

REPORT ON COASTAL LIVELIHOODS OF WEST BENGAL

(BASED ON A FIELDWORK IN BAGURAN JALPAI, EAST MEDINIPUR)

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CONTENTS

INTRODUCTION	6
METHODOLOGY OF STUDY	7
Tools for data collection	7
PART I- VILLAGE BAGURAN JALPAI	10
KNOWING BAGURAN JALPAI	10
Village Profile.....	12
Map of the Village	13
CHANGING NATURE OF COASTLINE AND ITS IMPLICATIONS ON THE LIVES AND LIVELIHOODS	13
COASTAL HAZARDS FACED BY THE VILLAGE OVER TIME	13
Pollution.....	14
Cyclones.....	15
Storm Surges and High Wind Speed.....	17
Maritime Security Hazards	18
Erosion	19
Flooding	19
Soil Salinity.....	20
VULNERABLE GROUPS AND WHY?	21
ECONOMIC VULNERABILITY	22
BIOPHYSICAL VULNERABILITY	23
SOCIAL VULNERABILITY	23
EFFECT OF HAZARDS ON THE LIFE AND LIVELIHOOD OF THE PEOPLE AND LONG-TERM IMPACTS	24
Fishing.....	24
Agriculture	24
Tourism	25
Environmental and Economic Impacts	25
Shrimp Farming	25
Decline in Fishing	26
Impact on Food Security	26
Long-Term Impacts	26
Land Degradation:	26
Economic Instability:	26

Cultural Shifts:	27
THE PROBLEM OF SHRIMP AQUACULTURE	27
FACTORS THAT IMPACT THE PHYSICAL AND THE MENTAL HEALTH OF THE FISHERFOLK	28
HAZARD RISK VULNERABILITY CAPACITY ASSESSMENT (HRVCA).....	30
Identification of hazards:	30
Understanding Community Risk and Resilience	32
Risk Matrix:	39
Hazard Likelihood Assessment:.....	39
Capacity Assessments:.....	40
Identification of Risk Reduction Strategies	41
Existing Risk Mitigation Measures.....	41
Recommended Measures	43
DEVELOPMENT SCHEMES- WHAT IS IN PLACE, IMPLEMENTATION AND PEOPLE'S PERCEPTION ON IT	44
<i>Khadya Sathi</i> Scheme	44
<i>Lakshmir Bhandar</i> Scheme.....	45
<i>Samudra Sathi</i> Scheme	45
ECOSYSTEM SERVICES AND RELIANCE ON ECOSYSTEM FOR RESILIENCE.....	46
<i>KHUTI PUJO</i> : UNVEILING THE CULTURAL RICHNESS OF BAGURAN JALPAI VILLAGE	50
FISHERIES AND DEVELOPMENT - AN EXISTENTIAL THREAT ?	52
GENDER BIASES IN THE FISHERIES SECTOR.....	54
UNCERTAIN FUTURES- SHADOW OVER THE FUTURE OF SMALL-SCALE FISHING	56
GAPS IN THE PLANS- INTEGRATION OF DISASTER RISK REDUCTION INTO DEVELOPMENT	58
PART II- DISTRICT EAST MEDINIPUR	62
EAST MEDINIPUR- DISTRICT PROFILE.....	62
ANALYSIS OF COASTAL HAZARDS	63
PROCESS OF DESIGNING THE DISTRICT DISASTER MANAGEMENT PLAN (DDMP)	65
GAPS IN THE DISASTER MANAGEMENT PLAN	66
PART III- STATE: WEST BENGAL	69
STATE PROFILE:.....	69
GEOGRAPHIC PROFILE.....	69
ADMINISTRATIVE PROFILE	69
DEMOGRAPHIC AND SOCIO-ECONOMIC PROFILE.....	69
ANALYSIS OF COASTAL VULNERABILITIES OF THE STATE OF WEST BENGAL.....	70

REFLECTION IN THE DISASTER MANAGEMENT PLAN	71
CONCEPT OF MAINSTREAMING DRR	72
MAINSTREAMING DISASTER MANAGEMENT INTO DEVELOPMENTAL PROGRAMS AS A STRUCTURAL MEASURE	73
SCHEMES IMPLEMENTED AND CHALLENGES	74
PART IV:CONCLUSION	75
Cultural and Environmental Heritage Preservation	75
Disaster Risk Management	75
Inclusive Development	76
Uncertainties surrounding the future of small-scale fishing	76
Recommendations for Future Action	78
REFERENCES	80

INTRODUCTION

The coastal regions of West Bengal, particularly the districts of East Medinipur and South 24 Parganas, are home to vibrant yet vulnerable communities that face a myriad of challenges in their daily lives. The 21-day fieldwork was an opportunity to immerse ourselves in the lives of these resilient coastal dwellers, gaining a deeper understanding of their livelihoods, coping strategies, and the intricate relationship between their communities and the surrounding ecosystems. Fishing has traditionally been the primary occupation, with generations of families relying on the bountiful marine resources for their sustenance and livelihoods. However, the communities we encountered are now grappling with the adverse impacts of climate change, leading to a gradual depletion of fish stocks and the encroachment of saltwater intrusion into agricultural lands.

One of the most pressing issues faced by these coastal communities is the increasing frequency and intensity of natural disasters, such as cyclones, storm surges, and coastal erosion. The impact of these events has been devastating, with many families losing their homes, access to essential services, and means of livelihood. The vulnerability of these communities is further exacerbated by their relative isolation and the lack of adequate infrastructure, making it challenging for them to access resources and support during times of crisis.

As we delved deeper into the lives of these coastal communities, we were humbled by their resourcefulness, their deep connection to the land and sea, and their unwavering determination to navigate the challenges they face. Their stories have not only broadened our perspective on the complexities of disaster management but have also reinforced the critical importance of incorporating community-led, ecosystem-based approaches into disaster risk reduction and climate change adaptation strategies.

METHODOLOGY OF STUDY

Review of existing literature on fishermen's livelihood and on broader issues of the coast was done before reaching the field. Background information of the field (assigned village- Baguran Jalpai) was gathered focusing on the demographics where we gathered population data from 2011 census, types of livelihoods and communities, climatic conditions of the area- the information on which we got from our resource person from the village. Villages to be studied for rapid survey were chalked out based on the type of communities living in the village, uniqueness of the village in terms of infrastructure (like presence of high school or different type of livelihood). Data obtained through the examination of existing documents has guided the formulation of specific steps designed to achieve the established objectives.

In the field, data was collected through observations and informal conversations with the villagers for the first three days. In the next five to six days we engaged in group discussions, in depth one-on-one conversations with key informants and semi structured interviews where both qualitative and quantitative data was gathered.

Tools for data collection

1. Transect Walk- We conducted a transect walk in the Baguran Jalpai village area. Mapped resources, land use patterns and ecological features.
2. Observations- Various observations were made during the transect walk and also over the course of our stay in the village. Multiple entry and exit points of the village, critical infrastructures, environmental resources and the variety of occupation were identified. Local festivals of religious and cultural significance were also attended to understand the cultural practices and beliefs surrounding the fishermen.
3. Informal Conversation- Engagement in informal conversations, be it in groups or one on one, gave us a way to connect with the community and know more about their lives and practices.
4. Semi- Structured Interviews- Conducted interviews with key stakeholders, including the District Disaster Management Officer (DDMO), Block Disaster Management Officer (BDMO), Department of Fire and Emergency Services and the Fisheries Department (Marine, Normal and Brackish), Anganwadi worker, *Pradhan* of the Manjilapur Gram

Panchayat to gather insights on the current disaster management plan, existing schemes and the most affected areas during cyclones and other disasters.

A face-to-face interview was also carried out with fishermen and their families covering different facets of socio-economic conditions such as occupational structure, daily routines, fishing activity levels, fish sales markets, income distribution and assets (boats and nets used).

5. Social Mapping and Resource Mapping (PRA)- Social Mapping was done with the help of the villagers where they created a map of their village. to identify natural resources such as water sources, forests, and agricultural land, and social mapping to map social structures and relationships within the community

Sampling Strategy

1) Stratified Sampling- The population of the village was divided into various strata based on their means of livelihood. Since it is an individual characteristic, it would be stratified and not cluster.

2) Convenience Sampling- Within the strata, the respondents were chosen based on availability. For example- the shrimp farmers were chosen based on availability and willingness to talk.

3) Snowball Sampling- For female fishermen and fish sellers, one respondent was told to gather other women involved in fishing activities. She brought two more women who then connected us to three more women fish sellers.

Sample Size

- Total respondents from Baguran Jalpai village- 32
- Agriculturalists with land (under their own name or owned by a family member) - 10 (all men)
- Fishermen and fish sellers- 6 women and 8 men
 - Fish sellers- 4 women and 2 men
 - Those who engage in fishing- 2 women and 6 men
 - Fishermen who own boats- 5 men

Fishermen who help in the boats- 2 women and 3 men

- Shrimp farmers- 3 men and 1 woman
- Shopkeepers by the beach- 3 men and 1 woman

PART I- VILLAGEBAGURAN JALPAI

KNOWING BAGURAN JALPAI

The name "Baguran Jalpai" holds a fascinating history that reflects the village's deep connection with the sea and the resilience of its inhabitants. Originally known simply as Baguran, the village was situated on the landward side of the area, away from the Bay of Bengal. With the construction of the sea dyke (embankment), a portion of the villagers, primarily the fishermen who had forged an intimate bond with the ocean, chose to resettle on the seaward side of the embankment. Driven by their deep-rooted connection to the bay and the allure of being closer to their livelihood source, these fishermen then established a new settlement, between the sea dyke and the vast expanse of the Bay of Bengal. It was this relocation that heralded the addition of the word 'Jalpai' to the village's name, signifying its newfound proximity to the sea.

Baguran Jalpai is 16 kms from Contai, the biggest town with the majority of the facilities available. The village is only connected via roadways and there are periodical local autos that ply between Contai and Baguran Jalpai. The village comes under Majilapur Gram Panchayat with the GP office located in Junput which is around 6 kms away from the village.

Fishing is the primary source of livelihood for most villagers in Baguran Jalpai, with approximately 320 registered fishermen and 15 boat owners supporting their families through this occupation (*Source: Dakhin Banga Matsyajibi forum*). The village's traditional fish landing spots, known as "Khotis," play a crucial role in the fishing activities, serving as focal points for the community's fishing endeavours. With two Khotis in the village, each overseen by a general body, these spots are essential hubs for fish trading and communal decision-making.

In addition to fishing, Baguran Jalpai also sustains agricultural activities and shrimp aquaculture. The village's proximity to the Bay of Bengal influences its agricultural produce, with crops like tomatoes and brinjal thriving in the saline conditions prevalent in the region. Over the past fifteen years, there has been a notable shift towards shrimp aquaculture, driven by its perceived economic benefits. However, recent trends indicate a waning interest in shrimp farming due to diminishing returns and escalating operational costs. Despite the presence of

brackish ponds surrounding the village, many remain unused, reflecting the challenges faced by shrimp aquaculture in the area.

The social fabric of Baguran Jalpai is characterized by strong community bonds and collective decision-making. Residents prioritize inclusivity and consensus-building, ensuring that decisions consider the perspectives and welfare of all villagers. This communal cohesion extends beyond socio-economic matters to include political stability, with the village boasting near-zero crime records and a harmonious social environment. Such cohesion and stability contribute to the overall well-being and resilience of the community, enabling them to navigate challenges and capitalize on opportunities effectively.

The Village has experienced many hazards in recent years with the most devastating being the Aila(2009), Fani(2019) & Yasa(2021). Because of the topography of the village the water doesn't enter from the sea directly as it is higher rather the water enters the village from the back *khal* and inundates the agricultural fields and the brackish ponds. This saline water affects the agricultural fields and declines the soil fertility and it takes a year to be able to practice agriculture again, the shrimp aquaculture faces the problem of all their produce getting washed out of the ponds as the ponds overflow during the floods. Also, on the sea side the village has a natural barrier, the *jhau bon* (forest) to save them from the adverse effect of the cyclones.

The situation of freshwater in the village is not in a great condition although the villagers have adjusted well to it. There are 5 water points located throughout the village which have a motor pump attached to it and a storage tank to collect the water, most of the drinking water is sourced from there. For other activities the water is mainly sourced from personal ponds with almost all the houses having one each except the *Jele para* (fisherman colony) who solely depend on the water points for all their water needs.



Fig: Shrimp aquaculture



Fig: Jhau bon near the coast

Village Profile

District	Purba Medinipur
Block	Contai -I
Gram Panchayat	Majilapur
Mouza	Baguran Jalpai
Police Station	Contai Police Station
Area	300.27 hectares
Demography	No. of Household: 345 Total Population: 1573 Total Male: 815 Total Female: 758 (Source: Census 2011)
Livelihoods	Fishing, Agriculture, Shrimp aquaculture
Hazards	Cyclones, Storm surges, Soil Salinity, Erosion, Floods, Pollution,
Percentage of villagers in Livelihoods	Fishing: 60% Agriculture: 20% Shrimp Aquaculture: 20%
Critical Infrastructure (Within the Village)	Primary school, Middle School Anganwadi Primary Health Centre (Not Open yet) Multipurpose Cyclone Shelter
Literacy Rate	Overall, 77.43% 83.56% males 70.84% females (Source: census 2011)
Nearest Town	Contai

Table: Village profile (source: Census,2011)

Map of the Village

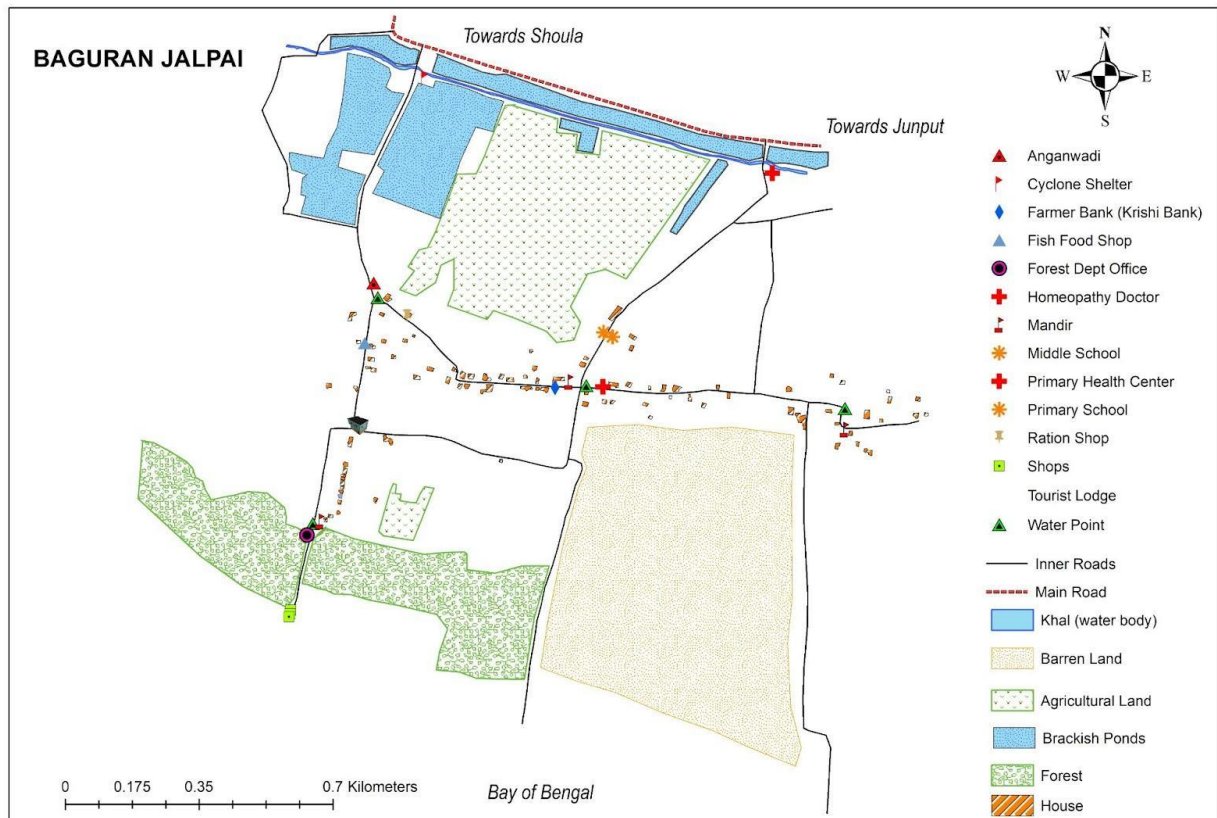


Fig: Resource Map of Baguran Jalpai

CHANGING NATURE OF COASTLINE AND ITS IMPLICATIONS ON THE LIVES AND LIVELIHOODS

As the village lies on a mudflat, visible erosion signs differ from sandy or rocky coasts; thus, GIS techniques are required for understanding it.

Although the villagers believe that the sea has come much closer to them over the years, as of now it does not pose any significant threat to lives and livelihoods.

COASTAL HAZARDS FACED BY THE VILLAGE OVER TIME

The different types of coastal hazards that the village has experienced include:

- Pollution
- Cyclones
- Storm surges and high wind speeds
- Maritime security hazards

- Erosion
- Cyclone-induced flooding
- Soil Salinity

Pollution

As Baguran Jalpai village experiences a surge in tourist numbers, the detrimental effects of this trend are becoming increasingly evident along the pristine shores of Baguran Jalpai beach. Renowned as a biodiversity hotspot for the conservation of red crabs, the beach is now grappling with mounting pollution caused by tourist activities, posing a grave threat to the delicate ecosystem and the indigenous wildlife. The once-pristine sands are now marred by litter and debris, with discarded plastics and other materials littering the shoreline and endangering the habitat of the red crabs. This escalating pollution not only tarnishes the natural beauty of the beach but also jeopardises the survival of the indigenous flora and fauna, undermining efforts towards biodiversity conservation.

The winter months witness a surge in picnic activities along the beachfront, particularly near the adjacent forests. While these gatherings offer opportunities for leisure and recreation, they also exacerbate the issue of littering, with vast quantities of plastic waste and other refuse left behind by visitors. The accumulation of litter poses significant environmental hazards, threatening the health of terrestrial and marine ecosystems and contributing to the proliferation of pollution-related diseases. Additionally, the presence of plastic waste poses a direct risk to marine life, with marine animals often mistaking plastic debris for food, leading to ingestion and entanglement, further exacerbating the ecological impact of tourism on the coastal environment.



Fig: Pollution caused by tourist activities

Cyclones

Cyclones pose a significant threat to the eastern coast of India, particularly in the Bay of Bengal region, where the majority of cyclones originate. Baguran Jalpai village, situated in one of the only two coastal districts of West Bengal, is highly susceptible to the ravages of these powerful storms. The village's geographical location exposes it to recurrent cyclonic activity, with several cyclones, notably Aila, Amphan, and Yaas, which occurred in the month of May in the years 2009, 2020 and 2021 respectively, inflicting considerable damage on the community. These cyclones, characterised by fierce winds and torrential rains, wreak havoc on the village's infrastructure and disrupt the lives of its inhabitants. One of the most devastating consequences of these cyclones is the direct impact on the livelihoods of the fisherman community. According to the Government of West Bengal statistics, over 6.77 million people have been affected and 137 killed in both North 24 Pargana and South 24 Pargana, the two worst hit districts of West Bengal. As the area was inundated by torrential rains, families were split apart, homes were damaged, and communities were fractured, resulting in chaos and sorrow. The hurricane made landfall in West Bengal, where the loss was very severe. In Kolkata alone, 18 people lost their lives, bringing the busy metropolis to a complete halt. The storm caused devastation as it moved through, destroying trees and breaching river embankments, cutting off hundreds of people from much needed relief efforts. Landslides exacerbated the disaster in northern regions such as Darjeeling, taking more lives and leaving a large number missing. Estimates from the government indicate that Cyclone Amphan damaged almost 3 million dwellings and affected over 5 million people in West Bengal. As cyclonic conditions render the sea perilous and impassable, fishermen are unable to venture out to sea to catch fish, depriving them of their primary source of income and exacerbating economic hardships within the community.

The fisherman community, comprising a significant portion of Baguran Jalpai's population, bears the brunt of the cyclones' destructive force. With their livelihoods intricately linked to the rhythms of the sea, the inability to fish during cyclonic events translates into immediate financial strain and food insecurity for fishermen and their families. Different sectors of the fishing community face different difficulties during cyclonic episodes. Due to a lack of resources for preparation, artisanal fishermen who use smaller boats close to the coast frequently experience damage to their boats and loss of fishing gear, which negatively affects their ability to make a living. The expense of repairing damaged vessels puts trawler owners in a difficult financial position. The lives and livelihoods of *Majhis*, who operate trawlers, are in

danger when at sea. In the meantime, workers aboard boats run the immediate risk of losing their jobs and suffering financial setbacks. To effectively design support and interventions to address the different needs of the fishing community during cyclones, it is imperative to acknowledge these disaggregated viewpoints. The destruction wrought by cyclones extends beyond the physical damage to infrastructure and agricultural land, inflicting lasting socio-economic repercussions on the community. Communities are severely affected by the socioeconomic fallout from cyclones, which goes well beyond mere property destruction. When vital services like healthcare and education are disrupted by infrastructure loss, businesses struggle to stay open, which increases unemployment and economic downturns. Devastation of agricultural land leads to poverty and food shortages, especially for small-scale farmers. While survivors deal with psychological trauma, displacement exacerbates social dislocation and vulnerability. Disrupted fishing activities not only result in income loss but also disrupt local supply chains and exacerbate food scarcity, particularly in vulnerable coastal communities like Baguran Jalpai. Disrupted fishing activities in places like Baguran Jalpai have profound and far-reaching consequences. Firstly, the immediate loss of income for fishermen, who rely on fishing for their livelihoods, reverberates throughout their families and communities, impacting their economic stability. Secondly, disruptions in fishing activities can disrupt local supply chains, leading to shortages of fish in markets and exacerbating food insecurity in coastal communities where fish is a primary source of protein and nutrition. Lastly, these disruptions compound existing food scarcity issues, particularly in vulnerable areas like Baguran Jalpai, where limited access to alternative food sources heightens dependence on fishing. Consequently, when fishing activities are disrupted, it strains an already fragile food supply, increasing the risk of malnutrition and hunger among vulnerable populations.

The devastating impact of cyclones on coastal communities underscores the urgent need for comprehensive disaster preparedness and resilience-building measures. In recent years, efforts have been made to enhance early warning systems and evacuation protocols to minimise loss of life and property during cyclonic events. Investments in resilient infrastructure and ecosystem-based adaptation strategies, such as mangrove restoration and coastal embankments, aim to mitigate the impact of cyclones and safeguard coastal communities from future disasters. Cyclones pose a formidable challenge to coastal communities like Baguran Jalpai, threatening lives, livelihoods, and ecosystems. The recurring occurrence of cyclonic events underscores the imperative for proactive measures to enhance disaster preparedness, build community

resilience, and address underlying socio-economic vulnerabilities. By fostering a culture of resilience and solidarity, coastal communities can navigate the uncertainties of climate change and forge a path towards a more sustainable and resilient future.

The multipurpose cyclone shelter in Baguran Jalpai village is evidence of the community's readiness for disasters. This important building can be used by the community as a multipurpose area during calmer times or as a safe haven during cyclones. This proactive approach to catastrophe risk reduction is indicative of Baguran Jalpai's dedication to defending its citizens and building their ability to withstand potential harm.



Fig: Multipurpose Cyclone Shelter

Storm Surges and High Wind Speed

Cyclones unleash a cascade of challenges upon coastal communities like Baguran Jalpai, where the rising waters and ferocious winds wreak havoc on both land and livelihoods. The surge in water levels transforms the once-calm sea into a tempestuous force, with villagers recounting how the water breaches the coastline, encroaching up to 500 metres inland and inundating low-lying areas with saline water. The unique topography of Baguran Jalpai exacerbates the inundation, as drainage channels, known locally as "*khals*," channel saline water into the village from the rear, flooding agricultural fields and compromising soil fertility. The production of crops and the viability of agriculture in the impacted areas are seriously threatened by the entry of saline water. Plants experience osmotic stress and slower growth when high soil dissolved salt concentrations prevent them from absorbing water. Moreover, the build-up of salt and chloride ions can cause direct harm to plant roots and interfere with vital physiological functions, reducing crop yields overall. In addition to impairing root growth and nutrient uptake, saline water also destroys soil structure. Unbalanced nutrient levels also worsen plant health and yield. Stressed plants also lose more production because they are more vulnerable

to insect and disease infestations. Farmers in the area struggle to maintain sufficient yields and a living, which exacerbates food insecurity and financial hardship. As a result, agriculture's long-term viability is jeopardized, which increases food insecurity and economic hardship for local farmers as they struggle to maintain adequate yields and livelihoods in the face of challenges

In addition to the inundation of land, cyclones unleash devastating storm surges that amplify the destructive impact of high winds. These surges propel seawater inland, inundating coastal communities and exacerbating flooding in already vulnerable areas. The ferocity of the winds uproots trees and wreaks havoc on infrastructure, with fallen trees often damaging electric cables and disrupting the flow of electricity in the village. The disruption of power supply not only hampers daily activities but also poses risks to public safety and exacerbates the challenges of disaster response and recovery efforts in the aftermath of cyclonic events.

Maritime Security Hazards

Maritime security hazards loom large in the vicinity of Baguran Jalpai, exacerbated by its proximity to Bangladesh. Villagers have voiced concerns about rampant smuggling activities, encompassing illegal drugs and livestock, which occur with alarming frequency despite the presence of naval authorities. This illicit trade not only undermines law enforcement efforts but also poses a significant threat to regional security, fuelling transnational criminal networks and fostering a culture of impunity. Moreover, the porous maritime borders serve as conduits for illegal immigration, exacerbating socio-economic pressures and straining limited resources in both countries. The unchecked flow of contraband and undocumented migrants not only compromises national sovereignty but also undermines efforts to maintain maritime security and uphold the rule of law in the region.

The proliferation of piracy incidents in the Bay of Bengal poses a significant threat to maritime trade and maritime security, disrupting shipping routes and jeopardising the safety of seafarers. The threat of maritime terrorism looms large, with extremist groups exploiting porous maritime borders to perpetrate acts of violence and destabilise the region. Additionally, environmental degradation, including pollution and overfishing, undermines the sustainability of marine ecosystems and threatens the livelihoods of coastal communities reliant on marine resources.

Erosion

Erosion poses a subtle yet persistent threat to coastal communities like Baguran Jalpai, despite its inconspicuous nature and the lack of overt signs of erosion. Situated within a mudflat, the village does not exhibit conspicuous signs of erosion visible in other coastal landscapes characterised by sandy shores or rocky cliffs. The absence of visible erosion does not negate the underlying risk posed by coastal erosion, which manifests gradually over time through the gradual loss of land and degradation of coastal habitats.

The perception of erosion as a less immediate or tangible hazard among villagers and local authorities helps in understanding the need for heightened awareness and proactive measures to monitor and mitigate erosion risks. The cumulative loss of coastal land and habitats due to erosion can exacerbate vulnerabilities to other hazards, such as storm surges and sea-level rise, amplifying the socio-economic and environmental impacts of coastal hazards.

Erosion, while often overshadowed by more visible and immediate threats such as cyclones and storm surges, warrants attention as a significant and pervasive hazard that requires integrated and proactive management strategies.

Flooding

Purba Medinipur in West Bengal is frequently battered by floods, both cyclone-induced and otherwise. The devastating 2000 Millennium Flood submerged a large portion of the district, impacting nearly a million people and destroying over 72,000 houses. More recently, the extremely severe Cyclone Amphan (May 2020) caused widespread inundation exceeding 80,000 hectares due to heavy rainfall and storm surge, overflowing rivers, and breached embankments, leaving many areas waterlogged for extended periods. Cyclone-induced flooding presents a challenge for communities residing in coastal areas, such as in Baguran Jalpai, particularly those engaged in shrimp aquaculture and agriculture. When cyclones strike, they bring not only torrential rains but also powerful storm surges that inundate low-lying regions. These surges often breach brackish water ponds used for shrimp aquaculture, allowing saline water to infiltrate not only the aquaculture areas but also adjacent agricultural lands. The topography of the village, characterized by low-lying terrain, exacerbates the ingress of saline water, particularly from the backside of the village.

The consequences of cyclone-induced flooding are profound and manifold. Firstly, the overflow of brackish water ponds compromises the integrity of shrimp aquaculture operations, leading to substantial economic losses for local farmers. Shrimp, being highly sensitive to salinity levels, are adversely affected by the sudden influx of saline water into their habitat. This not only disrupts the growth and development of the shrimp but also increases the risk of disease outbreaks, further jeopardizing the viability of the aquaculture industry in the aftermath of cyclones.

The intrusion of saline water into agricultural lands spells trouble for farmers who rely on these lands for their livelihoods. The high salinity levels make the soil unsuitable for cultivating traditional crops, causing yield reductions and impacting food security in the region. All the villagers mentioned the water drains out very quickly but the rapid drainage of floodwaters, while initially seeming advantageous, can exacerbate soil erosion and nutrient depletion, further diminishing the fertility of the land and hindering agricultural productivity in the long term.

Soil Salinity

Soil salinity, exacerbated by the intrusion of saline water from flooding and shrimp aquaculture practices, presents a significant challenge to agricultural productivity and human health in coastal regions. When floods occur, saline water infiltrates agricultural fields, depositing salts in the soil. The intensive shrimp aquaculture prevalent in these areas further contributes to soil salinization as brackish water from the pond's seeps into the underlying groundwater, creating a saline interface that compromises the quality of freshwater resources.

The consequences of soil salinity are far-reaching. Elevated soil salinity levels disrupt the delicate balance of nutrients essential for plant growth, hindering germination, root development, and overall crop productivity. As salts accumulate in the soil, they create osmotic stress, reducing the availability of water to plants and impeding their ability to absorb essential nutrients. This leads to stunted growth, decreased yields, and increased susceptibility to pests and diseases, exacerbating food insecurity and economic vulnerability among farming communities.

There are serious health risks for people and animals when there is salty water in agricultural areas. High concentrations of dissolved salts found in saline water can have a detrimental effect

on crop productivity and soil quality. Saline irrigation causes crops to absorb extra salts, which lowers crop quality and reduces yields. Consuming crops cultivated in salinized water can also aggravate health conditions in people, including renal and hypertension. When grazing on crops that have been irrigated with saline water or when given salty water to drink, livestock may experience electrolyte imbalances, dehydration, and decreased milk or meat output. Moreover, salt buildup in the soil might eventually reduce its fertility, creating long-term problems for food security and sustainable agriculture. Consuming crops grown in saline-affected soils can expose individuals to high levels of salt, leading to adverse health effects such as hypertension, kidney problems, and cardiovascular diseases. Moreover, irrigation with saline water exacerbates the accumulation of salts in crops, further amplifying the health risks associated with consumption.

VULNERABLE GROUPS AND WHY?

In rural areas, a multitude of demographic groups face multifaceted challenges that significantly impact their well-being and livelihoods. Among these are the elderly, who often confront a myriad of difficulties including limited access to healthcare services due to geographical remoteness or financial constraints. Moreover, they may endure social isolation exacerbated by dwindling social networks and familial support structures. Financial insecurity further compounds their situation, as many grapple with inadequate pensions or savings to sustain themselves.

For children in these areas, exposure to various health risks looms large, exacerbated by insufficient healthcare infrastructure and resources. Inadequate educational facilities perpetuate cycles of poverty and limited opportunities, hindering their potential for future advancement. Additionally, malnutrition remains a pressing concern for some children, as they lack access to nutritious food and dietary education, stunting their physical and cognitive development.

Women and girls face unique challenges rooted in pervasive gender disparities. Despite strides towards gender equality, access to education, healthcare, and economic opportunities often remain elusive for many. Discrimination and gender-based violence persist as significant barriers to their empowerment and well-being, perpetuating cycles of inequality and marginalization.

Migrant workers, particularly those engaged in seasonal activities such as fishing, are a transient community facing a host of vulnerabilities. Economic instability, exacerbated by irregular employment opportunities and lack of social safety nets, leaves them susceptible to exploitation and precarious living conditions. Limited access to essential services, such as healthcare and education, further exacerbates their marginalization within these communities.

Disabled individuals encounter systemic barriers that impede their access to essential services and opportunities for social and economic participation. In rural areas, where infrastructure and resources are often scarce, these challenges are amplified, further isolating them from crucial support networks and hindering their ability to lead fulfilling lives.

Marginalized groups, including ethnic minorities and indigenous communities, often endure discrimination and social exclusion, compounding their already challenging circumstances. Lack of access to resources, such as land and economic opportunities, perpetuates cycles of poverty and marginalization, exacerbating social disparities within these communities.

Landless labourers, reliant on daily wages for survival, face precarious living conditions characterized by job insecurity and lack of social protection. Limited access to basic amenities, such as clean water and sanitation, further exacerbates their vulnerability to exploitation and poverty.

Small-scale agriculturists and fishermen confront a myriad of challenges stemming from environmental degradation, climate change impacts, and inadequate access to modern technology. Land degradation and declining sea catch threaten their livelihoods, leading to economic instability and food insecurity. Lack of access to resources and training in modern agricultural practices further perpetuates cycles of poverty and vulnerability within these communities.

ECONOMIC VULNERABILITY

If we look at the different groups present from the economic point of view, the group that is solely dependent on fishing, the “*jefe para*” is the most vulnerable. They reside very near to the sea and will be the first ones to get hit by any disturbances caused in the sea. Also, their

main and only source of livelihood is fishing and are dependent on it, during floods or disturbances in the sea their way of earning livelihood gets hampered leading them towards poverty and suffering, also the major problems of climate change development without following sustainability, the change in the quality of seawater due to pollution etc. affects them a lot, especially the small-scale fishermen.

During the 2 months ban period, they do not have any alternative source of earning, and few of them work as labourers for others with a very minimum wage rate which is not sufficient to support lives. As per the new scheme launched by the government (*Samudra sathi*), they are to get a monthly amount of Rs 5000, during the ban period per family, but this is not sufficient enough for their sustenance. Hence, this community is highly vulnerable in the region and is prone to damages caused by the disasters.

BIOPHYSICAL VULNERABILITY

From the geographical point of view, the community residing in the area between *jale para* and the sea-dyke is highly vulnerable, the sea side is slightly elevated than this area, the topography of the village is not typical to any coastal village, Baguran is in a bowl with other sides being elevated than the middle making it prone to floods. The area consists of people primarily engaged in agriculture and practice fishing in ponds mostly for self-sustenance, and sell out the extra surplus if any in the local markets, during floods water enters this area through the back near the sea-dyke and destroys their fields and ponds, as saline water destroys their major source of livelihoods, one the agricultural land is affected by saline water for a minimum of one year there will be no harvest, and this makes them extremely vulnerable.

SOCIAL VULNERABILITY

From the social point of view, there are no particular community with in the village that is engaged in shrimp aquaculture but folks that are engaged in this livelihood are vulnerable, this community is not much liked the other communities present as they complain that the seawater, they use for shrimp aquaculture which they bring through pipes and channels due to certain leakages destroys the agricultural lands, also they consider it as harm to the environment and not very sustainable. The mutual disliking of their profession by the other communities makes them vulnerable, although they solely do it for their livelihood and to support their family it causes a lot of other troubles and adds to certain disasters such as soil salinity and land degradation, as once these agricultural lands are converted to be used for shrimp aquaculture

cannot be turned into agricultural land again according to the land conversion act (Assistant Director of fisheries, Brackish) . This also brings them trouble as most of them are illegally practising this business, i.e. they have not converted these agricultural lands into fishing ponds. According to ADF brackish in the last 5 years approximately 400 ponds were dug in Contai-1 itself

EFFECT OF HAZARDS ON THE LIFE AND LIVELIHOOD OF THE PEOPLE AND LONG-TERM IMPACTS

The residents of Baguran Jalpai, situated in East Medinipur, rely heavily on the region's natural resources and geographical features for their sustenance. Their livelihoods are intimately connected to the environment, with their dependency entirely resting on the resources available in their surroundings. The primary sources of their livelihood include:

Fishing

Being close to the coast, fishing plays a vital role in the economy of numerous residents. Along the coastline, small fishing villages are scattered, serving as hubs for fishermen who embark on daily expeditions into the sea. Employing traditional techniques and nets, they harvest various fish species, which are either sold fresh in nearby markets or preserved through drying for extended storage. The fishing harbours buzz with energy as trawlers discharge their hauls, while fishermen ready their nets for subsequent ventures. Beyond just ensuring food security, this activity fosters a communal framework built around the fishing trade, shaping the social fabric of the area.

Agriculture

Despite facing difficulties from saltwater intrusion in certain regions, agriculture continues to be a cornerstone of existence in Baguran Jalpai. Farmers persist in cultivating a variety of crops including rice, vegetables (mainly tomatoes), and legumes, leveraging both monsoon rains and irrigation methods. In recent times, some have ventured into shrimp farming, finding it to be a profitable endeavour, albeit one accompanied by its own set of risks and environmental considerations. The agricultural landscape in the area mirrors a fusion of traditional methods and modern adaptations, as farmers strive to strike a harmonious equilibrium between economic viability and ecological sustainability.

Tourism

The tranquil and relatively undiscovered beaches of Baguran Jalpai present an alternative avenue for livelihood through tourism. With its pristine natural allure, marked by golden shores and lush casuarina woodlands, the area beckons travellers in search of serenity away from urban hustle and bustle. The standout attraction of this beach is the presence of red crabs, lending a unique crimson hue to the shoreline. Tourism not only brings economic benefits but also encourages cultural interaction and a deeper admiration for the village's natural treasures.

The residents of Baguran Jalpai have established a varied economy that capitalizes on their distinctive coastal surroundings. By engaging in fishing, farming, and tourism, they have forged a resilient community that respects its traditions while embracing contemporary economic prospects. Despite appearing prosperous, their livelihoods have been significantly impacted by substantial challenges that have directly affected the fishing communities' well-being and means of sustenance. Some of them are as follows:

Environmental and Economic Impacts

Shrimp Farming

Many farmers in Baguran Jalpai have started raising shrimp instead of traditional crops because of the possibility of making more money. However, this change isn't without its challenges. It mentions two specific risks associated with shrimp farming damage to the land caused by the salty water needed for shrimp cultivation and financial losses incurred from diseases that affect the shrimp population.

The profitability of vannamei prawns has declined, with diseases becoming a significant concern, possibly due to residual effects in the ponds. Improper discharge of water from the ponds into the canal results in the same contaminated water re-entering during high tide, exacerbating the problem. This contaminated water, rife with disease, proves fatal for the shrimp. The heavy losses incurred weigh heavily on the cultivators, especially those who have taken substantial loans for shrimp cultivation.

Decline in Fishing

As fish stocks reduce and small-scale fishing becomes less profitable, numerous individuals within the community are transitioning to agricultural endeavours or exploring alternative occupational paths like shrimp cultivation which is more profitable but also riskier. However, given the community's heavy reliance on fishing, many are compelled to seek employment as labourers on fishing trawlers.

Impact on Food Security

The lasting harm inflicted on fertile lands by the infiltration of brackish water from shrimp farming poses a significant threat to food security. Paddy cultivation provided guaranteed, albeit modest, returns for the individual. However, the individual was compelled to transition to shrimp farming when neighbouring farms were excavated for shrimp cultivation, leading to the salinization of the water in their paddy fields. Despite repeated requests to halt the influx of saline water, no action was taken. Consequently, the salinity adversely affected paddy production, leading to a significant decline. With no other recourse, the individual was compelled to follow suit and engage in shrimp farming.

Long-Term Impacts

Land Degradation:

Transforming productive rice paddies into shrimp ponds may result in enduring land deterioration, which could adversely impact the agricultural capacity of the area in the long run. Introducing brackish water into paddy fields for shrimp farming elevates soil salinity levels, significantly diminishing the land's aptness for growing rice. Once previously fertile fields become saline, reversing this process proves to be both difficult and expensive.

Economic Instability:

The inherent risks associated with shrimp farming, coupled with the unpredictable nature of fish stocks, could potentially contribute to economic insecurity among the local populace. This instability may stem from various factors such as fluctuating market prices, susceptibility to natural disasters, and the vulnerability of shrimp to diseases and environmental changes. As a result, the livelihoods of those dependent on the shrimp farming industry may be significantly impacted, highlighting the need for diversified economic opportunities and robust support systems to mitigate these challenges and ensure the resilience of the local community.

Cultural Shifts:

The move away from traditional fishing practices could result in cultural shifts and loss of traditional knowledge within the community.

When considering these factors collectively, it becomes evident that the community in Baguran Jalpai is wrestling with the immediate economic benefits of shrimp farming, all while confronting the enduring repercussions of environmental decline and the impacts of climate change. The ability of the Baguran Jalpai community to endure and adjust will be pivotal as they confront these hurdles. To delve deeper into this issue, it's imperative to incorporate perspectives from residents, scientific findings, and the implications of policies to gain a comprehensive understanding and effectively tackle the multifaceted nature of the situation.

THE PROBLEM OF SHRIMP AQUACULTURE

The shrimp farming sector has witnessed significant growth in West Bengal's East Medinipur district over time. While shrimp farming plays a crucial role in the Indian economy (by exporting shrimps), contributing substantially to the nation's economic development, it is often accompanied by certain adverse environmental impacts.

The rapid expansion of brackish water ponds has had the most substantial impact on agricultural land compared to other land cover types. Farmers who opt for intensive and semi-intensive vannamei shrimp farming practices, which can potentially lead to land and water quality degradation, face increased financial risks. Sustainability in such culture systems encompasses both ecological and economic aspects, with economic sustainability being defined as the system's ability to generate positive income over time. Even if a system is environmentally sound, farmers may not adopt it if it fails to provide sufficient earnings. Ensuring a stable return from vannamei shrimp farming becomes crucial, as rural households invest limited resources into shrimp culture, often attracted by the perceived profitability of the venture.

Intensive shrimp farming methods are prone to disease outbreaks like white spot syndrome virus, yellow head virus, and *Vibrio* bacterial infections. These diseases can lead to substantial economic losses for farmers, underscoring the need for effective disease management strategies. Shrimp farming also faces risks from environmental damage and market fluctuations, threatening the livelihoods and sustainability of small-scale farmers.

Shrimp farmers often overuse antibiotics and chemicals to prevent and manage diseases, leading to antibiotic-resistant pathogens and environmental contamination. While these measures provide short-term solutions, they exacerbate antibiotic resistance and harm ecosystems, posing long-term risks that need to be addressed through sustainable aquaculture practices.

The discharge of saline water from shrimp ponds is a significant concern due to its potential to impact not only the immediate environment but also broader ecosystems and human communities. Coastal soils, vital for agriculture and food production, can become overly salinized, leading to reduced fertility and crop yields. Additionally, the infiltration of saltwater into groundwater reservoirs can compromise the quality of drinking water supplies, posing health risks to nearby populations.

The expansion of shrimp farming into agricultural areas and coastal zones has sparked conflicts between shrimp farmers and indigenous communities. This phenomenon occurs when traditional agricultural land and communal coastal areas are transformed into shrimp farms, often driven by economic incentives. Consequently, local communities reliant on these resources for their livelihoods find themselves marginalized and displaced, exacerbating social and economic inequalities. This conflict highlights the complex interplay between economic development, environmental conservation, and social justice in coastal regions undergoing rapid transformation due to aquaculture activities.

To mitigate the negative impacts and ensure the long-term viability of the shrimp farming industry, it is crucial to address these problems through improved management practices, environmental regulations, disease monitoring and control measures, and the promotion of sustainable and responsible shrimp aquaculture practices.

FACTORS THAT IMPACT THE PHYSICAL AND THE MENTAL HEALTH OF THE FISHERFOLK

In the village of Boguram Jalpai, located in a coastal area, fishermen and fisherwomen face significant physical health challenges due to the nature of their work and the environment they operate in.

Firstly, the villagers, both men and women, engage in physically demanding tasks such as hauling nets, sorting fish, and spending long hours at sea. These activities put a strain on their bodies, leading to musculoskeletal injuries, chronic pain, and fatigue. The repetitive motions

involved in fishing, coupled with heavy lifting and long periods of standing, can take a toll on their physical well-being over time.

Secondly, the maritime environment exposes villagers to harsh weather conditions, including sun exposure, strong winds, and saltwater. Prolonged exposure to these elements can result in various health issues, such as sunburns, dehydration, respiratory problems, and skin infections. Despite the necessity of being exposed to the sea for their livelihood, these conditions pose risks to their overall health and well-being.

Thirdly, access to healthcare facilities in Boguram Jalpai and similar coastal areas is often limited. Remote locations and inadequate infrastructure make it challenging for villagers to access medical care when needed. As a result, minor injuries and illnesses may go untreated, leading to complications over time. Without proper medical attention, conditions that could have been easily managed may worsen, impacting the villagers' physical health and quality of life.

Lastly, nutritional concerns add another layer of challenge for fishermen and their families in Boguram Jalpai. Irregular working hours and unpredictable catch sizes may result in inconsistent access to nutritious food. Dependence on the sea for sustenance means that fluctuations in catch can directly affect the availability of food for the community. Poor nutrition can weaken their immune systems, making them more susceptible to illnesses and impacting their ability to recover from injuries or ailments.

Fishermen and fisherwomen grapple with a multitude of challenges that deeply impact their mental and physical well-being. Financial insecurity looms large over their lives, as the fishing industry's unpredictability and unequal pay of the fisherwomen as compared to fishermen contribute to persistent anxiety and depression. Many families live hand-to-mouth, unsure of where their next meal will come from, which exacerbates feelings of helplessness and despair. Moreover, social stigma and discrimination further compound their struggles, with traditional gender roles relegating fisherwomen to inferior positions in society. This marginalization fosters a sense of isolation and low self-esteem, intensifying mental distress. The trauma from natural disasters, such as cyclones and floods, is an ever-present threat, leaving behind a trail of devastation and loss. The resulting grief and trauma can linger long after the immediate danger has passed, casting a shadow over the community's collective psyche. For fisherwomen, menstruation taboos add an additional layer of mental health challenges, as cultural norms

dictate their exclusion from certain activities and spaces during their periods. This stigma breeds feelings of shame, embarrassment, and isolation, particularly in disaster recovery contexts where access to safe spaces and resources is limited. Furthermore, the pervasive threat of gender-based violence looms large, leaving women vulnerable to harassment, abuse, and exploitation. The constant fear of violence heightens anxiety and hypervigilance, further eroding their mental well-being. The loss of livelihood following natural disasters or environmental degradation strips away not just income, but also stability and identity. Families are left grappling with grief, hopelessness, and despair as they struggle to rebuild their lives from the rubble. Compounding these challenges is the limited access to mental health support in rural and coastal areas like Boguram Jalpai. With few options for seeking help, fishermen and fisherwomen are left to navigate their mental health struggles alone, further hindering their recovery process and perpetuating cycles of suffering.

In summary, the well-being of fishermen and fisherwomen is profoundly influenced by various factors including occupational risks, societal disparities, environmental conditions, and cultural practices. To effectively address these multifaceted challenges, it is crucial to adopt a comprehensive strategy that emphasizes access to healthcare, economic empowerment, social assistance, and mental health support specifically tailored to the circumstances of coastal communities. By recognizing and tackling these issues head-on, we can strive towards fostering the resilience and overall welfare of fishermen and fisherwomen amidst the challenges they encounter.

HAZARD RISK VULNERABILITY CAPACITY ASSESSMENT (HRVCA)

HRVCA stands for Hazard, Risk, Vulnerability, and Capacity Analysis. It's a process used to identify potential disasters, assess how likely they are to occur and cause damage, and evaluate a community's ability to cope. This helps develop plans to reduce risks and prepare for emergencies. Here is a detailed HRVCA that was conducted for the village of Baguran Jalpai.

Identification of hazards:

These are the major hazards identified in the coastal village of Baguran Jalpai:

1. Atmospheric Hazards:

- Extreme Heat: Baguran Jalpai experiences high temperatures, which can lead to health issues such as heatstroke and dehydration, especially during the summer months.
 - Lightning: Being a coastal area, Baguran Jalpai is prone to frequent lightning strikes during thunderstorms, posing a risk to both property and human life.
 - Cyclones: The village is vulnerable to cyclones, which bring strong winds, heavy rainfall, and storm surges, causing significant damage to infrastructure and livelihoods.
 - High Winds: Strong winds accompanying cyclones or thunderstorms can cause structural damage to buildings, trees, and other infrastructure, increasing the risk of injury and property loss.
2. Hydrological Hazards:
- Storm Surges: The low-lying nature of Baguran Jalpai makes it susceptible to storm surges during cyclones, leading to coastal flooding and erosion, endangering lives and property.
 - Cyclone-induced floods: Heavy rainfall associated with cyclones can result in inland flooding, disrupting transportation, damaging crops, and contaminating water sources, heightening the risk of waterborne diseases.
3. Infrastructure Failure:
- Barrier Failure: The failure of barriers erected along the shoreline to prevent seawater intrusion increases the vulnerability of settlements to flooding and erosion, compromising the safety and resilience of the community.
4. Lack of Essential Services:
- Public Health Centre: The absence of a public health centre deprives residents of access to essential healthcare services, exacerbating health risks during emergencies.
 - Incomplete Water Drainage Lines: Inadequate drainage infrastructure leads to waterlogging during heavy rainfall, increasing the risk of flooding and waterborne diseases.
 - Waste Management: The lack of provision for waste collection and management contributes to environmental pollution, posing health hazards and affecting the overall well-being of the community.
5. Security:
- Public Disturbances: Tourism-related activities may result in public disturbances, potentially disrupting the peace and safety of the village.

- Land Pollution: Improper disposal of waste and lack of waste management infrastructure contribute to land pollution, degrading the environment and posing health risks to residents.
6. Hazardous Construction:
- Junput Missile Launching Pad: The presence of a missile launching pad in nearby Junput increases the risk of accidents or security breaches, posing a potential threat to the safety and security of Baguran Jalpai and its residents.

ATMOSPHERIC	HYDROLOGICAL	ESSENTIAL SERVICES	SECURITY	HAZARDOUS CONSTRUCTIONS
Extreme Heat	Storm Surges	No public health center	Public disturbances due to tourism	Junput Missile Launching Pad
Lightning	Cyclone induced flooding	Incomplete water drainage lines	Land pollution	
Cyclones		No provision of waste collection and management		
High Winds				

Table: Hazard Identification Table

Baguran Jalpai faces a multitude of hazards ranging from extreme weather events to infrastructure deficiencies and security concerns. Addressing these hazards requires comprehensive risk management strategies, including improved infrastructure, access to essential services, disaster preparedness measures, and environmental conservation efforts. Additionally, community engagement and capacity building are crucial for enhancing resilience and ensuring the safety and well-being of the coastal village residents.

Understanding Community Risk and Resilience

1. Community Resource Mapping (PRA):

Participatory Rural Appraisal (PRA) tools like community mapping involved working with the local residents to create visual representations of their village, including landmarks, infrastructure, and hazards. This exercise helped us understand the resources that the community considers key to their survival. For example- the women participating marked their *khuti* first.

2. Identifying Existing Risk Reduction Measures:

- Multi-purpose Cyclone Shelter: A designated shelter built to withstand cyclonic winds and provide refuge for villagers during extreme weather events like cyclones.
- *Ipomoea*: It might be a local term or resource used for risk reduction, such as a traditional method of building resilient structures or planting vegetation to mitigate erosion.
- Sea-dyke: A barrier constructed along the coastline to protect the village from storm surges and coastal flooding.



Fig: Ipomoea



Fig: Cyclone Shelter

3. Critical Assets and Infrastructures:

- Jhau Bon: A mangrove forest (Jhau is a common name for mangroves in the region), which acts as a natural buffer against coastal erosion, storm surges, and provides habitat for diverse wildlife.
- Water Points: Sources of drinking water such as wells, tube wells, or hand pumps, crucial for community water supply and resilience during disasters.
- School: Educational institution serving children in the village, which may also serve as a community centre during emergencies.
- Anganwadi: Government-run childcare and maternal healthcare centre, providing essential services to women and children in the community.
- Ration Shop: Government-operated store providing subsidized food items to villagers, ensuring food security, especially during emergencies.
- Krishi Bank: Agricultural bank providing financial services and support to local farmers for agricultural activities and livelihoods.

- MPCS (Multipurpose Cooperative Society): A cooperative society serving various needs of the community, including financial services, procurement, and distribution of essential goods.

4. Social and Economic Vulnerabilities:

- Trawlers vs Small-scale Fishermen: Trawlers, with their large-scale fishing operations, often compete with small-scale fishermen for resources, leading to overfishing and depletion of fish stocks. This competition threatens the livelihoods of small-scale fishermen who rely on traditional fishing methods and have limited access to modern fishing technology and markets. Trawlers often destroy the nets of these small-scale fishermen which leads them to face extreme losses and suffer making them more vulnerable.
- Small-scale Fishermen vs Shrimp Farmers: Small-scale fishermen may face competition and conflict with shrimp farmers for access to coastal land and water resources. Shrimp farming, often practiced on converted mangrove areas, can lead to habitat destruction and loss of traditional fishing grounds for small-scale fishermen, further marginalizing their livelihoods.
- Agriculturalists vs Shrimp Farmers: Shrimp farming, being a lucrative venture, may attract agriculturalists to convert their land for shrimp cultivation, leading to a shift away from traditional agriculture. This conversion can impact food security, biodiversity, and the resilience of agricultural communities, especially during natural disasters.
- Family Size vs Bread Earners: Larger family sizes coupled with limited bread earners can strain household resources and increase vulnerability to economic shocks. In the event of a hazard, such as a cyclone or crop failure, households with fewer breadwinners may struggle to recover and meet basic needs, putting them at greater risk of poverty and food insecurity.
- Stagnant Livelihoods (No Diversification): Dependence on single livelihoods, such as fishing or agriculture, without diversification, leaves communities vulnerable to fluctuations in market prices, environmental degradation, and climate change impacts. Lack of alternative income-generating activities limits resilience and adaptive capacity, perpetuating poverty and vulnerability.
- Men vs Female Fishers: Gender disparities exist within the fishing industry, with men often having greater access to resources, markets, and decision-making roles compared

to female fishers. Women engaged in fishing may face discrimination, limited access to credit and extension services, and inadequate representation in fisheries management, exacerbating their vulnerability to hazards and economic shocks. Women also face security issues while selling their stocks in the market. There have been cases of harassment.

- **Lack of Access to Social Security Benefits:** Many residents in Baguran Jalpai may lack access to social security benefits such as health insurance, unemployment benefits, and pension schemes. This lack of social protection exposes households to greater financial risks during emergencies or periods of economic instability, deepening poverty and vulnerability.

5. Physical and Environmental vulnerabilities:

- **Cyclones and Floods:** Baguran Jalpai, being a coastal village, is highly vulnerable to cyclones, which are intense tropical storms characterized by strong winds and heavy rainfall. Cyclones can cause widespread flooding, damage to infrastructure, and loss of life and livelihoods. Floods, often triggered by cyclones or heavy rainfall, can inundate low-lying areas, leading to property damage, crop loss, contamination of water sources, and displacement of residents. Floodwaters can also carry debris and pollutants, posing health risks to the community.
- **Storm Surges:** Storm surges are sudden rises in sea level during cyclones, which can inundate coastal areas and cause extensive damage to property and infrastructure. Baguran Jalpai's proximity to the coast makes it particularly susceptible to storm surges, which can lead to erosion of beaches, destruction of buildings, and loss of lives.
- **Topography:** The topography of Baguran Jalpai plays a critical role in shaping the village's vulnerability to natural hazards. The low-lying terrain increases the risk of flooding during cyclones and heavy rainfall events. Additionally, the flat coastal plains offer little natural protection against storm surges, leaving the community exposed to coastal hazards.
- **Deforestation:** Deforestation, particularly the forest cover (*jhau bon*) and other coastal vegetation, exacerbates the village's vulnerability to natural hazards. These act as natural barriers against storm surges, erosion, and flooding, helping to stabilize coastal ecosystems and protect inland areas from coastal hazards. The loss of these and coastal vegetation reduces the village's resilience to cyclones and floods, making it more susceptible to erosion, inundation, and damage during extreme weather events.

6. Underlying Risk Drivers:

- **Climate Change:** Climate change contributes to increased frequency and intensity of natural hazards such as cyclones, floods, and storm surges in Baguran Jalpai. Rising sea levels, changing rainfall patterns, and temperature fluctuations amplify the vulnerability of the coastal village to these hazards, leading to greater risks of property damage, displacement, and loss of livelihoods.
- **Mechanization of Fishing:** The mechanization of fishing practices, such as the use of motorized boats and advanced fishing gear, can lead to overexploitation of fish stocks and depletion of marine resources. This overfishing not only threatens the sustainability of the local fisheries but also undermines the livelihoods of traditional fishermen who rely on small-scale, artisanal fishing methods.
- **Unplanned Development:** Unplanned development, characterized by rapid urbanization, infrastructure expansion, and land-use changes, can exacerbate the village's vulnerability to natural hazards. Poorly designed infrastructure, such as inadequate drainage systems and coastal barriers, increases the risk of flooding and erosion during cyclones and storms.
- **Poverty:** Poverty exacerbates the vulnerability of Baguran Jalpai's residents to natural hazards by limiting their capacity to prepare for, cope with, and recover from disasters. Poor households may lack access to resources, infrastructure, and social protection measures, leaving them more susceptible to the impacts of cyclones, floods, and other hazards.
- **Tourism:** While tourism can contribute to economic development and livelihood diversification, it also poses risks to the coastal village. Unregulated tourism activities may lead to environmental degradation, habitat destruction, and increased vulnerability to coastal hazards such as erosion and storm surges.
- **Environmental and Natural Resource Management:** Poor environmental and natural resource management practices, such as deforestation, mangrove destruction, and pollution, undermine the resilience of Baguran Jalpai to natural hazards. Degradation of coastal ecosystems reduces their capacity to buffer against storms, floods, and sea-level rise, increasing the community's exposure to risks.
- **Lack of Community Participation in Disaster Risk Reduction (DRR):** Limited community participation in DRR initiatives hinders the effectiveness of preparedness,

response, and recovery efforts in Baguran Jalpai. Engaging local residents in decision-making processes, risk assessments, and capacity-building activities is essential for building resilience and fostering sustainable development.

- **Lack of Awareness:** Inadequate awareness and education about natural hazards, disaster preparedness, and mitigation measures leave the community ill-prepared to respond to emergencies effectively. Enhancing awareness through education, training, and communication initiatives is crucial for empowering residents to protect themselves and their assets from risks.
- **Increase in Population:** The increase in population in Baguran Jalpai exacerbates pressure on natural resources, infrastructure, and services, increasing the community's vulnerability to hazards. Population growth can strain existing systems and limit access to resources, exacerbating social and economic inequalities and hampering disaster resilience.
- **Market Instability:** Market instability, characterized by fluctuations in prices, demand, and supply of goods and services, can disrupt livelihoods and exacerbate poverty and vulnerability in Baguran Jalpai. Economic shocks resulting from market instability can compound the impacts of natural hazards, further challenging the community's resilience and recovery efforts.

7. Development of Hazard Scenarios:

- **Restriction on Fishing During Cyclone Warnings:**

Hazard Scenario- Despite cyclone warnings and restrictions on fishing, fishermen in Baguran Jalpai continue to venture into the sea due to lack of compensation or alternative livelihood options. This increases the risk of fishermen being caught in rough seas and facing danger to their lives and vessels.

Potential Impacts- Loss of lives, injuries, damage to fishing boats and equipment, disruption of livelihoods, economic losses to the fishing community, and strain on search and rescue operations during cyclonic events.

- **Presence of the Residing Community on Encroachment Area of the Sea:**

Hazard Scenario- The community residing in encroachment areas along the coastline of Baguran Jalpai is vulnerable to storm surges, coastal erosion, and flooding during

cyclones and high tides. The lack of relocation plans or protective measures increases the risk of loss of lives, damage to property, and displacement.

Potential Impacts- Loss of lives, injuries, destruction of homes and infrastructure, displacement of residents, loss of livelihoods, psychological trauma, and social disruption within the affected community.

- **No Proper Solid Waste Management:**

Hazard Scenario- Inadequate solid waste management practices in Baguran Jalpai result in the accumulation of garbage in public spaces, water bodies, and coastal areas. During cyclones and heavy rainfall, unmanaged waste can clog drainage systems, exacerbating flooding and spreading waterborne diseases.

Potential Impacts- Increased risk of water pollution, spread of diseases, breeding grounds for pests and vectors, damage to ecosystems, contamination of soil and water sources, and negative impacts on public health and environmental quality.

- **No Proper Drainage (Waterlogging):**

Hazard Scenario-The absence of proper drainage infrastructure in Baguran Jalpai leads to waterlogging in low-lying areas during cyclones and heavy rainfall events. Waterlogged streets, homes, and public spaces impede mobility, damage property, and increase the risk of accidents and health hazards.

Potential Impacts- Disruption of transportation, damage to infrastructure, loss of property, increased risk of waterborne diseases, economic losses to businesses, and social inconvenience for residents.

- **Stagnant Pond Water Used for Drinking with Inadequate Filtration:**

Hazard Scenario- Residents of Baguran Jalpai rely on stagnant pond water for drinking, which undergoes an inadequate filtration process. During cyclones and heavy rainfall, contaminants and pathogens from surface runoff can infiltrate the water source, compromising its safety and leading to waterborne illnesses.

Potential Impacts- Increased risk of waterborne diseases such as diarrhoea, cholera, and typhoid, health impacts on vulnerable populations such as children and the elderly,

strain on healthcare facilities, loss of productivity, and economic burdens on affected households.

Risk Matrix:

A risk matrix is a tool that helps prioritize hazards based on their likelihood and potential impact. By plotting these factors, one can quickly identify severe threats and allocate resources for prevention or mitigation strategies. This focused approach ensures best preparation for the most critical risks.

Risk Matrix		Severity				
		Negligible	Minor	Moderate	Major	Catastrophic
Likelihood	Very likely			Sea level Rise, Heat waves	Floods (Cyclone), Pollution, Climate Change	
	Probable			Storm Surge	Livelihood Loss, Soil salinity	
	Possible		Community Tensions	Death by lightning		Infrastructure failure
	Not Likely					
	Very Unlikely					

Table: Risk Matrix

The risk matrix for Baguran Jalpai illustrates the potential impact of various factors on the community. It categorizes risks based on their likelihood and severity, providing insight into the level of concern each poses. For instance, while community tensions are deemed possible, their severity is minor. Conversely, infrastructure failure is also possible but carries catastrophic consequences. Notably, climate change stands out as a very probable occurrence, with its effects predicted to be majorly disastrous. This matrix serves as a valuable tool for pre-emptive planning and risk mitigation strategies, enabling stakeholders to prioritize resources and interventions effectively in safeguarding the community against potential threats.

Hazard Likelihood Assessment:

In HRVCA, hazard likelihood assessment isn't just about knowing what threats exist. It helps us understand how probable each hazard is. This lets us prioritize risks, focusing on those most

likely to strike. By understanding likelihood, we can allocate resources effectively to prepare for and prevent the most pressing dangers.

HAZARD NAME	HISTORICAL LIKELIHOOD	CURRENT LIKELIHOOD	FUTURE LIKELIHOOD
Extreme heat	B	D	E
Cyclone	D	D	E
Lightning	C	C	D
Storm surge	C	D	E
Flooding	D	D	E
Pollution(solid waste management)	A	D	E
Infrastructure failure	D	C	B&C

A- rare; B- Unlikely; C- Probable; D- Likely; E- Almost Certain

Table: Hazard Likelihood assessment

The hazard likelihood assessment for the village reveals the varying probabilities of potential hazards occurring over historical, current, and future timeframes. Notably, cyclones are marked as "D" for both historical and current likelihoods, indicating their high likelihood of occurrence. Moreover, the assessment projects an escalation to an "E" in future likelihood, signifying an almost certain probability. Contrastingly, pollution is classified as "A" for historical likelihood, denoting its rarity, while it stands at "D" for current likelihood. However, concerning the future, there's a significant increase projected, with a potential rise to an "E" likelihood level. These assessments provide crucial insights for the village's risk management strategies, highlighting the need for proactive measures to address both the immediate and evolving threats posed by these hazards.

Capacity Assessments:

This helps us understand a community's strengths. By knowing what resources, skills, and support systems are already in place, we can create better plans for disaster preparedness, response, and recovery. It's like evaluating a community's "disaster muscles" to see how well-equipped they are to handle emergencies.

COMPONENTS	SYSTEMS & STRUCTURES	CAPACITY GAPS
Transport	Auto, e-rickshaw, private vehicles	Incomplete road construction
Health and medical services	Homeopathy doctor is present.	No PHC, Hospital or medical shops within a 4 km radius
Early warning	Announcements & SMS alert	Information dissemination done largely through whatsapp, can be fake or might crack.
Evacuation	Evacuated to the MPCs and schools	No food provisions and cannot accommodate the entire village
Critical infrastructure	School, Anganwadi, ration shop, gram panchayat	Fragile and not resilient
Food & water security	Water points & ration shops	Piped water does not reach households
Ecosystem management & restoration	Forest cover along shoreline, red crabs, ipomia	Deforestation & access tourism needs to be checked

Table: Capacity Assessment

From the table we can figure out the community's strength and the gaps that are needed to be addressed for better resilience. As we can see, transportation in the village relies on auto-rickshaws, e-rickshaws, and private vehicles. However, incomplete road construction poses a challenge to efficient mobility. Evacuation plans are in place, directing residents to Multi-Purpose Community Centres (MPCS) and schools during emergencies. Yet, there's a significant shortfall in food provisions and capacity, making full village accommodation unfeasible. Critical infrastructure includes schools, Anganwadi centres, ration shops, and the gram panchayat, serving as vital community resources. However, these structures are fragile and lack resilience. Ensuring their upkeep and reinforcing their durability is essential for sustaining community services.

Identification of Risk Reduction Strategies

Existing Risk Mitigation Measures

- **Forest Cover by the Shoreline:** Baguran Jalpai benefits from forest cover along the shoreline, which can include *jhau bon* and other coastal vegetation. These natural barriers play a crucial role in reducing the impacts of coastal hazards such as storm surges, erosion, and flooding. They stabilize coastal ecosystems, provide habitat for marine life, and absorb wave energy, helping to protect inland areas from the destructive forces of cyclones and high tides. Enhanced coastal resilience, reduced

erosion and flooding, protection of biodiversity, preservation of ecosystem services, and sustainable management of coastal resources.

- **Planting of *Ipomoea*:** *Ipomoea*, also known as beach morning glory, is a coastal plant species that helps stabilize sand dunes and prevent erosion along beaches. By planting *Ipomoea* along vulnerable stretches of coastline in Baguran Jalpai, the community can strengthen natural defences against storm surges, wind erosion, and tidal action. Additionally, the deep-rooted nature of *Ipomoea* helps anchor sand and soil, reducing the risk of land degradation and loss. Improves beach stability, erosion control, enhanced coastal resilience, preservation of natural habitats, and aesthetic enhancement of the coastal landscape.
- **Declaration of Beach as Biodiversity Heritage Site:** Designating the beach in Baguran Jalpai as a biodiversity heritage site acknowledges its ecological significance and promotes conservation efforts. This designation can lead to increased protection and management of the beach ecosystem, including measures to prevent habitat destruction, pollution, and unsustainable development. By preserving biodiversity and ecosystem integrity, the beach can better withstand the impacts of natural hazards while providing valuable ecosystem services to the community. Conservation of biodiversity, protection of sensitive habitats, promotion of sustainable tourism, enhancement of community awareness and engagement, and recognition of cultural and ecological values.
- **Construction of Sea Dyke:** The construction of a sea dyke along the shoreline of Baguran Jalpai serves as a physical barrier to protect the village from storm surges, coastal flooding, and erosion. Sea dykes are engineered structures designed to absorb wave energy and prevent seawater intrusion into coastal settlements. By reducing the risk of inundation and damage to infrastructure, sea dykes contribute to the resilience of the community and enhance its capacity to withstand coastal hazards. Increased coastal protection, reduced risk of flooding and erosion, safeguarding of property and livelihoods, improved community safety and well-being, and long-term resilience to climate change impacts.
- **Multipurpose Cyclone Shelter:** The construction of a multipurpose cyclone shelter provides a safe refuge for the residents of Baguran Jalpai during cyclonic storms and other emergencies. Multipurpose cyclone shelters are specially designed buildings equipped with reinforced structures, emergency supplies, and basic amenities to accommodate evacuees and provide temporary shelter. By having a designated

evacuation centre, the village enhances its disaster preparedness and response capabilities, reducing the risks of casualties and injuries during cyclones and floods.

Recommended Measures

- **Resilient Housing Provisions:** Resilient housing provisions involve constructing homes that can withstand the impacts of natural hazards such as cyclones, floods, and storms. This could include using reinforced materials, elevating structures above flood levels, and designing buildings to resist high winds. By investing in resilient housing, it can minimize property damage, protect residents' lives, and enhance community resilience during disasters.
- **Proper Solid Waste Management Mechanisms:** Establishing proper solid waste management mechanisms is crucial for maintaining environmental hygiene and reducing health risks. This involves implementing strategies for waste collection, segregation, recycling, and disposal. By ensuring proper waste management practices, it can prevent pollution, minimize the spread of diseases, and maintain the cleanliness of its surroundings.
- **Drainage Systems Should Be Built:** Constructing drainage systems is essential for managing stormwater runoff and preventing waterlogging, especially during heavy rainfall events or cyclones. Proper drainage infrastructure, including drains, culverts, and channels, helps redirect excess water away from populated areas, reducing the risk of flooding and property damage. Investing in drainage systems enhances the village's resilience to water-related hazards.
- **Check on Pollution:** Implementing measures to check pollution is vital for safeguarding the health of their residents and protecting the environment. This may involve monitoring industrial emissions, regulating waste disposal practices, and promoting sustainable agricultural practices. By controlling pollution, the village can preserve its natural resources, maintain biodiversity, and ensure the well-being of its inhabitants.
- **Development and Construction Keeping the Topography in Mind:** Developing and constructing infrastructure while considering the topography of the area helps minimize risks associated with erosion and flooding. By avoiding construction in hazard-prone areas and preserving natural buffers such as dunes, it can reduce vulnerability to natural disasters and ensure the safety of its residents and infrastructure.

- **Measures to Avoid Overfishing:** Implementing measures to avoid overfishing is essential for maintaining the sustainability of marine ecosystems and supporting the livelihoods of fishermen. This could involve enforcing fishing quotas, regulating gear types and fishing seasons, and promoting responsible fishing practices. By preventing overexploitation of fish stocks, it can preserve biodiversity, support local fisheries, and ensure the long-term viability of marine resources.
- **Allotment of Separate Ground for Shrimp Aquaculture:** Allocating separate grounds for shrimp aquaculture, away from agricultural lands, helps minimize conflicts and environmental impacts. This measure ensures that shrimp farming activities do not encroach on agricultural areas or degrade soil quality. By zoning suitable sites for shrimp aquaculture and implementing regulations, they can promote sustainable aquaculture practices and protect agricultural lands for food production.

DEVELOPMENT SCHEMES- WHAT IS IN PLACE, IMPLEMENTATION AND PEOPLE'S PERCEPTION ON IT

Khadya Sathi Scheme

The *Khadya Sathi Scheme*, introduced on January 27, 2016, is a flagship initiative aimed at encouraging food security for vulnerable segments of society. The scheme endeavours to provide subsidized food grains, particularly rice and wheat, to those who are economically disadvantaged. Through this program, eligible families gain access to these essential staples at significantly reduced rates, with some even receiving them almost free of charge thanks to government subsidies. The allocation stands at a mere 2 rupees per kilogram of rice and wheat, making sustenance more affordable for those in need (Mondal, B. K., Mondal, A., & Das, R. Assessing the Effectiveness of the Major Welfare Schemes of West Bengal: A Geographical Appraisal.).

Fast forward to 2024, the *Khadya Sathi Scheme* remains a foundation of the state's efforts to combat hunger and malnutrition. The updated version of the scheme continues its steadfast commitment to ensuring food security, with approximately 7 crore individuals, constituting nearly 90% of the state's population, benefiting from its provisions. Rice and wheat remain the primary commodities provided, and the fixed rate of ₹2 per kilogram ensures that these essentials remain accessible to all eligible recipients.

(*Source: khadya-sathi-food-security-scheme, 2020*)

Moreover, in a bid to expand the scheme's reach and impact, around 50 lakh additional individuals now have the opportunity to avail themselves of these crucial food items at half the prevailing market price. This expansion underscores the government's dedication to inclusivity and equity, as it strives to extend the benefits of the Khadya Sathi Scheme to an even broader segment of the population.

Lakshmir Bhandar Scheme

The *Lakshmir Bhandar* Scheme, introduced by the West Bengal Government in February 2021, stands as a flagship initiative aimed at providing financial aid to women belonging to economically disadvantaged backgrounds. Targeting women between the ages of 25 to 60, particularly those enrolled in the 'Swasthya Sathi' program, the scheme extends a monthly allowance of ₹1000 to women from SC/ST households and ₹500 to those from other categories. With over 1.5 crore applications received and processed, the scheme signifies a significant effort towards empowering women and fostering financial independence among them. Through a one-time grant, recipients are enabled to purchase essential goods and services, thus promoting their economic autonomy and overall well-being. (Source- myscheme/gov/wb).

The West Bengal *Lakshmi Bhandar* Scheme 2024, an updated version of the existing program, introduces significant modifications. Notably, financial assistance has been augmented to ₹1000 for women in the general category and ₹1200 for those belonging to SC/ST communities. The Department of Women and Child Development and Social Welfare has issued eligibility criteria for availing the scheme's benefits, effective July 30th. The scheme is slated to commence on September 1st.

Samudra Sathi Scheme

The *Samudra Sathi* scheme has been announced by the Government of West Bengal in the Annual Financial Statement for 2024, which will come into force on April 1, 2024. The *Samudra Sathi* scheme is a welcome sign for the fishing communities in Baguran Jalpai villages. This developmental initiative aims to empower these communities by providing them with the much-needed financial support of Rs 5,000 monthly to all marine fishermen above the age group of 21 who are adversely affected due to the ban of two months (April 15th to June 14th) on venturing out into the sea.

To apply for the scheme, fishermen must have a valid Fishermen Registration Card (FRC) number. The benefit may only be applied to those officially registered with the Department of Fisheries as maritime fishermen. Additionally, only one person will benefit within each family unit. In addition to ensuring fair allocation, this restriction stops a household from making numerous claims. It is imperative to provide financial support to registered marine fishermen during the two-month fishing activity prohibition, which is typically observed between mid-April and mid-June to coincide with the crucial fish breeding season. This assistance seeks to support the sustainability of fish stocks while also easing the financial strain brought on by the brief suspension of fishing operations. Financial assistance allows fishermen to weather the inactivity without experiencing significant financial hardship, encouraging adherence to the fishing prohibition.

This sum, though potentially well-intentioned, is perceived by the recipients as grossly insufficient given the magnitude of the challenges they face. Our interactions with community members reveal a deep sense of frustration and disillusionment, with many expressing feelings of abandonment by authorities who appear disconnected from the gravity of their circumstances. As stated by a fisherman, "*5000 takae etojon loker ek maash ki kore cholbe?*" (how will Rs. 5000 sustain such a big family for one whole month?) symbolizing a failure to comprehend the depth of their struggles and aspirations. As our report underscores, this sum is akin to a drop in the ocean, unable to alleviate the burdens of poverty, environmental degradation, and economic insecurity that pervade the lives of Baguran Jalpai's residents.

ECOSYSTEM SERVICES AND RELIANCE ON ECOSYSTEM FOR RESILIENCE

Baguran Jalpai Village offers a myriad of ecosystem services that play a vital role in life sustenance and increasing resilience. These services can be broadly categorised into provisioning, regulating, cultural, and supporting services.

Baguran Jalpai is a secluded beach and a habitat of red crabs and sand bubbler crabs. In the context of ecosystem services, red crabs' contribution to beach protection would be classified as "Regulating Services". These crabs are essential for stabilizing beaches and nutrient cycling, both of these processes are important for maintaining the balance of the coastal ecosystem. Red crabs burrow into the sand, creating tunnels and chambers that help to aerate the soil further

helping in preventing soil erosion. Their digging activities also promote the mixing of sand layers, contributing to beach stabilisation by making the substrate more cohesive and resistant to wave action. The crabs also facilitate nutrient cycling. As they consume and process this organic material, they contribute to the decomposition process and the cycling of nutrients. These nutrients, in turn, can be transported by rainfall or runoff to the beach ecosystem, supporting the growth of vegetation and enhancing soil fertility, which further aids in beach stabilisation (Chakraborty 2017).



A Red Crab on the shore of Baguran Jalpai Beach.



A sand bubbler crab on the beach of Baguran Jalpai.



A red crab burrows the sand creating a tunnel which demonstrates the regulating services under the Ecosystem Service.

It is appropriate that Baguran Jalpai Beach be recognized as a biodiversity heritage site, mainly to protect the red crab population that lives along its shores. This statement emphasizes how important these crustaceans are to maintaining the delicate balance that keeps life on the beach

and how they regulate the coastal ecosystem. Local communities depend heavily on these red crabs for more than just economic sustenance; they also play a crucial role in maintaining ecological balance.

The Dakshin Banga Matsayajibi Forum dedicated five years of relentless effort, beginning in 2018, to advocate for the declaration of Baguran Jalpai Beach as a biodiversity heritage site. Through their unwavering commitment and struggles, they successfully achieved this milestone. Their roles extend beyond advocacy; they actively engage in monitoring, continuous observation, and evaluation of the beach's ecosystem. Recognizing the importance of collaboration, they liaised with the forest department to ensure the protection of the land, particularly as it serves as a habitat for red crabs. Moreover, they appealed to the police to bolster their presence during peak tourist months, such as December, to manage crowds effectively. Collaborating with the superintendent of police, they secured additional support to maintain order and safety in the area. Despite their accomplishments, their dedication persists as they continue to implement measures to restrict vehicle access to the beach, thus further safeguarding its ecological integrity. Through their ongoing efforts, the forum remains steadfast in its mission to ensure the enduring protection of Baguran Jalpai Beach for future generations.



A signboard that gives the idea that Baguran Jalpai Beach is a Biodiversity Heritage site.



The picture depicts the importance of red crabs and the awareness that they need to be conserved.

The entire length of the golden beach is bordered by dense casuarina forests. It is also known as Australian Pine, which primarily provides regulating services. Their remarkable ability to retain soil and prevent soil erosion is a significant benefit of Casuarina trees. These trees stabilize sandy coastal soils well owing to their vast root systems, which is especially important in places where erosion from wind and water is a problem. Casuarina trees anchor the soil, preventing land deterioration and maintaining the integrity of the coastal environments of Baguran Jalpai Beach. Furthermore, because of their dense foliage, casuarina trees act as natural windbreaks along beaches. This feature lowers wind speed, protecting infrastructure and coastal towns from storm damage. Casuarina trees are known for their exceptional salt tolerance, which allows them to flourish in highly salinized areas while also aiding in the cycling of nutrients. These trees are essential to preserving the ecological balance of coastal environments because they improve soil fertility and cycle nutrients. Their relevance in this region, where other plant species may find it difficult to survive, is further highlighted by their capacity to flourish in salinity. `



fig: Casuarina Trees

***KHUTI PUJO*: UNVEILING THE CULTURAL RICHNESS OF BAGURAN JALPAI VILLAGE**

Baguran Jalpai village reveals its cultural richness through *Khuti Pujo* which is a traditional Bengali festival, primarily of the fishermen communities. This ritual can be categorised as the cultural service of the ecosystem. Fishermen worship their nets, boats, and other fishing equipment during *Khuti Pujo* to receive blessings for a successful catch and a safe sea voyage. Invoking the sea gods for a fruitful and safe fishing voyage, the event is often held before the start of the fishing season. Different fishing communities observe *Khuti Pujo* in different ways, but generally speaking, the customs involve making offerings of fruits, flowers, candies, and occasionally even fish to please the sea gods and obtain their favours. Customary prayers and hymns are chanted, and occasionally the ceremonies are led by priests or community leaders.

Apart from its religious significance, *Khuti Pujo* functions as a communal event for the fishing community. As fishermen gather to celebrate and get ready for the following fishing season, it promotes a sense of solidarity and brotherhood among them.

In general, the fishing communities in Baguran Jalpai Village place a great deal of cultural and spiritual significance on *Khuti Pujo*, as it represents their close relationship to the sea and their dependence on it for their means of subsistence.

The word "*Khoti*" refers only to the fishing landing centres where small-scale fishermen from nearby or occasionally from farther away locations congregate to transact business and find work. The two primary activities of the business and employment are fishing from the sea and drying the fish, which entails several additional tiny activities. People claim that "*Khuti pute*" (by burying bamboo poles) performs the majority of those tasks, which is why these fish

landing stations go by the name "*Khoti*." "This "*Khotis*" is active for about six months, measured in Bengali months, ranging from the middle of *Bhadro* to the middle of *Falgun* (approximately from the middle of September to the middle of March). Looking at it then, one might conclude that "*Khoti*" is a village populated solely by fishermen. To be clear, though, this is not a village. It is merely a fish landing facility that, when fishing is at its peak, takes on the appearance of a community. A wide range of people live in the lively fishing hamlet of *Khoti*, which influences its dynamics. The Layas, who are enterprising fishermen who extensively invest in boats and nets to fish, are at the centre of it all. They frequently depend on *dadan*, or financial help from *Sowdagars* and *Aratdars*. *Jalias*, who work as workers in fishing crews, has frequently left the Laya community and is now seeking work and security. Whereas *Aratdars* concentrate on trading dried fish, *Sowdagars*, who are merchants, are essential in purchasing and processing raw fish. Women make up the majority of *Bachhunis* who help with the drying and sorting of fish. Furthermore, *Khoti's* operation depends on other workers and craftspeople, like boat repair workers and store owners.

The body that oversees and maintains every aspect of a *Khoti* is known as the *Khoti* committee. The organization is primarily composed of a five-person board, fifteen executive members, and all of the *Khoti* members, who are counted as general members. The president, Vice-President, secretary, assistant secretary, and treasurer make up the board. They are all democratically chosen from the executive committee, mostly by the other executive members voting for them during the general meeting, with the backing of all *Khoti* members. The ADF, the Marines, and other government representatives are present when the board members are chosen. Those board members act as the governing body of a *Khoti*.

The people of Baguran Jalpai exhibit remarkable endurance, as evidenced by their close ties to the land and water that provide them with sustenance. They have a special link with the red crabs, sand bubbler crabs, and casuarina trees that line their coastlines, even if they have to deal with the difficulties of coastal erosion and erratic fishing yields. They have loved and guarded these natural gifts for decades, knowing how important they are to the preservation of their coastal home. And the spirit of *Khuti Pujo*, a celebration that goes beyond simple custom, beats at the centre of their community. It's a gathering of spirits, bound by a common respect for the water and a wish for abundant harvests. They strengthen the ties of kinship that carry them through every storm as they gather together and offer prayers and songs to the ocean

gods. This resilience is the very core of human resilience; it goes beyond simply enduring adversity to include living in harmony with the land and water that form their life.

FISHERIES AND DEVELOPMENT - AN EXISTENTIAL THREAT ?

Baguran Jalpai, a village predominantly dependent on fishing and agriculture, signifies a community deeply intertwined with its natural surroundings. The livelihoods of its residents revolve around these primary occupations. These traditional occupations have been integral to the way of life in Baguran Jalpai for generations, providing sustenance and economic stability to the community.

Despite the village's inability to work more, there has been an increase in tourism, especially on weekends, due to its secluded beauty and beautiful attractions. However, amid this growing interest, there have been development concerns, particularly with the proposed beach resort project. This project generated considerable opposition from villagers and fishermen who depend on the coast for their livelihood. The proposed site adjoined the fisherman's landing place, locally known as 'Khoti,' where fishermen let their nets dry and process their catch. Implementation of the project would have resulted in the displacement of these vital activities, jeopardising the economic development of the community. As a result, the villagers united in protest mobilized by DBMF on the effect of the project on their livelihood and managed to halt the development of the project. The potential impact of the resort project on the economic and social resources of the village cannot be underestimated. In the context of Baguran Jalpai, the sentence suggests that while the development of tourism could potentially bring economic benefits and job opportunities to the local community, there is a concern that it might also threaten the longstanding fishing traditions that define the identity of the village. Baguran Jalpai's fishing traditions are deeply ingrained in its cultural heritage and have sustained the livelihoods of its residents for generations. Introducing tourism development projects without careful consideration could lead to the erosion of these traditions, either through environmental degradation or changes in local practices to cater to tourist demands. Therefore, any tourism initiatives in Baguran Jalpai should be approached thoughtfully, ensuring that they complement rather than overshadow the village's unique cultural and economic foundation.

The fishermen's protest highlighted the importance of preserving this livelihood, which sustains about 80% of the village's population. This conflict exemplifies the delicate balance between economic growth and cultural preservation in rural communities.

While external investment may promise growth, it must be used to prioritise the needs and aspirations of local communities. In the case of Baguran Jalpai, the proposed resort project failed to align with the values and priorities of the community, causing them to act collectively to protect their way of life.

Contemporary examples further highlight the challenges posed by development policies in rural coastal areas. For example, debates over infrastructure projects such as ports or industrial zones highlight the tension between economic development and environmental conservation. Similarly, proposals for tourist expansion, including hotels or theme parks, often face opposition from local communities concerned about the loss of natural habitats and cultural heritage. In navigating these challenges, inclusive decision-making processes are paramount. By engaging stakeholders in dialogue and prioritising sustainable development practices, policymakers can mitigate conflict and foster resilient communities. In Baguran Jalpai, successful protests against the resort project are a testament to the power of collective action in preserving local livelihoods and protecting cultural heritage in changing development landscapes.

The recent proposal to launch a missile launch near Junput has aroused a lot of fear and misperception among the villagers of Baguran Jalpai. This relief stemmed from past experiences in development projects, especially the prolonged protests against the Haripur Nuclear Power Plant, which eventually led to its abandonment after five years of resistance. Now, the prospect of finding a missile launch site near the village has revived concerns about security and disruption to daily life. Baguran Jalpai, about 20 kilometres from the proposed site, stands to be directly affected by the activities of the missile test site.

Villagers vividly recall the confusing experience of previous missile tests, characterised by loud vibrations, deafening noises and lack of firing before notice. These uncertainties deepened the fears, leaving them fearing for their safety and well-being. As a result, many villagers now consider the need to move to safer areas to protect themselves from potential hazards associated with the missile site.

If the people migrate to avoid the potential hazard, the doubt remains about the availability of gainful employment for community members, with concerns that employment opportunities may be limited to specialised workers, leaving villagers trapped in menial roles. This perceived gap in career prospects furthers mistrust and uncertainty about development policies. One villager expressed fears that the missile launch site would mainly benefit scientists and soldiers, marginalising local people and relegating them to menial roles within the facility.

Dealing with the trauma of developmental violence (like protest against missile launching pad at Junput), the proposed construction of a launching pad at Junput has ignited significant discontent among the people, potentially leading to a major conflict in the future. Baguran Jalpai confronts profound existential questions about the future trajectory of the village. The ongoing development reflects a broader public debate about the appropriate balance between economic development and the preservation of cultural heritage and the environment. In addressing these challenges, inclusive decision-making that prioritises local voices and concerns is essential to achieving sustainable and equitable development. Through dialogue and collaboration, stakeholders can work towards a shared vision that will enhance the well-being and resilience of all communities in the face of the challenges of a rapidly changing world.

Baguran Jalpai is currently undergoing development and economic growth, but it faces a delicate challenge: striking a balance between traditional ways of life, community well-being, and conservation efforts. This means that the community must find a way to uphold its cultural practices while also ensuring the welfare of its members and protecting the environment.

Changing development policies highlight the significance of inclusive decision-making. It's important that decision-making processes involve local voices and take into account diverse perspectives. These decisions should address sustainability, equity, and cultural preservation.

The focus should be on long-term well-being, fairness, and safeguarding cultural heritage.

For the village to move forward, competing interests must be reconciled while protecting the interests of all its residents for generations to come.

GENDER BIASES IN THE FISHERIES SECTOR

The challenges faced by marginalized fisherwomen in West Bengal's East Medinipur coastal districts are deeply rooted in systemic inequalities and societal norms. Despite playing a crucial

role in the fishing industry, they are often sidelined from decision-making processes, face discrimination in wages and work assignments, and endure mistreatment and harassment in marketplaces. Additionally, cultural taboos surrounding menstruation exacerbate their economic vulnerability, further complicating their ability to secure a stable livelihood.

In the aftermath of disasters, these challenges become even more pronounced. Poor pay acts as a significant barrier to rebuilding their livelihoods, while their lack of representation in decision-making forums diminishes their voices and concerns. Safety concerns, particularly in volatile marketplaces, pose additional obstacles, affecting both their mental and physical well-being. To effectively address these multifaceted challenges, interventions must be comprehensive and holistic. Economic empowerment programs tailored for fisherwomen, such as skill-building workshops and access to microfinance, aim to enhance their earning potential and resilience. Initiatives that promote women's leadership and participation in decision-making processes are crucial for ensuring their voices are heard and their needs addressed. Safety and security measures, including increased police presence and designated safe areas in marketplaces, are vital for mitigating the risk of harassment and violence.

Community involvement, legislative advocacy, and gender-sensitive disaster recovery strategies are also key components of effective interventions. By challenging patriarchal norms and advocating for gender equality, these programs aim to create a supportive environment conducive to fisher women's empowerment and long-term resilience. A particularly promising approach lies in the establishment of community-based women's empowerment centres. These centres offer a comprehensive solution tailored to the unique needs of fisherwomen in disaster recovery contexts. By integrating various interventions such as cultural sensitivity training, mental health support, legal aid, and alternative income opportunities, these centres address economic, social, and emotional challenges holistically. Moreover, by fostering collective action and solidarity, they empower fisherwomen to advocate for their rights and access resources effectively.

Addressing the challenges faced by marginalized fisherwomen in disaster recovery contexts requires a multifaceted and inclusive approach. By addressing economic, social, and cultural barriers through targeted interventions and community involvement, we can create a more equitable and supportive environment for fisherwomen to rebuild their lives and thrive. Ultimately, ensuring the empowerment and resilience of fisherwomen is not only essential for

their well-being but also for the overall development and sustainability of fishing communities in West Bengal's coastal districts.

UNCERTAIN FUTURES- SHADOW OVER THE FUTURE OF SMALL-SCALE FISHING

The coastal village of Baguran Jalpai, located in the Purba Medinipur district of West Bengal, stands as a testament to the resilience of small-scale fishing communities. However, the future of this traditional livelihood faces a myriad of challenges that threaten to disrupt the delicate balance of the local ecosystem and the livelihoods of its inhabitants.

One of the most pressing issues confronting the fishermen of Baguran Jalpai is the dwindling fish catch. Over the past two decades, the village has witnessed a staggering 60% reduction in the number of fish they are able to harvest. This alarming decline can be attributed to a complex interplay of factors, chief among them being the rise of mechanized fishing and the proliferation of destructive bottom trawlers.

The advent of large-scale, technologically advanced fishing vessels has tipped the scales in favour of industrial operations, leaving little room for the traditional small-scale fishermen of Baguran Jalpai. These mechanized trawlers, equipped with powerful engines and sophisticated gear, are able to extract far greater quantities of fish from the waters, often encroaching upon the designated areas demarcated for small-scale fisheries. This systematic overfishing by the trawlers has had a devastating impact on the livelihoods of the Baguran Jalpai community. The fishermen, who rely on their hand-driven boats and modest equipment, are simply unable to compete with the sheer scale and efficiency of the mechanized vessels. The result is a severe depletion of the local fish stocks, leaving the small-scale fishermen with dwindling catches and diminishing returns.

Adding to the woes of the Baguran Jalpai fishermen is the significant financial burden they bear to maintain their operations. The fuel-guzzling 4- and 6-cylinder boats they use consume an astonishing 300 Liters of diesel every two weeks, at a cost of around 27,900 rupees (diesel costing 93 rupees per Liter. They also do not get any subsidies on diesel). However, this investment in fuel does not translate to a proportionate increase in their fish catch, leading to substantial financial losses for the community.

Furthermore, the fragility of the small-scale fishing equipment is another pressing concern. The nets used by the Baguran Jalpai fishermen, which cost between 35,000 to 50,000 rupees each, are prone to rapid degradation, often lasting only a single fishing season. This constant need to replace essential gear places an additional financial strain on the already struggling community.

Compounding these challenges is the 60-day fishing ban period, a government-imposed measure aimed at allowing fish stocks to replenish. While the intent behind this policy is understandable, the lack of alternative livelihood options during this time leaves the Baguran Jalpai fishermen in a precarious situation, with no means to sustain their families and communities.

The uncertainties surrounding the future of small-scale fishing in Baguran Jalpai extend beyond the immediate concerns of dwindling catches and financial hardship. The long-term viability of this traditional way of life is under threat, as the community faces the daunting task of adapting to an ever-changing marine environment and the encroachment of industrial-scale operations.

As the residents of Baguran Jalpai navigate these treacherous waters, it becomes increasingly evident that the challenges they face require a multi-faceted approach, one that addresses the complex interplay of ecological, economic, and social factors. Collaborative efforts between policymakers, environmentalists, and the fishing community itself will be crucial in charting a path forward that ensures the sustainable and equitable development of the region's coastal resources.

The story of Baguran Jalpai is a microcosm of the challenges faced by small-scale fishing communities across the globe. As the world grapples with the impacts of climate change, overfishing, and the uneven distribution of resources, the resilience and adaptability of these traditional livelihoods will be a key determinant in the future of our shared maritime heritage.

GAPS IN THE PLANS- INTEGRATION OF DISASTER RISK REDUCTION INTO DEVELOPMENT

One of the primary gaps identified in the disaster management strategy for Baguran Jalpai village is the absence of comprehensive village-level plans; it was concluded after conversation with the Gram *Pradhan*. While the district-level disaster management plan outlines overarching strategies and guidelines for the preparation of the plans by involving the community, the information collected from the field indicates major gaps between the planning and implementation of the district recommendations. The construction and maintenance of the Multi-Purpose Cyclone Shelters (locally called Aila Centre or Aila Ghar) have been a successful endeavour but it alone seems to take centre stage in the preparations for an impending disaster while other essential services like health, sanitation, water supply are looked over- at least as seen in Baguran Jalpai. The lack of localised plans tailored to the specific needs and vulnerabilities of the village poses significant challenges in effectively mitigating and responding to disasters.

The absence of comprehensive village-level plans indicates a disconnect between top-down planning approaches and grassroots-level engagement. Effective disaster management requires active participation and input from local communities who possess invaluable knowledge of their environment, resources, and vulnerabilities. The failure to engage residents of Baguran Jalpai in the planning process undermines the relevance and effectiveness of disaster preparedness and response efforts.

Village-level plans are essential for assessing and addressing the specific hazards and risks faced by Baguran Jalpai and its residents. Without localised risk assessments and vulnerability analyses, it becomes challenging to prioritise interventions, allocate resources effectively, and implement targeted mitigation measures. The lack of comprehensive village-level plans hampers the identification of key vulnerabilities, such as the susceptibility to cyclones, storm surges, flooding, and erosion, which are prevalent in coastal areas like Baguran Jalpai. This identification would also play a crucial role in the allocation of resources in such a way that every village under a gram panchayat (“*anchal*” in the local language) may be appropriately equipped to deal with a disaster and provide aid after it passes.

Disaster risk reduction (DRR) is a crucial aspect of sustainable development, aiming to minimise the impacts of hazards on vulnerable communities and enhance resilience to future disasters. As there was no plan available at the village or *anchal* level, the integration of disaster risk reduction into development plans and projects will be examined upon reviewing the Block and District level plans. The Block Disaster Management Plan (BDMP) focuses on- structural, non-structural and fail-safe communication networks (for early warning) for disaster preparedness and mitigation.

Overall, the BDMP seemed to have quite a limited scope as compared to the District Disaster Management Plan (DDMP) with focus mainly given to resilient infrastructural development and the loss and damage of the same. The District Disaster Management Plan of East Medinipur provides a comprehensive framework for disaster preparedness, response, recovery, and mitigation. It outlines strategies, policies, and interventions to address various hazards prevalent in the region, including cyclones, floods, and storm surges. While the plan emphasises the importance of community engagement, coordination among stakeholders, and capacity building, it is essential to examine how DRR considerations are incorporated into the broader development plans of the district.

As there is no plan specific to Baguran Jalpai or even the *anchal* under which it falls, the traditional disaster mitigation knowledge of the villagers is completely unused and overlooked. Traditional knowledge and practices often hold valuable insights into coping mechanisms and resilience strategies during disasters. Failure to acknowledge and incorporate indigenous practices may overlook valuable resources and community resilience strategies. Coastal forests, locally known as "*Jhau Bon*," play a vital role in mitigating the impact of cyclonic storms by acting as natural barriers that break the force of winds and waves. The traditional knowledge held by villagers recognizes the importance of preserving these coastal forests for disaster resilience. Coastal forests, locally known as "*Jhau Bon*," play a vital role in mitigating the impact of cyclonic storms by acting as natural barriers that break the force of winds and waves. The traditional knowledge held by villagers recognizes the importance of preserving these coastal forests for disaster resilience.

Therefore, the disaster management plan should include strict provisions for

- Enforcing regulations to prevent overfishing and habitat destruction in coastal areas where red crabs thrive.

- Establishing protected areas or marine reserves to safeguard red crab populations and their breeding grounds.
- Conducting community awareness programs to educate residents about the ecological significance of red crabs and the need for their conservation.
- Collaborating with local fisherfolk and community leaders to develop sustainable fishing practices that ensure the long-term viability of red crab populations.

Ipomoea, a coastal plant species commonly found in some areas of Baguran Jalpai, possesses unique properties that contribute to soil stabilisation and erosion control along coastal regions. Traditional knowledge passed down through generations acknowledges the importance of Ipomoea in protecting the Bengal coastline from erosion and land degradation. Therefore, the disaster management plan should prioritise the plantation of Ipomoea as part of coastal protection measures.

Effective integration of DRR into development planning requires close collaboration and coordination among various government departments, agencies, and stakeholders responsible for both disaster management and development initiatives. While disaster response and all post-disaster work is done in collaboration with these multiple sectors such as urban planning, agriculture, infrastructure, and housing, there is a lack of such coordination in the formulation of development plans.

A reflection of this gap can be seen in the real-time example of the construction of a Missile Launching Pad, in Junput (Block- Contai 1, East Medinipur). It represents a significant infrastructure development project aimed at bolstering national defence capabilities. The project involves the establishment of a state-of-the-art facility equipped for missile testing and launch operations, aimed at enhancing India's deterrence capabilities and bolstering its defence preparedness in the region. The construction of such infrastructure signifies the government's commitment to strengthening the country's defence infrastructure and projecting its military prowess on the global stage. However, such large-scale development initiatives often overlook the potential disaster risks they pose to local communities, particularly vulnerable groups such as fishermen.

Despite its strategic significance, the construction of the Junput Missile Launching Pad has raised concerns regarding its potential impact on the livelihoods of thousands of fishermen

residing along the Bengal coastline leading to protests in various pockets along the coastline. The displacement of fishing communities residing within the immediate radius of the launching pad, disruption of traditional fishing practices (as well as boat making), and degradation of coastal ecosystems due to the project's implementation pose significant challenges to the sustainability of local livelihoods. Moreover, the lack of adequate consultation with affected communities and the absence of mitigation measures to address their concerns exacerbate vulnerabilities and increase the risk of socio-economic hardships.

The development of the Junput Missile Launching Pad exemplifies the neglect of disaster risk reduction considerations in large-scale infrastructure projects. While the project aims to enhance national security and defence capabilities, it fails to account for the potential disasters it could trigger, such as environmental degradation, loss of biodiversity, and socio-economic displacement of coastal communities. The absence of comprehensive risk assessments, mitigation strategies, and community engagement processes underscores the disconnect between development planning and disaster risk reduction principles.



Fig: Junput Missile Pad

PART II- DISTRICT EAST MEDINIPUR

EAST MEDINIPUR- DISTRICT PROFILE

East Midnapur district, also known as Purba Medinipur, holds a significant place among the nineteen districts of West Bengal. It was established on 1st January 2002 following the division of the erstwhile Midnapur district into Paschim Midnapur and Purba Medinipur. Serving as the administrative hub, the district headquarters is located in Tamluk.

This sprawling district encompasses several key towns and cities, each contributing to its vibrant socio-economic landscape. Among these urban centres are Panskura, Contai, Tamluk, Egra, Haldia, Mecheda, Haria, Mahisadal, Digha, Nandigram, Mandarmoni, Ramnagar, Khejuri, Potashpur, Manglamarro, Bhagabanpur, Chandipur, Kolaghat, Nandaigajan, and Paniparul.

The district is further divided into four sub-divisions, each with its distinct administrative jurisdiction and cultural identity. These sub-divisions are Tamluk, Egra, Contai, and Haldia, facilitating efficient governance and service delivery across the region.

East Midnapur district boasts a rich tapestry of tourist attractions, drawing visitors from far and wide to explore its scenic beauty and cultural heritage. Among the most sought-after destinations are Mandarmoni, famous for its pristine beaches and tranquil ambiance, and Digha, renowned as one of West Bengal's most popular seaside resorts. Shankarpur, with its picturesque coastline and serene surroundings, offers a perfect retreat for nature lovers. Haldia, a bustling industrial town, also beckons tourists with its unique blend of urban amenities and natural charm.

In essence, East Midnapur district stands as a testament to West Bengal's cultural and geographical diversity, offering a myriad of experiences for tourists and residents alike to explore and cherish.

Area	4736 km sq.
Length of Coastline	65.5 km
Population	"50,95,875"
Subdivisions	4
Blocks	25
GP	223
Villages	3500
District HQ	Tamluk
DM	Tanvir Afzal

Table: Administrative profile (source: Census,2011)

ANALYSIS OF COASTAL HAZARDS

- 1) Geographical Vulnerability- The district, being located along the coast, is susceptible to various coastal hazards such as cyclones, storm surges, and flooding. Its proximity to the Bay of Bengal exposes it to the direct impact of tropical cyclones originating from the sea.
- 2) Impact of Cyclones- The plan likely includes measures to mitigate the impact of cyclones, considering their frequency and severity in the region. This may involve evacuation plans, strengthening of infrastructure, and early warning systems to alert residents about impending cyclones.
- 3) Storm Surges- Coastal areas are at risk of storm surges, which are sudden rises in sea level during storms. These surges can inundate low-lying areas, causing extensive damage to property and posing a threat to human lives.
- 4) Flooding- Apart from storm surges, the district faces the risk of flooding during heavy rainfall events, especially in low-lying coastal regions. Drainage systems may become overwhelmed, leading to the inundation of roads, homes, and agricultural land.

Upon discussions with the various government officials, it was clear that at the institutional level, disasters are defined only as extreme events and the economic losses attached to them. The impact of these events on people is not seen as a disaster. Coastal hazards pose significant challenges to the livelihoods of coastal communities, with implications extending far beyond immediate physical damage to infrastructure and human settlements. Particularly vulnerable are those who rely on agriculture, fishing, and other coastal activities as their primary source of income. The disruption caused by coastal hazards can have profound and long-lasting socio-economic repercussions, impacting various aspects of community life.



Fig. Meeting with Block Disaster Management Officer (Mr. Debashis Tripathy)

The agricultural sector, which often includes the cultivation of crops and the rearing of livestock in coastal regions, faces severe consequences. Storm surges and flooding associated with coastal hazards can lead to the destruction of crops, erosion of arable land, and contamination of soil due to saltwater intrusion. These adverse effects not only result in immediate crop losses but also compromise the productivity of agricultural land in the long term. Subsistence farmers, who lack access to financial resources and insurance, are particularly vulnerable to such disruptions, facing food insecurity and diminished income.

Similarly, the fishing industry, which sustains the livelihoods of numerous coastal communities, is profoundly affected by coastal hazards. Cyclones and storm surges can damage fishing boats, equipment, and infrastructure such as harbours and fish processing facilities. Moreover, rough seas and turbid waters following a coastal hazard event make fishing activities

hazardous and less productive, impacting the catch quantity and quality. For small-scale fishers, who often lack alternative sources of income, such disruptions can lead to significant economic hardships, exacerbating poverty and food insecurity within coastal communities.

Aquaculture operations, including shrimp farming, are susceptible to saltwater flooding which leads to massive amounts of loss and overall habitat degradation. Infrastructure damage, loss of stock, and environmental contamination can result in substantial economic losses for aquaculture farmers, disrupting supply chains and affecting market prices for seafood products.

PROCESS OF DESIGNING THE DISTRICT DISASTER MANAGEMENT PLAN (DDMP)

Initiation and Coordination: A committee is constituted and chaired by the District Magistrate & Collector of East Medinipur. The District Disaster Management Officer (DDMO) also takes center stage in the formulation of the DM plan. This body oversees the entire planning process.

Risk Assessment and Hazard Mapping: Hazard maps are created to visualize areas prone to specific disasters such as floods, cyclones, earthquakes, etc. HRVCA for the plan is also to be conducted at the block levels.

Stakeholder Engagement: Various stakeholders, including government departments, NGOs, community leaders, and subject matter experts, are to be involved. The plan is to be floated at the village level to include consultations of the communities that the plan is being prepared for.

Data Collection and Analysis: Data related to population demographics, infrastructure, emergency services, and resources are also to be collected and analyzed at the block level to understand the district's capacity to respond to disasters.

Formulation of Policies and Strategies: Block and district-level plans are formulated after feedback and suggestions from the grassroots levels.

Capacity Building and Training: Training programs are organized for government officials, first responders, volunteers, and community members a minimum of twice a year by the District Disaster Management Department to enhance their skills in disaster preparedness and response. The main aim is to make the community members “self-reliant in the face of disasters”. The *Aapda Mitra* Capacity Building programme saw its last phase to completion in East Medinipur in 2020. After that there has been no other capacity building initiative.

Resource Mobilization and Budgeting: Recommendations for Budgetary allocations are sent to the state for implementing various components of the DDMP, including infrastructure development, procurement of equipment, and capacity-building activities.

Review and Revision: The DDMP is reviewed and revised every year to incorporate lessons learned from past disasters, changes in risk profiles, and advancements in technology and knowledge.

The above process has been written as has been reported by the district disaster management office. However, there were certain gaps found in the plan and the implementation of it.



Fig. Meeting with the District Disaster Management Officer

GAPS IN THE DISASTER MANAGEMENT PLAN

Some sections of the plan lack detailed information. For instance, while it outlines various problems faced by children during disasters it lacks specific plans to address them. The plan should ensure that adequate resources, training, and protocols are in place to address the unique needs of children during each phase of a disaster. The plan recognizes the interruption of education as a significant challenge during disasters. While it suggests measures such as developing emergency preparedness plans for schools and providing educational kits for shelters, no such provision is received by the village schools. The schools are turned into cyclone shelters during times of disasters and not much provision for education is in place at that time.

The plan mentions the need for training and sensitization of various personnel but does not provide specific protocols or guidelines for implementation. The plan mentions the importance of psychosocial care for children and caregivers, but there are limitations in the provision and availability of trained counsellors and psychological trauma management services. Moreover, psychological and psychosocial issues fall in the lowest strata of health-related priorities during disasters.

Resource allocation is mainly done for basic relief materials and equipment which leaves much to be desired by not just the disaster-affected communities but also the personnel involved in emergency services. Lack of manpower and a distinct neglect towards issues of disaster preparedness are also felt by the block and district level officials themselves.

The plan does not adequately address mechanisms for monitoring and evaluating the effectiveness of disaster management activities even though the plan itself is revised each year. It's essential to have robust monitoring systems in place to track progress, identify challenges, and make necessary adjustments.

While the plan mentions the involvement of communities at the grassroots level, there was a lack of a concrete village disaster management plan (in the case of Junput Gram Panchayat under which Baguran Jalpai falls). Therefore, the plan - as directed by the district- is not floated among the community members for their suggestions.

Currently, the plan provides-

- Gratuitous Relief (Normal Relief):

Covers persons like idiots, lunatics, cripples, blind, aged, and women in danger of starvation.

Current coverage is about 0.25% of the population.

Scale of assistance is 12 kg wheat or ₹120 per month per adult, and half for minors.

- House Building Grant:

Provided to indigent families below the poverty line (income less than ₹2,500/month) for repairing or rebuilding houses damaged by natural calamities or accidental fires.

₹20,000 for fully damaged houses and ₹5,000 for partly damaged houses.

After many conversations with villagers of different villages across the coast of East Medinipur, one thing was clear. There is a major gap between the proposed plan and the resources available. On an average of 40-50 people in a village receive the promised relief

while the rest are left with nothing. One narrative was common among all villages, “*Jaader khoti hoye, tara kichui paayeni*”. (Translation: The people who actually suffered did not get anything.)

PART III- STATE: WEST BENGAL

STATE PROFILE:

GEOGRAPHIC PROFILE

Area	88,752 sq. km
Latitude and Longitude	27°13'15"N to 21°25'24"N and 85°48'20"E to 89°53'04"E
Length of the Coastline	158 km

ADMINISTRATIVE PROFILE

No. of Districts	28
No. of Subdivisions	68
No of Blocks	345
No of Municipalities/ Notified Area Authority	121
No. of municipal corporations	07
No of Gram Panchayats	3339
No of Police Stations	508

Table: Administrative profile (source: Census,2011)

DEMOGRAPHIC AND SOCIO-ECONOMIC PROFILE

Population	91276115
Male	4,68,09,027
Female	4,44,67,088
Sex Ratio	947 females per 1000 males
Population Density	1028/km ² (2700/sq. mi)
Rural Population	About 68.13% of the population
Urban Population	

Urban Population	About 31.87% of the population
Highest Density	Kolkata (24,306/km ²)
Literacy Rate	77.08%
Literate (Total)	6,15,38,281
Male	3,38,18,810
Female	2,77,19,471
Male Literacy	82.67%
Female Literacy	71.16%
Official Primary Language	Bengali
Other Languages Spoken	Out of 18 Scheduled languages in West Bengal Main spoken language English, Hindi, Nepali, Urdu, Santali.

Table: Demographic & socio-economic profile (source: Census,2011)

ANALYSIS OF COASTAL VULNERABILITIES OF THE STATE OF WEST BENGAL

An extensive analysis of West Bengal's coastal vulnerabilities reveals a complex network of issues that are intrinsic to the state's large coastline that borders the Bay of Bengal. The state is more vulnerable to a range of coastal hazards due to its geographical configuration, which includes large amounts of low-lying land and the Sundarbans mangrove forest in the south. They include cyclone-induced storm surges, erosion, where waves and currents take away coastal land relentlessly and inundation brought on by rising sea levels brought on by climate change. Due to its delicate balance and vulnerability to various environmental stressors, the Sundarbans, a crucial ecosystem and UNESCO World Heritage Site are particularly vulnerable. The ongoing barrage of cyclones that originate in the Bay of Bengal presents a serious risk to coastal infrastructure and communities. These cyclones can seriously harm coastal communities, agriculture, and means of subsistence since they frequently bring with them fierce winds, heavy rains, and deadly storm surges. Human settlements are particularly vulnerable because of things like inadequate infrastructure, which makes communities ill-

equipped to endure the assault of natural disasters. Examples of such problems include poorly constructed homes and inadequate drainage systems.

The morphology of coasts is gradually shaped by natural processes called coastal erosion and accretion. These processes have important ramifications for the ecosystem and human settlements in the coastal region of West Bengal.

Strong tidal currents, storm surges from cyclones, and rising sea levels all cause erosion in West Bengal along exposed portions of the shore. Consequently, there is a loss of coastal land, which puts buildings, roads, and agricultural fields at risk. In addition to affecting the nearby coastal region, this land loss may result in community uprooting and loss of means of subsistence. On the other hand, accretion which is the process of sediment deposition that results in the growth of land occurs in several locations along the coastline of West Bengal. Natural sediment accumulation can happen as a result of sediment being carried by rivers or being re-distributed along the coast. Certain places in West Bengal may experience accretion due to the deposition of sediment brought by the Ganges and other rivers. Furthermore, the installation of breakwaters and groynes along the shore might change the patterns of sediment movement, resulting in localized accretion.

REFLECTION IN THE DISASTER MANAGEMENT PLAN

West Bengal's susceptibility to a plethora of coastal hazards such as cyclones, floods, erosion, and accretion, is a well-established concern. However, an in-depth examination of the state's disaster management plan for 2023 reveals significant gaps in addressing these formidable challenges. Notably, coastal erosion and accretion, despite being potent threats, are conspicuously absent from the plan's hazard identification, which consequently leads to a dearth of management strategies. Similarly, while cyclones pose a substantial risk to the state, the management plan lacks a comprehensive discussion on cyclone management strategies. Instead, the focus predominantly lies on floods, with an elaborate categorization of flood types and a detailed flash flood management plan. This apparent oversight underscores the need for a more holistic approach to disaster preparedness, one that accounts for the diverse range of coastal hazards that West Bengal faces.

CONCEPT OF MAINSTREAMING DRR

Within the West Bengal State Disaster Management Plan of 2023, the strategy of mainstreaming Disaster Risk Reduction (DRR) in developmental projects stands out as a prime example of mitigation measures. The strategy recognizes that decreasing vulnerabilities and increasing resilience to disasters requires incorporating DRR principles into development objectives.

In line with the principles outlined in the United Nations Convention on the Rights of the Child (1989), the State Disaster Management Plan for West Bengal emphasizes the critical importance of child- and women-centric disaster risk reduction measures. It also acknowledges the gender-specific vulnerabilities that are highlighted in disaster situations. The plan places a strong emphasis on the need to ensure the safety, protection, and well-being of children, women, and adolescents, especially those from disadvantaged communities, in light of the region's multi-hazard profile and its aggravating effects. It highlights the disruption of learning and education brought on by frequent catastrophes like cyclones and floods, highlighting the significance of safe school environments and addressing risks on school property and along routes to schools.

Additionally, the strategy emphasizes the gender perspective in attempts to reduce disaster risk, highlighting the unique vulnerabilities that women confront, such as heightened risks of abuse, exploitation, and violence after a disaster. It emphasizes the significance of empowering women, guaranteeing their access to institutions and resources, and attending to their particular needs in relief and recovery operations to lessen the negative effects of disasters on their general well-being and means of subsistence, thereby promoting sustainable development in the area.

The Dhaka Declaration and the UN Convention on the Rights of Persons with Disabilities (UNCRPD) emphasize how crucial it is to incorporate disability-inclusive Disaster Risk Reduction (DRR) with the Sustainable Development Goals (SDGs). This acknowledgement results from the knowledge that obstacles prevent people with disabilities from fully engaging in society. We increase resilience, protect accomplishments, and lessen the effects of disasters by putting inclusive DRM into practice. To promote a society where everyone can participate in disaster preparedness, response, and recovery for resilience and sustainability, inclusive DRM makes sure that people with disabilities are active participants in disaster response and risk reduction initiatives.

MAINSTREAMING DISASTER MANAGEMENT INTO DEVELOPMENTAL PROGRAMS AS A STRUCTURAL MEASURE

The State Disaster Management Plan features a distinct chapter dedicated to mainstreaming disaster management concerns into developmental plans, programmes, and projects that highlight the imperative integration of risk reduction strategies within the state's development agenda.

Two basic approaches are outlined in the West Bengal State Disaster Management Plan of 2023 to integrate Disaster Management into development projects. First and foremost, it highlights the necessity of including disaster management requirements in the design and implementation of all governmental initiatives. This guarantees that risk reduction strategies are an essential component of all developmental initiatives because projects will only be approved or pursued if they comply with Disaster management regulations. The plan also emphasizes the significance of setting up a significant amount of money, especially for catastrophe management. The plan's goal is to make sure that the program, scheme is adequately funded for disaster management. This will allow for the efficient implementation of risk reduction strategies, which will increase the resilience of infrastructure and communities to future disasters.

In this endeavour, distinct roles are assigned to various departments and authorities. The Department of Planning, Statistics, and Program Monitoring is in charge of making sure that development initiatives follow the rules and regulations related to disaster management. Providing knowledge and direction on incorporating Disaster Management measures into development projects is the responsibility of the Disaster Management & Civil Defense Department. Furthermore, disaster management must be taken into account in all other line departments' plans and projects that are involved in developing operations. In addition, district-level officials and Heads of Departments (HoD) have the authority to evaluate and approve plans and projects. However, they must make sure that disaster risk reduction measures are appropriately incorporated into the development projects that fall under their jurisdiction. The strategy is intended to promote thorough and efficient mainstreaming of DRR across all levels of government and development initiatives in West Bengal through this division of responsibilities.

SCHEMES IMPLEMENTED AND CHALLENGES

After a thorough analysis, we have seen that the plan is devoid of meaningful discussions about developmental plans and how they will be implemented. The plan covers preparedness, response, and recovery measures for disasters well; nevertheless, it does not seem to address the important issue of incorporating developmental schemes into the larger framework for disaster management.

PART IV:CONCLUSION

The field report on the coastal district of Purba Medinipur, West Bengal, reveals a multifaceted landscape characterized by a delicate interplay between development aspirations, environmental vulnerabilities, and disaster management challenges. Through thorough analysis and stakeholder engagement, several key themes emerge, painting a nuanced picture of the region's dynamics.

Cultural and Environmental Heritage Preservation

One of the paramount concerns highlighted in the report is the imperative to safeguard the rich cultural heritage and environmental integrity of Purba Medinipur. The district's coastal areas boast a diverse tapestry of cultural traditions and natural wonders, ranging from pristine beaches to vibrant fishing communities. However, the rapid pace of development, driven by tourism and industrialization, poses a significant threat to these cherished assets. The proposed beach resort project and potential missile launch site near Junput underscore the tension between economic growth and cultural preservation. The collective resistance by local communities exemplifies the deep-rooted attachment to their traditional way of life and the determination to protect it from external encroachments.

Disaster Risk Management

Purba Medinipur's geographical location renders it highly susceptible to a myriad of coastal hazards, including cyclones, storm surges, and flooding. The district's vulnerability to these natural calamities underscores the urgent need for robust disaster risk management strategies. While the district has made strides in formulating disaster management plans and building infrastructure such as cyclone shelters, gaps persist in the implementation and integration of these measures into broader developmental schemes. The report underscores the importance of mainstreaming disaster management concerns into all facets of development which as of now is not a matter of concern for the block and district level disaster management authorities. It is necessary that disasters be seen from a people centered lens rather than merely as structural damage and loss of lives.

Inclusive Development

A recurring theme throughout the report is the imperative of inclusive development that prioritizes the needs and aspirations of local communities, particularly marginalized groups such as women and persons with disabilities. The document advocates for gender-sensitive disaster risk reduction strategies and disability-inclusive development initiatives to ensure the equitable distribution of resources and opportunities. By empowering women, enhancing access to education and healthcare, and promoting inclusive decision-making processes, Purba Medinipur can foster a more resilient and sustainable future for all its residents.

Uncertainties surrounding the future of small-scale fishing

The fishermen of Baguran Jalpai face a myriad of challenges that threaten their traditional way of life. One of the most pressing issues is the dwindling fish catch, with a staggering 60% reduction observed over the past two decades. This decline can be attributed to various factors, including the rise of mechanized fishing and the proliferation of destructive bottom trawlers. These large-scale, technologically advanced fishing vessels outcompete traditional small-scale fishermen, leading to a severe depletion of local fish stocks and diminishing returns for the community.

Adding to the fishermen's woes is the significant financial burden they bear to maintain their operations. The fuel costs for their hand-driven boats are substantial, consuming an astonishing 300 litres of diesel every two weeks. This investment in fuel often does not translate into a proportional increase in fish catch, leading to substantial financial losses. Furthermore, the fragility of the small-scale fishing equipment, such as nets, adds to the financial strain, as they require frequent replacement.

Compounding these challenges is the government-imposed 60-day fishing ban period, aimed at allowing fish stocks to replenish. While the intent behind this policy is understandable, the lack of alternative livelihood options during this time leaves the Baguran Jalpai fishermen in a precarious situation, with no means to sustain their families and communities.

Here are some potential strategies to protect small-scale fishermen and their livelihoods in the future:

Sustainable Fisheries Management: Implementing sustainable fishing practices is crucial to ensure the long-term viability of fish stocks and the livelihoods of small-scale fishermen. This can involve measures such as catch limits, closed seasons, and the use of selective fishing gear to reduce bycatch and minimize environmental impact.

Exclusive Fishing Zones: Establishing exclusive fishing zones for small-scale fishermen can help protect their access to coastal fishing grounds and prevent competition from larger commercial vessels. These zones can be designed to prioritize traditional and artisanal fishing methods, ensuring that small-scale fishermen have a secure area to carry out their activities.

Access to Finance and Alternative Livelihoods: Providing small-scale fishermen with access to affordable credit and financial services can help them invest in better equipment, diversify their income streams, and cope with seasonal fluctuations or emergencies. Additionally, offering training and support for alternative livelihood options, such as aquaculture, tourism, or coastal resource management, can provide a buffer against the uncertainties of fishing.

Disaster Risk Reduction and Climate Change Adaptation: Small-scale fishermen are often at the forefront of climate change impacts, such as rising sea levels, coastal erosion, and extreme weather events. Implementing disaster risk reduction strategies, early warning systems, and climate change adaptation measures can help protect their communities and livelihoods from these threats.

Co-management and Community-based Conservation: Involving small-scale fishermen in the decision-making processes related to fisheries management and coastal resource conservation can foster a sense of ownership and promote more sustainable practices. Co-management approaches, where local communities collaborate with government agencies and other stakeholders, can lead to more effective and equitable management of marine resources.

Market Access and Fair Trade: Facilitating access to domestic and international markets for small-scale fishermen can help them obtain better prices for their catch and increase their income. Additionally, promoting fair trade practices and initiatives can ensure that small-scale fishermen receive a fair share of the value chain.

Social Safety Nets and Insurance: Establishing social safety nets, such as insurance schemes or emergency funds, can provide a safety cushion for small-scale fishermen during periods of low

catch, natural disasters, or other unforeseen circumstances. These measures can help reduce their vulnerability and enhance their resilience.

Capacity Building and Knowledge Sharing: Investing in capacity building programs, including training in sustainable fishing practices, business skills, and alternative livelihoods, can empower small-scale fishermen and equip them with the knowledge and tools to adapt to changing circumstances.

The challenges facing small-scale fisheries in Baguran Jalpai are complex and multifaceted, but they are not insurmountable. By implementing a combination of regulatory, community-based, and sustainable management strategies, we can protect the livelihoods of small-scale fishermen, preserve marine ecosystems, and build resilient coastal communities. The future of small-scale fisheries depends on our ability to work together to address these challenges and ensure a sustainable and equitable future for coastal communities around the world.

Recommendations for Future Action

As the district charts its course towards sustainable development, several recommendations emerge from the findings of the report. These include:

1. Strengthening community-based disaster preparedness and response mechanisms through enhanced training and capacity-building initiatives.
2. Preparation of village specific disaster management plans in association with the representatives of the community. These plans should not only have protocols during disaster but should also talk about the post disaster recovery of various sectors for example- livelihood.
3. Promoting ecologically sustainable tourism practices that minimize adverse impacts on the environment and local livelihoods.
4. Disaster aid, relief and schemes must move away from purely monetary compensation and ensure strengthening of the underlying factors that make communities vulnerable. That way the people will become capable of bouncing back from a crisis without a lot of external assistance.
5. Investing in infrastructure resilient to coastal hazards, such as early warning systems, coastal protection measures, and resilient housing construction techniques.

6. Prioritizing research and data collection efforts to better understand the complex interplay of socio-economic, environmental, and climatic factors shaping the region's vulnerability to disasters.

The report offers an overview of the opportunities and challenges facing Purba Medinipur as it navigates the complex nexus of development, environmental sustainability, and disaster resilience. Through concerted action and collaboration, Purba Medinipur can emerge as a beacon of sustainable development and community resilience, setting a positive example for other coastal regions facing similar challenges in an era of rapid environmental change and socio-economic transformation.

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