed rise is 0.019 degrees Centigrade per year over the Bay of Bengal, and a similar rising trend is also observed in the Sundarbans. The study estimates that if this trend continues, temperature in this area is expected to rise by one degree Centigrade by 2050.” Singh's study in 2002 (cited in Ghosh et al., 2015) also shows that there “has been a 26% rise in the frequency of cyclones over Bay of Bengal between the years 1881 and 2001.” Shah, J. (2015)'s account supports this argument. He ponders,

“I can feel changes in the weather too. It's hot throughout the year and rains have considerably decreased. Frequency of cyclones has increased. Whenever it is unusually hot in summer, we expect a destructive monsoon. The number of trees has decreased too. Small cyclones would occur every year in the area and with every cyclone the sand embankment would shorten and get washed into the sea. Earlier, the embankments were not so high and in spite of that there would be no flooding. As far as I can tell, it is not only the increased intensity of storms but I feel the island is also sinking. Higher embankments are being needed with passage of time.”

Shah, J. (2015) ruminates on how he had to shift his abode twice due to floods and also mentions the possible causes behind the phenomena.

“I also feel that global warming and greenhouse effect are major reasons for weather changes. I have noticed that the seasons have become irregular. It is hot all the time and winters are for namesake only. Rainfall has become variable and storms have become more frequent and

intensified. I have myself built my house three times. I liked to enjoy the river breeze and hence, I had built my home near to the river. Twice it got washed away due to floods. Now I am here.”

Shah, M. A. (2015) further elaborates citing quantitative data saying,

“The area of the island was 52,500 bighas when I was working in the Panchayat twenty areas ago. Now, I think it has come down to 30,000 bighas. Kusumtala has faced more erosion than Baliara. The map of the island has changed. There was an outward bend in the Kusumtala area which has now straightened out. Earlier, I remember ships could enter this creek. Now, they can't. The soil that is being eroded from this island is getting deposited in the sea.”

WWF-India (2010) have cited various studies that show “the relative mean sea level in Sagar and adjoining areas of the Bay of Bengal was rising at 3.14mm /year; the global estimate of sea level rise was between 0.5 to 3 mm per year. According to this study, such a rise in the Sundarbans area will lead to a 20 cm rise of sea level by 2050 (ibid). The study further mentions that the rate of coastal erosion in the Indian Sundarbans to be about 5.50 sq km/year within the time frame of 2001-2009. A total land area of 6402.09 sq. km of the Indian Sundarbans in the year 2001 was reduced to 6358.05 sq km in 2009 (ibid). This amounts to net land loss of 44.04 sq km which includes erosion of 64.16 sq. km and the accretion of 20.12 sq. km (ibid). Mousuni Island has already lost 14% of its landmass to erosion (ibid) and is the second most vulnerable island to coastal inundation after Ghoramara.” Gour Hari Pramanik (2015), an elderly resident of Mousuni gravely predicts a similar future –

“During my childhood days, there used to be a bungalow near the embankment. That area is now in the middle of the river. The area of the island too has reduced a lot. I have heard from many that the depth of the river has decreased leading to inundation. The water level during high tide has increased to 2-3 metres. If a proper embankment is not constructed now, we will have to leave this island very soon. Reforestation was also tried. It was not so successful. Just like there are only 5000 people living in Ghoramara now, Mousuni too will suffer the same fate.”

The community's awareness and knowledge regarding the factors causing these troubles is aptly highlighted by an explanation of Shah, J (2015). It goes like this–

“Intensity of floods has no doubt increased here considering the earlier environment of the island. Global warming, siltation of the river etc is leading to rise in water levels, even more than the embankment height. Nowadays,

embankments have to be made taller than a height of 15 ft. Then there was Green Revolution. Along with HYV seeds and pesticides, it required a good irrigation network. For this purpose, the outlets of these canals [constructed during the British times to allow tidal waters to pass through] were closed in order to hold rainwater for cultivation in the dry season. It led to flooding as the tidal waters now did not have an outlet to flow.

Another reason for this increased flooding, in my opinion, can be harnessing of hydropower in the middle course of the river leading to rejuvenation. The delta region which earlier fell in the lower course and was characterized by sluggish flow and deposition is now falling in the middle course. There is increased land erosion hence.”

Studies have conclusively proved these factors mentioned by Shah, J. (2015) to be one of main causes behind the plight of Mousuni. “In Sundarbans, there is a high turnover rate of aggradation and erosion, which was more or less balanced in the past (Mitra et al., 2009 cited in Ghosh et al., 2015). Today, however, erosion rates are much higher than aggradation, which is most likely the result of artificial sediment traps upstream by dams and barrages in particular areas (e.g. the Farakka Barrage) and higher discharge through water diversion in other parts of the drainage basin (Giri et al., 2007; Mitra et al., 2009 cited in Ghosh et al., 2015). Another concern is the higher amount of melt water from Himalayan glaciers, which increases erosion along the estuaries and thus delivers a higher amount of sediments” (Raha et al., 2012; Mitra et al., 2009; Bannerjee, 2013 cited in Ghosh et al., 2015).

Dispossession

“Over 8000 people were registered missing and about a million were rendered homeless in the two countries when on 25 May 2009, a tropical cyclone (Aila) hit the Sundarbans in India and Bangladesh with a wind speed of 110 km/hr” (Gupta et al., 2009 cited in Ghosh et al., 2015). This cyclone is a recent one in a series of devastating cyclones that had earlier hit the region - 1988, 1991, Sidr in 2007, Nardis in 2008 (Ghosh et al., 2015). Sea level rise owing to global warming, anthropogenic stimuli, and coastal erosion are some other critical issues affecting the region (Raha et al., 2012; Mitra et al., 2009; Bannerjee, 2013 cited in Ghosh et al., 2015), which is eventually destroying mangrove forest and displacing vulnerable, coastal communities. “The cumulative effect of this, described as relative mean sea level (RMSL), has risen between 3.14 mm/year (Hazra et al., 2002 cited in Ghosh et al., 2015) and almost 5 mm/year (Nandy and Bandopadhyay, 2009 cited in Ghosh et al., 2015) in the Sundarbans, which are much higher than global averages, and threaten to inundate close to a billion people” (DasGupta et al., 2014 cited in Ghosh et al., 2015).

The narratives from Mousuni are filled with accounts of dispossession induced by breach of embankments caused by increased storms and resulting in massive floods in the island. Shah, M. A. (2015) mentions,

“After Aila, the situation has worsened and no amount of strengthening of embankments is helping us anymore. There is no place for us to go. There is no place to migrate to. At the onset of monsoons, we become more alert and keep track of the changing water levels in the river. My house was situated close to the embankment but I had to shift back due to flooding in monsoons. Water level reaches waist- deep inside the house. I have still kept the tiles and doors of our previous house. I think I will have to move this year permanently to the interior of the village.”

Such type of flooding has become a yearly phenomenon in every monsoon season which is evident when Kayum Khan (2015), further adds,

“Just the sun rises in the east and sets in the west; it is a universal truth in this island that there will be flooding every year. Storm winds blowing from the east in the rainy season indicate disastrous floods. Although relief reaches us whenever we need, nobody is trying to solve the actual problem – the embankment. People are always alert to changes in weather and flooding.”

Many NGOs have tried to train people in disaster management and nowadays we receive early warnings of low pressure and bad weather. It started after repeated flooding became a common phenomenon. In case of unusually heavy storms, we leave our mud houses and take shelter in the high schools or any other concrete structure that is available. Mud houses are at the risk of collapsing. This marketplace here becomes fully flooded. The screams and cries of the people during floods can move anybody to tears. It is chaotic and nobody knows where to go and what to do.”

Surviving the flood waters is not enough. The deluge brings with itself additional livelihood challenges and biodiversity loss that accumulates over time. Gouranga Mandal (2015) relives his tale of how he had to change his occupation thrice due to flooding.

“We had been cultivating paddy for the past 10-12 years. Our main source of income was from agriculture. I had 5 bighas of land. But after Aila, we have not been able to cultivate for the last 5-6 years due to salt water inundation in the rice fields. In the monsoons during flooding, the waves reach a height of 20 feet and the water gushes in with great force. That cannot be stopped with a simple mud, sack or bamboo embankment. It needs a strong one, may be concrete or block pitching. Mud embankments would

invariably give away in times of heavy rainfall. I converted the land into a fishery project. Flooding occurred again and my fishery project also got destroyed.. The fish spawns were carried away by the flood waters and I couldn't recover even my cost of setting up the project. This sweet shop has been there for 30 years. I added a tea stall to it and it is working just fine. We get a daily income to sustain ourselves. I do not have any plans of restarting the fishery.”

Shah, M. A. (2015) too has suffered the same fate where he says,

“I own 30 bighas of land but I cannot cultivate it because the soil has become saline. Earlier, no fertilizers were required for cultivation and the productivity of soil was extremely high. I used to work in the fields with my father and I remember it would require quite a lot of effort to thresh them as they were strong stalks of paddy. Now, no amount of HYV seeds is helping to increase the yield.”

Loss of livelihood options inevitably leads to migration to urban centres in search of jobs. Mandal, A. (2015) points this out in his account where he says,

“The main impact has been on our primary source of income which is agriculture which has forced people to migrate outside and look for jobs as a construction worker and so on.”

Shah, J. (2015) reminisces those days when Mousuni was a fertile land and one could grow a variety of crops. He says,

“We could cultivate watermelons and chilies here in Mousuni. They got destroyed due to untimely hailstorms and excessive rains. After continuous inundation of saline water, these crops cannot be revived here. Paddy cultivation has been affected badly by it. Gourds are the only vegetables that are cultivated here. Even the fish production has decreased here. It is causing the younger generation to migrate to places like Kerala to work as construction labourers. My son too has gone there.”

Not only is agriculture affected in this island due to constant tidal ingress, but also fisheries. The community has noticed a gradual decline in the catch both in terms of quality and quantity. However, it seems that they are well aware of the reason behind these changes and admit their own mismanagement as evident from the narrative of Mandal, A. (2015)–

“There were so many varieties of fish in this area; freshwater as well as brackish. Within a few years, it was all gone. Fishing techniques had changed drastically. From small boats, we moved up to motor-run boats and trawlers. The noise from these boats, ripples and waves generated from their movement disturb the fish and they started

changing their habitat. Human greed has no end. With our mechanized boats, we people are chasing the fish and following their trail as far as possible. These boats return after 8-10 days, some successful; some not so successful. These small boats which you see now are actually fishing for small tiny prawns. These prawns are dried in the sun and used as 'fish meal' for poultry. Earlier, these very rivers would yield so much fish. Now, we get almost nothing here."

His account can be supplemented by available literature on the issue. "High levels of pollution, sediment load, and salinity trigger negative effects on the faunal reproduction and growth, as well disturbing composition and distribution patterns" (Shams-Uddin et al., 2013 cited in Ghosh et al., 2015). The population of invasive fish species or "opportunistic trash fish" has also increased significantly, "while the abundance of commercially important taxa has decreased" (ibid). The environment of Sundarbans is irreversibly affected by "such qualitative and quantitative losses in ecosystem services" and may be a trigger for emigration and a resulting "shift in profession" (ibid).

Possible Solutions

In all the narratives collected, there is a common consensus regarding the possible solution to the problem of continuous tidal ingress. It is the construction of stronger, more durable embankments. WWF – India's study (2010) had charted out quantitative data regarding the condition of embankments in Mousuni which is as follows – "the coastal stretch of Baliara is 11.06 km long while the length of the embankment is 8.49 km of which only 1.8 km is brick paved and the remaining 6.69 km is just exposed earthwork. The embankment height ranges from 4 to 6 metres. In August 2008, a 400 metres stretch of embankment along the western border of Baliara was breached affecting 26 hectares of agricultural land. In May 2009, Baliara lost 900 metres of the embankment while its northern neighbour, Kusumtala lost 1200 metres." The Government apathy is evident in the narratives where Shah, J. (2015) comments,

"Political will is severely lacking here when it comes to building stronger embankments. By the time the budget is passed, it is already the rainy season. All that they do is fix up the battered embankment with mud. It invariably gets washed away due to flooding every year. I remember one MLA giving a speech. He had said that once we politicians get a seat in Delhi, we forget that an island like Mousuni exists. It is true. We receive attention only when something catastrophic happens."

Mandal, A. (2015) is critical in his take on the issue where he says,

"It is strange that the budget for embankments is passed in the monsoon months and the project is given to contractors. If labourers are digging 1000 units of soil, not even 300 units are used in embankments. The rain washes away whatever is dug and the situation remains as it was before. Soil here is sandy in composition. Sand does not have the strength to hold embankments."

Khan (2015) sarcastically slams the politicians saying,

"The politicians drawing out irrigation schemes are probably eating fish that our people catch and sell but they are not bothered about how the people are surviving here."

Although it is the responsibility of the Government to come up with sustainable plans for construction of embankments, the solution does not end there since the problem of erosion and ingress is deep-rooted in India's colonial history. "Indiscriminate construction of circuit embankments to make islands habitable since the British administration, have, over 200 years, altered natural geomorphological processes of delta formation" (Chakraborty, 2005 cited in Ghosh et al., 2015). Increase in the depth of creek beds have resulted into constant inundation of the "low-lying reclaimed areas, turning those areas into vast stretches of permanent marshes that seals off the possibility of these tracts ever naturally maturing into lands habitable by humans" (Bhattacharya, 1998 cited in Ghosh et al., 2015).

CONCLUSION

The study had set out to document the public memories and meaning pertaining to environmental challenges threatening their existence in Sundarbans. It sought to integrate ecological research and social perspectives through the voices of the people who are bearing the brunt of changing climate and limited resources for sustenance and livelihood.

In Mousuni, it reveals the lived realities of the aftermath of land erosion due to climate change and the resultant dispossession of the people. It tries to draw a picture of the island as it was in the past and how it suffered a drastic change in the recent years. It gives us the concept of threatened human security because of climate change. Dispossession induced by sea level rise is causing the local communities to become "climate refugees" (Panda, 2010) which has severe implications not only for the local environment but also in the macro-level socio-economic conditions of the country as a whole. The once self-sufficient community has now been left at the mercy of the rising seas so much so that flooding has become a universal truth in the island.

Based on qualitative research methods, it demonstrates the ability of ordinary people to interpret the ongoing

ecological processes and changes as part of everyday memories and meaning making. These memory based narratives can be the key to unlock coping strategies in the dynamic Sundarbans delta.

ACKNOWLEDGEMENT

The study was undertaken by the author under the guidance of Dr. Shalini Sharma in 2015 in Tata Institute of Social Sciences, Guwahati as a part of her Master's course on Ecology, Environment and Sustainable Development. Dr. Sharma is currently Associate Professor in the Dept. of Humanities and Social Sciences in Institute of Science Education and Research (IISER), Pune.

REFERENCES

- Barnett, J.** (2013) Climate Change and Security. In Sygna, L. et al., (eds.) A Changing Environment for Human Security Transformative Approaches to research, policy and action, London and New York: Routledge.
- Berg, B. L.** (2001) Qualitative Research Methods for the Social Sciences, Boston: Allyn and Bacon.
- Bornat, J.** (2012) Oral History and Qualitative Research. In Neale, B. and Henwood, K. (eds.) Timescapes Methods Guides Series, Guide No. 12 [Online] Available from: <http://www.timescapes.leeds.ac.uk/assets/files/methods-guides/timescapes-bornat-oral-history.pdf> [Accessed on 27th Mar, 2016]
- Chakrabarti, R.** (2009) Local People and Global Tiger: An Environmental History of the Sundarbans. Global Environment 3 [Online] Available from: <http://www.environmentandsociety.org/node/4614>. [Accessed on 29th Feb, 2016].
- Chowdhury, A. N.** et al., (2016) Ecopsychosocial Aspects of Human- Tiger conflict: An
- Ethnographic Study of Tiger Widows of Sundarban Delta, India. Environmental Health Insights [Online] Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4712980/> [Accessed on 3rd Apr, 2016].
- Crossman, A.** (2014) Snowball Sample [Online] Available from: <http://sociology.about.com/od/Types-of-Samples/a/Snowball-Sample.htm> [Accessed on 27th Mar, 2016]
- Danda, A** (ed.) (2010) Sundarbans: Future Imperfect Climate Adaptation Report, WWF- India Report Deltas – Feature of Deposition, [Online] Available from: <http://lcgeography.preswex.ie/delta-river-landform.html> [Accessed on 5th Apr, 2016].
- Dickman, A. J.** (2010) Complexities of Conflict: the importance of understanding social factors for effectively resolving human-wildlife conflict, *Animal Conservation*. 13. p. 458-466.
- Elliot, J.** (2005) Using Narrative in Social Research, London: Sage Publications
- Ghosh, A.** et al., (2015) The Indian Sundarban Mangrove Forest: History, Utilization, Conservation Strategies and Local Perception. Diversity [Online] Available from: <http://www.mdpi.com/1424-2818/7/2/149> [Accessed on 29th Feb, 2016].
- Global Humanitarian Forum** (2009) Human Impact Report: Climate Change – The Anatomy of A Silent Crisis, Geneva.
- Islam, S. N. and Gnauck, A.** (2008) Mangrove wetland ecosystems in Ganges- Brahmaputra delta in Bangladesh, Higher Education Press and Springer Verlag.
- IPCC** (2007) Climate Change 2007: The Physical Science Basis. Contribution of the Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.
- Macfarlane, B.** (2009) Researching With Integrity The Ethics of Academic Enquiry, New York and London: Routledge.
- Mahadevia, K. and Vikas, M.** (2012) Climate Change – Impact on the Sundarbans: A case study. International Scientific Journal Environmental Science [Online] Available from: <http://environment.scientific-journal.com/articles/2/1.pdf> [Accessed on 5th Apr, 2016].
- Malthus, T. R.** (1798) An Essay on the Principle of Population, Oxford World Classics Reprint
- National Geographic** (2016) Delta [Online] Available from: <http://education.nationalgeographic.org/encyclopedia/delta/> [Accessed on 5th Apr, 2016].
- Panda, A.** (2010) Climate refugees: Implications for India, Economic and Political Weekly. 20. p. 76-79
- Seasonal Calendars [Online] Available from: <http://betterevaluation.org/evaluation-options/seasonalcalendars> [Accessed on 27th Mar, 2016].
- Singh, S. S.** (2014) Thousands left homeless in Bengal's sinking island, The Hindu, July 17, 2014, [Online] Available from: <http://www.thehindu.com/news/cities/kolkata/thousands-left-homeless-in-bengals-sinking-island/article6219942.ece> [Accessed on 29th Oct, 2015].
- Stewart, P. J. and Strathern, A.** (eds.) (2003) Landscape, Memory and History, Anthropological Perspectives, London: Pluto Press.
- World Bank**, (2016) Community Resource Mapping [Online] Available from: <http://siteresources.worldbank.org/EXTTOPPSISOU/Resources/142400>

- 2-118530479427 8/4026035-1185375653056/4028835-1185375678936 /4_Community_resource_mapping.pdf [Accessed on 27th Mar, 2016].
24. **World Wildlife Fund** - WWF (2009) Vulnerable Sundarbans islanders use technology against climate change threats [Online] Available from: http://wwf.panda.org/wwf_news/?161941/Vulnerable-Sundarbans-islanders-use-technology-against-climate-change-threats [Accessed on 5th Apr, 2016].
 25. **Khan, K.** (2015) Interviewed by Datta, A., Baliara Mouza, South 24 Parganas, 9th Dec 2015 (Mousuni Field Notes, p.7).
 26. **Mandal, A.** (2015) Interviewed by Datta, A., Baliara Mouza, South 24 Parganas, 7th Dec 2015 (Mousuni Field Notes, p. 3-4).
 27. **Mandal, G.** (2015) Interviewed by Datta, A., Baliara Mouza, South 24 Parganas, 9th Dec 2015 (Mousuni Field Notes, p.6).
 28. **Shah, M. A.** (2015) Interviewed by Datta, A., Baliara Mouza, South 24 Parganas, 7th Dec 2015 (Mousuni Field Notes, p. 1-3).
 29. **Shah, J.** (2015) Interviewed by Datta, A., Baliara Mouza, South 24 Parganas, 7th Dec 2015 (Mousuni Field Notes, p. 4-5).