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Sonu Tiwari

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Introduction

In Sundarbans, human mobility and immobility is a complex phenomenon but not a new one. People have temporarily evacuated during disasters, returned to their original homesteads and rebuilt homes, and again evacuated multiple times. They have relocated their homes due to coastal erosion and have stayed on embankments, chars, and wastelands until they could build a dwelling for themselves or continue living in displacement on embankments, wasteland, with relatives and neighbors. Most have seasonally migrated as laborers during lean agricultural and fishing periods and after a crisis or disaster.

On this complex mobility grid in this fluid ecological space, climate change is another driver that has started complicating mobility patterns in the last two decades. In the last 23 years, the Sundarbans have witnessed 13 supercyclones. The previous three years saw four cyclones – Fani (2019), Bulbul (2019), Amphan (2020), and Yaas (2021). Due to the rising sea, the experimentation (Paprocki 2023) done in Sundarbans in the form of embankments, deforestation, reclamation, settlements, building railways, and bridges, with the altering land and water bodies, are all failing quickly in front of a climate crisis.

I am arguing through this paper that on this complex mobility grid in this fluid ecological space, climate change is a relatively new driver that complicates mobility patterns. The disasters act as triggers to propel destruction and expose the wrongdoings of experimentation done in Sundarbans in the form of embankments, deforestation, reclamation, settlements, building railways, and bridges, with the altering land and water bodies. Therefore, the question that becomes relevant for this paper is not whether climate change and disasters will impact lives and livelihoods and propel mobility or immobility. Because it is certain, given its geography and location. The larger question this paper deals with is how these impacts will be distributed within and between different people and how the forms of mobility and immobility will alter/complicate in the climate crisis. Dispossession is experienced by some, but not all, is relational and is an outcome of the uneven field of social and socioenvironmental relations into which climate intervenes.[1]

Landscapes, Waterscapes, and Fishscapes are changing rapidly, and the viability of fishing, agriculture, and freshwater is at stake. This when coupled with the outcomes of dispossession have a direct relevance on who relocates, displaces, and migrates, how they move, does the movement alter their life situations, and who doesn't. Findings suggest that mostly male, but also female, but young

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and able-bodied people are moving out to work based on their networks, where the demand for labor, the level of crisis at home, and the ability of the migrating members. As they migrate out, those vulnerable, viz. men(weak, sick, mental illness)/women, elderly parents, disabled, small children, and school-going children, are left behind to deal with the problems back home, both economic and ecological. " Problems Back home" also requires coping with different forms of mobility ranging from being relocated or displaced, both temporarily and permanently, depending on whether/ or how often their lands were submerged/washed away/ or swallowed by the sea and how social factors like age, caste, gender and political affiliation of people facilitates/delimits the access to land and resources.

The poor governance of this mobility was exposed during the pandemic, further worsening the conditions of the migrants and those left behind at home. Over the years, the governance of the Sundarbans delta in India has been questioned by many scholars as being bureaucratic, top-down approach, with departments working in silos looking at embankments, climate change, disaster relief and evacuation, labor and migration, and relocation and resettlement, gender(equated as women) as separate problems, and with minimal regard for the sustenance of local people and their lives in the name of protecting tigers, mangroves forest and providing "into the wild" experience to eco-tourists. The paper suggests that mobility has to be considered in totality, providing governance practices for all forms of mobility, be it safe migration, safe relocation, and managing local displacement with dignity. It is only possible with the coherence of policies and practices of climate change adaptation, disaster relief, recovery, relocation and resettlement, and labor migrant workers with each other, along with developing this fluid ecology according to the needs of the delta and its inhabitants.

Environmental Mobility and Gender

Throughout history, human mobility has been driven by various factors such as conflict, persecution, land disputes, violence threats, development projects, natural hazards, and economic opportunities. This movement has taken different forms, including permanent and temporary migration, seasonal and protracted displacement, forced and voluntary movement, as well as internal and transboundary mobility. In the present era, climate change is introducing a new dimension to human mobility. The literature on climate change indicates that migration patterns worldwide will undergo fundamental reshaping as individuals opt to migrate in search of safety and economic opportunities. [2]Numerous individuals reside in environmentally vulnerable regions, particularly in hotspots like mountains, floodplains, semi-arid lands, and river deltas[3] The frequency, intensity, duration, and timing of disasters are changing due to climate change impacts.[4] The effects of climate change manifest through increasing droughts, heavy rainfall, flooding, cyclones, rising sea levels, and extreme temperatures.[5] These changes pose significant challenges for households that rely on natural resources such as agriculture, forestry, and water [6]by exacerbating the existing socioeconomic vulnerabilities and everyday risks.[7] In response, individuals and communities adopt diverse strategies to address these risks, including strengthening infrastructure, reducing vulnerabilities, and moving out of vulnerable areas.[8]

Mobility resulting from systemic environmental change is closely intertwined with the causes and effects of such change. [9] For those residing in environmentally fragile areas, mobility often translates into Displacement and Migration, which are facets of vulnerability and adaptation. On the one hand, studies refer to displacement as forced and involuntary caused due to particular natural hazards or other environmental factors responsible for forcefully evicting people from their homes. [10] [11] Displacement linked to environmental stressors involves the involuntary and unforeseen

movement of individuals from their homes due to damage to property and infrastructure. While this displacement is usually temporary, it can be disruptive and traumatic for those impacted. It is studied in the context of evacuations, protracted issues and failure to adapt in the regions affected by repeated disasters or environmental stress, resettlement, relocation and rehabilitation. While on the other, other studies interpret the movement of people from their homes due to a multitude of intertwined social, economic, and environmental causes, linking the preexisting vulnerabilities to the decision to move. Migration is often seen as responsive adative strategy to the climate stressors and slow onset disasters and draws inspiration from livelihood literature that highlights the role of traditional and modern migratory practices to reduce livelihood risks. These studies have viewed the process as Migration which is often the result of a complex set of multiple pressures of which the environmental event is only the proximate cause. [12]Studies have been done in the context of slow environmental degradation and understood migration as a response to changing environmental conditions. Migration can enhance resilience by supplementing incomes, diversifying livelihoods, spreading the exposure of people and their livelihoods to environmental risk, and building linkages between sending and receiving areas[13] Another category that has recently caught the needs attention of the researchers in the context of climate change are those who do not have the capacity to move out. For example, the UK's Foresight Report of 2011 introduces the concept of "trapped populations" to describe those most vulnerable to environmental changes but lacking the means to move away[14], that is, having low levels of motility.

In the contemporary literature on displacement, several researchers have challenged such categorizations. Samaddar(2020) argues that analysis of refugee and forced migration flows should not be subject to the apriori theory of knowledge that depends on binaries like such as refugee/IDP, episodic violence/structural violence, citizen/stateless, movement due to fear/ movement due to economic imperative, international norms/national responsibility, and human rights / humanitarianism, but to the theory of discursive practices that does not privilege a concept anterior to the discourse.[15] They claimed that fitting people into categories might be problematic and does little help in understanding the real complex issues that surround their lives. These studies have attempted to understand the human relationship with place and their experiences of disjuncture. Such studies often argue that the boundaries of poverty-induced Migration, development-induced displacement, and forced motilities intersect and are blurred. [16] This overlapping is particularly so in the context of late modernity when place and personhood do not seem to be bound up, and there exists a generalized sense of homelessness. [17] Castles (2002) interestingly posits that forced and economic migration are closely related and often interchangeable expressions of global inequality and societal crisis.[18] In his book "The Post-colonial Age of Migration," Ranabir Samaddar argues that it is difficult to attribute the main reason for any displacement to a particular phenomenon solely or primarily, be it climate change, and therefore deliberately abstains from using the word "climate refugees."[19] According to Samaddar(2020), the post-colonial story of migration and displacement is the story about migrant labor and thus voices concerns over the omission of labor and life from the climate discourse. Walter Kalin expresses the impossibility of determining whether a particular disaster would or wouldn't have happened without climate change, and thus policies and practices should simply look at the movement of people due to environmental reasons instead of coining a term for it.[20]

The context of above categorizations or the blurred reality of it, become more pronounced when we look at it from a gendered perspective. Because then the question of who is moving, with whom are they moving or those not moving at all comes into the frame, along with temporary mobility associated with staying back in vulnerable locations, or the larger question of whether

migrating changes their well being or life situations. Like the experiences of climate change is gendered and intersectional[21]i.e. how social factors like age, caste, gender and political affiliation of people facilitates/delimits the access to land and resources and facilititates coping in the event of climatic stressors, in the same way, mobility is influenced intersectionally, with implications on where one is placed on the social and mobility grid. For e.g. those who stay behind in vulnerable locations deal with mobility in form of local displacement associated with climatic stressors, it depends on how social factors like age, caste, gender and political affiliation of people facilitates/delimits the access to land and resources. The same is true for the ones who migrate.

Sundarbans and Its Fluid Fragile Ecology

The Indian Sundarbans delta is a part of the Ganga Brahmaputra Meghna Delta (GBM). Its unique in its geography, which comprises a mesh of islands sculpted by an ever-evolving delta, one that is the youngest, largest, and most active delta in the world. [22] The Ganga, Brahmaputra, and Meghna rivers branch into numerous river channels that traverse through the delta and empty into the Bay of Bengal, carrying the highest proportion of sediment of any world river system, amounting to about 25 percent of the world's total. It is estimated that some 40,000 million cubic feet of silt settle in the deltaic plain on their journey to the Bay of Bengal, creating enormous areas of new land known as chars and diaries. [23]This process of sedimentation reaches its peak during the annual monsoon downpour, which also makes the land fertile for agriculture.

Another feature of this region's geomorphology is the subsidence of land due to both natural and anthropogenic reasons, which has relevance to relative sea level rise in the context of climate change, calculated as absolute changes in sea level adjusted to local vertical movement of land related to local and regional geomorphological processes. The siltation process alters the geography of the delta, hence is not fixed; it is a fluid space. Some parts of it progrades as the delta grows farther out into the sea over time, i.e., when the volume of the incoming sediments is more than that of the delta, that is lost through subsidence and erosion. While some parts of it retrograde, i.e., the delta shrinks inside when the delta volume is lost through subsidence and erosion more than the incoming sediment.

This region boasts of its invaluable natural feature—the mangroves—which act as a protective buffer between the water and the land. The dense jungles, along with its flora and fauna, contribute to the area's unique ecological tapestry. Sundarbans region is demarcated by Hooghly on the West, the Bay of Bengal on the South, the Ichamati-Kalindi-Raimongal rivers on the east, and the Dampier-Hodges line on the North. The region is within the 5-meter contour line and is susceptible to high-intensity storm surges, cyclones, coastal floods, and erosion. Hence, it is considered one of the world's most vulnerable deltas.

Out of 102 islands, of which 54 are inhabited and protected by 3,500 kilometers of earthen embankments, and the rest are reserved for tigers. Of the 9,630 square kilometers area that constitutes the West Bengal Sundarbans, 2,585 square kilometers was declared a Tiger Reserve in 1973. The embanked delta is home to approximately 5 million people [24], who have established their lives amidst its surroundings and rely on the fertile land for farming, water for its fish and crabs, forests for their wood and honey, rear livestock, live as coastal communities dealing with the vagaries of nature. The Britishers settled them as they reclaimed large parts of Sundarban forests in the 18th and 19th Centuries and were mostly migrants from the most marginalized sections of the society, as discussed later in the chapter.

As per the 2011 Census, the population of Sundarbans is 45 lakhs, out of which 33 lakhs approx. live in South 24 Parganas district. The female population is 48.6 % of the total population of the district. The percentage of the Scheduled castes population in the district is 37.14 % of the total population.[25] With Reference to minorities, the percentage of Muslims in the district is 27. 9 %. A high percentage of people, around 50.74 % of those residing in Sundarbans in South 24 Parganas, belong to the BPL category and are extremely poor. The population is primarily rural, living in poor housing conditions, with 67.8 percent living in kutcha houses, 72% in one room, and 86% having houses with mud floors.[26] With a population primarily dependent on subsistence-level livelihoods, this area is geographically disconnected from the mainland. The lack of industries, the absence of basic facilities, and sheer underdevelopment are a harsh reality of this area.

Methodology

This study adopts a qualitative approach to capture data at the household level. It focuses on capturing the experiences of both the men and women in the household, locating their vulnerabilities, and coping and adaptive strategies to deal with climatic stressors. The attempt was to look at intra households dynamics concerning the impact of climate change related mobility on families. The methods of data collection used for this study were in-depth interviews (22), life histories (8), and key informant interviews (11). The reason behind using multiple methods for collection is that the essence of an object can only be captured by showing it simultaneously from various points of view. [27]The fieldwork was conducted during a series of visits between February 2022 and June 2022 as part of the doctoral research the author is pursuing.

Within 24 South Paraganas district, two villages were purposively selected for this study to represent the high coastal erosion-prone area in the Sundarbans, experiencing both slow onset and rapid onset natural hazards through pilot visits and key informant interviews. The villages chosen were Gowardhanpur in the G plot, Grampanchayat in the Patharpratima block, and Baliara in Mousini Grampanchayat in the Namkhana block. Within the chosen village, the researcher purposively selected households experiencing mobility and immobility in the villages after losing their homes and land to the sea, keeping in mind that the selected households represent different castes, household headships, and poverty categories.

Natural Hazards as Triggers

Coastal settlements in the Sundarbans are increasingly subjected to flooding during cyclones, leading to surface waters and groundwater being infiltrated by saline intrusion. In the last 23 years, the Sundarbans have witnessed 13 cyclones. Since 2009 four Cyclones have devastated coastal Bengal, viz. Aila (2009), BulBul (2019), Amphan (2020), and Yaas (2021) leading to widespread inundation of the coastal villages due to the breaking/overtopping/collapsing of the embankment and large-scale destruction of human settlements. Dasgupta et al. (2020) state that during the passage of a single cyclone, the loss and damage inflicted by a few hours of battering of waves, winds, and surges can undo the gains from many years of accumulative processes. Scientists warn of an increase in the post-monsoon cyclogenesis by 50 percent between 2041 to 2060 due to increased greenhouse gas concentrations and the warming up of surface temperatures.[28]

Along with cyclones, oastal erosion has devastating impacts on the people who reside near the shorelines. They dismantle and dissolve everything that comes in their path. People lose their lands, homes, and their ecosystems. In Sundarbans, village after village that was once at a

comfortable distance from the sea has been wiped away or encroached upon by brackish waters, awaiting their submergence. In the recent past, densely settled islands, namely Lohachahara, Suparibhanga, Bedford, and Ghoramara Island, have entirely submerged, which resulted in a mass displacement of people from these areas to adjoining places in Sundarbans. [29]Both the villages of Baliara on Moushini Island and Gowardhanpur on G plot Island, were I collected the data for this paper, are retrograding. They are shrinking over the years. G Plot has been reduced to 40.79 km sq from 52.31 sq km from 1970 to 2020, while in the same period, Moushini Island has shrunk from 33.51 sq km to 26.21 sq km. [30]In the last 50 years, both islands have lost approximately 22% of their land area.

Erosion is enhanced due to climatic impacts. Studies compute the sea level rise at a staggering 17.8 mm per year at Sagar Island Observatory between 2001 and 2008, compared to a rise of only 3.14 mm per year during the preceding decade[31]The sea level off the coast of Bengal is rising at 4.04±0.44 mm/year. The impact of sea level rise in Sundarban is further accelerated due to the slow subsidence of land at the rate of 2.9 mm/year.[32] The impacts of sea-level rise, along with the complex hydrodynamics of deltas along the Sundarbans, significantly impact the erosion-deposition process that shapes the islands and consequently leads to land-use changes in the Sundarbans.[33] A World Bank report claims that the Sundarbans have had a net loss of 450 sq. km of land from 1904 to 2016. In the last two decades, the erosion rate has increased significantly due to the enhanced impact of climate change in the region.[34]

Slow and long-lasting hazards like soil erosion and sea-level rise tend to act as stressors on the everyday living conditions of the people of Sundarbans. This gradual process of environmental degradation, combined with sudden extreme events due to climate change like storm surges, flooding, and tropical cyclones, can exacerbate people's vulnerabilities to hazards and undermine their livelihood and capacity to adapt to stressors and threats. According to Harms (2017), the loss suffered by families due to erosion during storm surges is way beyond comprehension.[35] To quote Harms (2020, p 151)," That which breaks in a storm can be mended, replanted, or rebuilt from scratch. Erosion, however, takes the land for good. The ground under one's feet is washed away, homesteads lost, and agrarian futures undid."[36] Another problem in Sundarbans is the quality of water that erodes shorelines. The salty or brackish water here is responsible for the destruction of the landmass by salinizing agricultural fields and drinking water sources.[37] In such a scenario, even if the accreted land is of no use, it must be freed of salinity before cropping.[38]

Not only Climate

Scientists have linked the accelerated rate of coastal erosion, mangrove depletion, and rising soil salinity to intensified impacts of climate change and sea-level rise and anthropogenic reasons in the region. Local people in the Sundarbans delta instead attribute it to the variety of other well-known changes in the landscape-the construction of embankments, closing of river creeks, destruction of mangroves, and tourism. Not to negate the fact that climate change doesn't impact the coastal region, but rather to highlight the fact that one need to understand the other drivers of ecological degradation along with the climate. The contemporary debates on climate change are laden with power dynamics that silence alternative understandings of the history and politics of environmental change in this region[39]

Embankments Breach, Salinity Intrusion Linked Mobility

Fixed embankments were built on a prograding and retrograding space, by facilitating the clearing of forests, reclamation, and settlement of people in the delta up to the coastal margins. With the construction of the embankment, the rapid deforestation and expansion of the area of settlement and cultivation began. The advent of the embankment law also initiated a beginning towards imagining this region as a unidimensional cartographic space[40], ignoring the fluid nature of the Sundarbans, whereby ascertaining cartesian binaries of land and water, human and non-human, to manipulate the 'soaked ecology' for colonial gains.[41] The imposition of a permanent infrastructure on top of a dynamic landscape began unveiling serious ecological impacts in the form of interrupted the natural cycle of monsoon floods, and it impaired the normal sediment dispersal process of this ecology.[42]This meant that the river channels, which were deprived of space to flow onto land during tidal inundation, began to deposit the alluvial sediment on its river bed, reducing its water-holding capacity and slowly becoming narrower and shallower.As the river channel narrowed, they put more pressure on the embankments, which breached as a result.

In both villages, the key informants indicated the presence of chouras right next to the islands. They explained that due to the rising of the river bed next to their villages, the wave height has increased, along with the water currents (Jalospiti), which is responsible for the rapid erosion of the coast. Along with the river beds being gradually elevated, adjoining flood plains were deprived of accretion of sediment[43], leading to their subsidence. As the process continued, drainage became more difficult as the high tides achieved a height far above surrounding villages, resulting in water-logging, where there was insufficient space for water to drain back into the rivers. On the contrary, sediment deposition continued in the non-reclaimed forest areas, and consequently, the area stands at a higher level (+1 m.) on average than the reclaimed areas[44].

This is also linked to deforestation, including destruction of mangroves, facing loss of their mangrove cover. The district of 24 South Pagaranas (where I have conducted this research) in West Bengal holds 47% of India's mangrove forest share[45] The Forest State Report 2021 revealed that the very dense mangrove cover in the Sundarbans shrunk by two square kilometers, from 996 sq km to 994 sq km, between 2019 and 2021, and the total forest cover lost between 2011 and 2021 was 49.95 sq km, which is approximately 4.3 % of the total forest cover.[46] The Sundarbans' landscape and hydrology underwent significant transformations during the colonial period due to systematic deforestation for cultivation and increased revenue generation. There was a dual perspective on the Sundarbans forest: on the one hand, an attempt to clear the unproductive forest to expand agriculture and generate revenue due to its fertile land, and on the other hand, the forest was seen as a habitat for wild flora and fauna, prone to natural disasters and considered unsuitable for human habitation. [47] Depletion of mangrove forests has a huge impact on the lives and livelihood of the local inhabitants and takes away their only protection from cyclones and storm surges.

Another issue is that of water logging. Bimala Das, in Gowardhanpur village, says "*Earlier, the embankment was earthen and used to break, so the water receded during low tide. There were small disasters, and the water used to come and go. Now the water comes over the concrete embankment and stays longer. The water is logged here..all saline water...earlier there was no water logging, but now, there is more water logging." (Bimala Das, Gowardhanpur village).*[48] The difference in elevation traps rainwater inside the embankment, river water then overflows, and the ensuing drainage congestion causes damaging floods called jalabaddho or waterlogging[49]. Also, during extreme events like cyclones and storm surges the water inside the village by overtopping the embankments, doesn't find a way to drain back into the rivers. The

ensuing congestion leads the water to stagnate and ruins crops in the type of flood referred to as jalabaddho[50] or water logging.

Tourism

A panchayat official of G plot said with much confidence, "*We are trying to invest in tourism-related activities here. If tourism picks up, we will see a few boys going out for work to other cities. (Ashish Burman, G Plot Gram Panchayat).*[51] Tourism is a thriving business on both the Glpot and Mousini Islands. Encouraged by the local and national governments, many private operators and enterprises have started tourism initiatives along with the government in the past two decades (Ghosh 2014). According to Noor Islam, " *Local people previously used the land where the tourism projects are located today for segregation and drying of fish.*[52]It is evident from the excerpt that the benefit of the tourism projects has been accrued only by a few, especially those having access to land and resources. Similar findings are demonstrated by P. Ghosh and A. Ghosh's (2018) research in Sundarbans; their study found that 36% of the interviewees claimed to receive direct or indirect benefits from ecotourism in contrary it failed to offer any benefits at all to the poorest and most marginal communities.[53] They offered disproportionately larger returns to the remotely located capital invested in the local ecotourism facilities in the Sundarbans, hinting at an unequal, uneven, and skewed accumulation of benefits of tourism, often associated with market mechanisms of global environmental protection, thus defeating the principle behind the mechanism.

A cursory look into the resorts in Baliara and Gowardhanpur is sufficient to provide one with a glimpse of the luxury they promise to tourists. From AC rooms, Rooms with attached bathrooms, Pure Water, Bottled Water, Purified, Hot water, and Chilled water to Exotic Food (Crabs, Fishes, Greens, Asian, American, Italian) and good music to ambiance, to a nice beach and tour of the Jambudeep Forests(Island). The question that one is confronted with is in less than five years, how much machinery and human resources were pulled from outside these villages to put pressure on the already sensitive land that is shrinking into the sea. In 2022, there were barely any trees left; while the villages claimed that a few years ago their village had a dark, deep forest, it was scary enough to keep the villagers away.

The local villagers attribute the destruction caused in the recent times, during cyclone amphan and cyclone Yaas, to the rapid construction of the resorts in the area. *Much damage is being done after the tourism projects came up. They are directly taking mud from the river in front of them. The ground level is going down; the water is coming up with more force.* [54]In order to deal with destruction of the cyclones, the resorts take mud from the river to raise their surface. During cyclone Yaas, the force of the water was so strong that four resorts facing her homestead, were taken along into the sea with the waves.'s house now faces the sea directly, the physical protection that she thought that the resorts offered to them as a wall between the sea and their tiny house exist no more. Since cyclone Yaas has happened, the community has started questioning the viability of the tourism projects and accusing them of damaging their ecology. In the words of Savitri haldar *"Sarkar is not looking at the embankment here on the western side. For the tourism project party, they have done mud work to protect the projects, but nothing for us."*[55]

Although the tourist camp are being viewed as potentially damaging the ecology and ethos of the villages. During Cyclone Yaas, the tourism projects opened the gates for the local people to take shether in times of need. Most informants were thankful to the projects for providing them with relief items post cyclone Yaas. As mentioned by one of my research participants, in the absence of any support from the state, the tourist projects provided them with water needed for drinking, cooking, bathing, and washing clothes. The camps and resorts allowed them to stay in their premises

till the time they could go back to their homes, some people even stayed for more than two months, especially those who had no way of returning to their homes.

The Gender- Mobility Nexus: Those Left behind

A conversation with a household in Gowardhanpur and Baliara Village begins mostly with family members pointing in the direction of the river "*there…. our home was there…. It's in Ganga now" (Ganga te pore che).* In Sundarbans, one experiences disasters as frequent, mundane, and everyday phenomena which are variant manifestations of pre-existing processes and power relations and severe as a lens through which the nexus between power and development apathy unfolds in Sundarbans.[56] Not to negate that flooding, cyclones, and coastal erosion can significantly impact the people who reside near the coast. But the people of Sundarbans are not at the mercy of disasters alone; their vulnerability multiplied due to the apathy and negligence of the government departments responsible for protecting embankments and providing services in the event of erosion and flooding. Floods are seasonal and saline; however, they only last for a few days or months.

The poorest households in the coastal areas of Sundarbans do not have the capacity to leave their villages even if their homes and lands are being eroded and submerged. The economic burden of survival outside the village is huge for them. The fear of going to a foreign land lingers in the stories of those who have returned from cities. During floods, households are displaced and forced to move temporarily, seeking access to government services and alternative forms of livelihood. People are rarely compensated for loss and damage. They feel safe living with other displaced families on the embankment or wastelands. Those families who have relatives staying nearby take refuge in their homes. For example, relatives allow their displaced family members to make temporary makeshift huts on their land or add extensions to their existing homes to accommodate displaced people. People with greater purchasing power buy land in other villages within Sundarbans. However, most displaced families prefer to find their second homes within Sundarbans.

Women, children, and elderly stay behind as the "Trapped population."[57]especially households with pregnant women, children, disabled or sick family members, or the elderly are vulnerable. Migration, requires able bodied people to move out to work, because it involves a lot of hard work, be it in the construction sector, domestic sector or the fishing sector. Males, who are weak, do not got out to work, even if they migrate, they are not able to take the pressure of the hard work associated with migration and come back home and continue to live with their families. Basanti Bera, 55 years old women talks about her son who is not willing to go to city and work, while she is getting old, and doesn't have the capacity to work as hard as she used to do before. "*He was in Tamil Nadu for work before corona; he used to do thread work. But he wasn't able to work for long. Supposed he worked for five days, he couldn't work for the next five. He wasn't able to push his body to work. So he came back.I don't know what he will do, whether he will go outside to work or work here."*[58] Elderly women have limited opportunities to move out to work, which might exist in the younger women, depending on their responsibilities back home, and the support network they have for looking after their family members. In absence of facilitating opportunities to migrate, which are linked to many factors, women are often the one who stay behind.

For those who stay behind, migrating members are the source of remittances, yet the burden of care and the responsibility of taking care and providing food for their families are the responsibilities of the women who stay back. In the absence of men, it is the women who disproportionately bear the burden of survival without their husbands, engage in child and elderly care, take up alternative livelihoods to provide for their families, deal with the catastrophic impacts of

repeated disasters, and negotiate with the government and non-government officers for compensation and aid. *Cyclone Yaas destroyed Anjana's house again. It was the fourth time when her house was destroyed. Anjana, 36 years, is a mother of four daughters; her husband works in Kerala and sends them remittances, on which the family is completely dependent for survival. In her husband's absence during Yaas, she evacuated her children to the government school alone. After taking refuge in the school for a few days, she constructed a shed over them, with the help of her daughter, where they live now. They salvaged some leftover materials from her old, dilapidated house and bought some new materials on loans from the nearby shops.* [59]Yet, monthly remittances sent by migrant male members help reduce the vulnerability back home[60]; it also improves living standards by enabling families to pay for food, education, and health care back home. This is also highlighted by a study in the Mahanadi delta that exchanging money, knowledge, and ideas between the migrant's place of origin and destination can potentially reduce women-headed households' socio-economic and bio-physical vulnerabilities[61].

Households with no migrating members are worse off, there is pressure to perform survival labor on breadearners while dealing with environmental stressors. As Bhabani narrates *"I work as a laborer here. I work whenever and wherever I get to work. I do all sorts of domestic and labor work. I also work in mnerga 100 days work. Earlier I used to catch prawn seedlings and use to catch fish. I have done all sorts of jobs to feed myself and my family. We can do anything for our stomachs. Throughout my life, even if I couldn't do any work, I did it. I have to search for work constantly; what if I don't find one? Because otherwise, I can't feed myself, nor can I buy medicines for my mother. Now, I am going to the betel leaf farm as a laborer."*[62]

In cases where young couple migrate out with their children, elderly family members are left alone. *Rupa Mondal, 60 years old, lives next to the embankment with her old and sick husband at their displaced home. Her son has bought a place in Karanjali and lives there with his family. On being asked why she continues to live here. She laments, "but it's (his house) in such a place that the road is in front of their house. There are so many vehicles passing by. I think it's not got for us older people. My husband says he will not go there. Nobody will understand his language. He will have to stay inside the house all the time. He says he will not go. he will die here. I don't want to leave him alone. My daughter-in-law used to look after us, but now she is also gone; we will see how much we can manage independently.*[63] Gemenne (2010) observed a orrelation between age and evacuation decisions and identified that post-Hurricane Katrina, elderly people were unwilling to leave, as isolation crippled their mobility. Post-disaster studies have considered the elderly to be at high risk of disaster impacts due to increased health concerns, reduced mobility, and fixed economic resources.[64] In Sundarbans, the elderly living alone without their families are at high risk due to their diminishing social capital, which hinders their ability to receive warnings, preparation, assistance during an evacuation, and access to resources [65]. Similar findings were observed in a study in Mexico, where elderly couples receiving money from their sons or daughters who also have to maintain their own families are usually worse off.[66]

Those living along the coast live with saline water coming and moving out of their homestead during the rainy season and natural calamities. Especially in monsoon, women spend a considerable time pumping out saline water from their homes and ponds. With the increased amount of saline water coming over the concrete embankments, water sources, mainly ponds and tubewells are getting contaminated. Women and girls spend a considerable amount of time getting water from faraway tubewells for their household needs. Male members or grown-up boys also help female members of the household in this process by riding the vans for them. To adapt to the water problems, many families used a cycle van (a local transport vehicle in Sundarbans) to transport water from the tubewells to their homes.

Aparna Mandal, 29 years explains water problem as "*Our pond also has saline water in it. So I have to go to other people's ponds to bathe. But if they see, they fight with us. People don't allow us to bathe in their*

ponds. Somehow we manage; in their absence, we take baths. Because of the water problem, we can't even keep goats and cows. They are also the source of fights."[67] In resource-constraint areas, household face difficulty in pursuing alternative sources of feeding practices through the kitchen garden, livestock rearing, etc., that ensure the food security of their families. Before their land and homes were submerged in the water, women of the households were engaged in activities like growing vegetables, rearing livestock, and catching fish. They did not go deep into the water but used a small net(chain jhal) to collect fish near the coast. Every day families would catch 1-1.5 kg of fish used for household consumption. In the words of Biswajit Sahu "*There was Tangra, chingri, and parse in the pond -jewel fish, Letha, son, and koi fish, which we used to get throughout the year. We used to have fish every two or three days. Women used to grow vegetables. They used to rear hens, goats, and cows. The women were providers of food in the family. Women seldom went to work for an income, but in the family, they used to work a lot harder to ensure that we were fed sufficiently."*[68]

Children belonging to the villages studied also have difficulty continuing education at school during the monsoons. Saline water ingress in the villages impedes continuous learning as the connectivity between the school is affected by water logging and floods. During cyclones, schools are being used to provide shelter to evacuated families as the number of cyclone shelters in the affected area is abysmally low and does not cater to the needs of a high percentage of the population. With the number of cyclones getting frequent, apart from monsoons, schools also run as evacuation centers for a few months. To compensate for their children's learning, households invest in home tuition. However, not all households can afford home tuition for their children, those who do prefer sending male children to tuition as they are the future bread earners of the family. During the Covid-19 crisis, as the schools were shut, the rate of expenditure was considerably increased for home tuition. However, families with reverse migrations, where breadwinners didn't have a source of income, faced difficulty sending their children for tuition.

The Gender- Mobility Nexus: Those who Migrate

Within the last twenty years, there has been a rise in the amount of research done to assess and understand the nexus between natural hazards, the environment, climate change, and migration in Indian Sundarbans. Studies post-Cyclone Aila claims that the increased salinization of agricultural fields and water bodies endangered food security and led to large-scale displacement and male migration[69]. There is no comprehensive data on displacement after Aila, but recent regional studies have documented the migration, particularly of men, after the cyclone. [70]Studies claim that over the last two decades, seasonal migration has become a coping mechanism to environmental stressors for a large proportion of the population in the Sundarbans.

According to the DECCMA Brief 2018, 18 % of families have sent migrants in search of better livelihood options.[71] Hajra and Ghosh (2018), found a positive association between a decrease in agricultural productivity and out-migration.[72] In India's Bengal delta, encompassing the Sundarbans mangrove forests, one in five households now has at least one family member who has migrated.[73] Males migrate once or twice a year. They migrate within West Bengal, Bihar, and Orissa or venture far to states like Maharashtra, Tamil Nadu, Kerala, and Gujarat. [74]The report indirectly links environmental stresses to livelihood insecurity that necessitates migration. It suggests that the most significant proportion of migrants are males aged between 21-30 years old. The intentions to migrate in the future are high (among two-thirds of all households): to seek jobs, better education, and alleviate environmental stresses [75]. Perceived environmental and economic impacts, including flooding, cyclone, erosion, and loss of seasonal income, are apparent in areas more exposed to hazards, indicating a higher probability of future migration from these areas. [76] The aspirations of the

people in the Sundarbans and their social networks in terms of finding employment also promote migration (Misra and others, 2017).

During a key informant interview, Tapas Bera, 47 years, talks about how displacement occurs for households after losing their lands to the river and sea. *"After their land and the house has gone into the water, they are helpless; if they have some relatives somewhere else, they try to contact them. They find out if some wasteland is available or near the road where they can make a home. They look for places where they can find work; e.g., people have gone to Purba Mednipur, they have gone to Bhakhali, they got into the fishing business, as they were fishermen here. Some also go to cities like Kolkata and Orrisa; they stay on footpaths in slums wherever they find a place."* (KII, Gowardhanpur village)

Women also migrate, but their numbers are less as compared to men. However, in recent times the number of women migrants has been increasing (DECCMA Brief 2018). Within a household, a women's decision to migrate depends on the household. Most women migrate along with their husbands and families. However, in households, where male members are not able to migrate because of their inability to do hardwork, mental/physical illiness, women leave their dependents with relatives before migrating for work. Women migrate to areas close by, mostly within Kolkata or its urban hinterland; males migrate out of the state and sometimes out of the country.

Nafisa, 62 years, worked in Kolkata as a nursemaid for 35 years. She had no option but to feed her family of three children in Baliara village. Her husband did not work at all. According to Nafisa, he was a bit different. He used to go here and there and did not earn for them. The saline water used to enter their homeland. There was destruction every year. They could not sustain life or feed their children, so she went to Kolkata for work, leaving her three children with her parents.[77]

Migrants in the destination areas face acute poverty in terms of material status. Their perceived well-being is affected due to their inability to pay for health services and clean sanitation. Most migrants I spoke to narrated their challenges with not knowing the language and having non-Bengali food, which is a typical mustard oil and sauce preparation. Men who had the means to take their wives with them preferred to do so.

As Abdul, 28 years old, a migrant worker in Kerala, narrates, *I was a supervisor in a sports turf company. After a few years, I picked up the Kerala people's way of talking. It took me four years to learn their language. Then I took my wife along with me. She could work as a laborer and manage my food. Earlier I used to eat very little as I was not too fond of their food taste. Life was easier with having my wife beside me. But now we have a small daughter. She cannot manage to do the labor work with her. So, this time, I leave my wife behind with my mother when I go. It's too expensive in Kerala. I cannot sustain the expenses of the three of us by working alone.*[78]

During the Covid 19 pandemic, families experienced a massive reverse migration of migrating family members. According to the third pole, an online news portal, many migrants from Sundarbans were working in Kerala and Maharasthra, two states showing the highest number of COVID-19 infections, at the time the crisis happened. The families that were dependent on remittances were the ones who supported the migrant male members who were struck in their place of destination during the corona crisis.

Bhabhani (48 years old) recently lost her husband in 2021; her son was in Kerala when corona crisis began. *"My son called me from there, saying he had no money to eat, so I borrowed money from the locals here and sent 5000 rupees to him. He was also infected with corona; we had no communication; he was in the nursing home for about a month. I had no word from him. I was worried. I used to cry a lot. After 1.5 months, he called me after he was feeling fine. The people there took away his phone when he was not well. "Now he has again gone to Kerala to work. He works as a laborer and as a mason helper. He went during Durga puja but has not sent any money till now. He had taken Rs.5000 from someone as a loan when he was going, and there was some expense while traveling. He has paid the person back with interest. But he couldn't send money home. These days they don't*

find work in Kerala easily. Others who had gone along with him to Kerala are coming back." (In-depth interview, Gowardhanpur village)[79]

As the COVID-19 pandemic turned into an unprecedented global and national crisis and the country initiated a nationwide lockdown with barely any warning, hundreds of thousands of migrant workers were pushed out from their destination sites with only short notice. During the crisis, migrant family members could not travel home because of the risks of bringing the virus home. Some who did not leave the destination or could not afford to do so were suddenly left with no jobs, no income, no shelter, and no food to eat. Worse off were those who contracted the virus; they were left at the mercy of none.

The Covid 19 pandemic points to inherent insecurity and unsustainability at both the sending and the destination locations. There is a huge uncertainty of future subsistence in the home locations as a sizeable migration from these areas is distress-induced, there is little possibility of them being engaged in local economic activities, and the work under MGNERGA is also scanty [80] Even after Covid 19 threat has been minimized, there is uncertainty about job prospects in the destination areas, as expressed by a few people during interviews.

Conclusion

This paper argues that climate change acts as a new driver intensifying these mobility challenges and exposes the shortcomings of various experimental interventions in the region. The key question is not whether climate change will impact mobility but how these impacts will be distributed among different groups and how they will alter mobility patterns. Dispossession resulting from climate change is a relational and uneven process. Changes in landscapes, waterscapes, and fishscapes also affect fishing, agriculture, and freshwater resources. Findings reveal that mostly young, able-bodied individuals migrate for work, leaving vulnerable groups behind to cope with the ecological and economic challenges at home. Poor governance exacerbates these issues, as government departments often work in isolation, neglecting the holistic needs of the local population. The paper calls for comprehensive governance practices that consider all forms of mobility, from safe migration to relocation, and emphasizes the need for policy coherence in climate adaptation, disaster relief, labor migration, and ecological development to meet the unique needs of the Sundarbans delta and its inhabita

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