

CLEARING THE COAST

How aquaculture and
construction threaten
the pristine coast of
West Bengal



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Summary

Coastal areas have unique ecological conditions that make them home to many marine and estuarine species, and to mangroves forests that stabilize the coastline. Their protection is therefore necessary from an environmental perspective. West Bengal has a long coastline with millions of people living around it. Growing scale of anthropogenic activities in recent years has threatened the state's fragile coastal areas.

This report presents analysis of the land use changes in three coastal districts of West Bengal—Purba Medinipur, North 24 Parganas and South 24 Parganas. This has been done using remote sensing, GIS technique and Google Earth timeseries satellite data analysis. A field visit to a few identified locations was also conducted. The key causes for change in coastal areas are new construction, aquaculture and brick kiln operations.

In the last one decade, more than 1,529 ha agricultural land has been diverted to aquaculture clusters on the banks of Haldi River in Purba Medinipur district, as per field survey of 12 locations. This has also led to releasing of polluted water, loaded with synthetic chemicals, into the river without any treatment. Further, the soil and mud extracted during construction of aquaculture tanks are used in brick kilns, which become a source of air pollution.

In the last few years, a lot of new construction work has come up in the coastal areas. Construction of concrete structures near the coast changes its geological characteristics and causes irreversible damage. This is especially worrisome because most of the construction activity has been initiated by various government departments for promoting tourism. Notably, these departments are responsible for safeguarding the sensitive coastal zones.

Introduction

West Bengal has a 210 km-long coastline across three districts viz Purba Medinipur, North 24 Parganas and South 24 Parganas (CAG, 2017). According to the Census 2011, the state's coastal districts account for 32% of its population, which is about 25.4 million people or nearly five million households (Lal, 2015). According to a 2012 report by the Indian Space Research Organisation (ISRO) titled "Coastal Zones of India", about 39% of West Bengal's coastal area is used for agriculture, 21% for human habitation and 3% for aquaculture. However, the ecologically-sensitive and crucial coastal zone is under growing stress due to the development of industries, tourism, trade and commerce, the resultant increase human population, and the deterioration of water quality and overall environment (Mondal et al., 2014). This surge in anthropogenic activities has caused a number of problems in the region, ranging from loss of traditional livelihoods to reduction of ecologically-fragile Sundarbans mangrove area.

Coastal Regulation Zone (CRZ) Notification was introduced to protect sensitive ecosystems such as mangrove forests, breeding grounds of endangered marine and estuarine species, and prevent loss of land due to coastal erosion and flooding. Regulating any high-impact activities in coastal zones can control the damages to certain extent.

West Bengal's Coastal Zone Management Plan—a detailed map demarcated with High Tide Line, Low Tide Line, Hazard line, etc.—was supposed to be prepared as per the CRZ Notification¹. However, the plan has still not been finalized and is lying with the National Centre for Sustainable Coastal Management (NCSCM)².

Methodology

In an independent research, our team has identified some locations in coastal areas and tidally affected waterbodies, where major land use changes have happened in last 15 years. This has been done using remote sensing, GIS technique and Google Earth timeseries satellite data analysis. The team also conducted a field visit and interacted with locals to verify the reason behind this change, and to understand the on-ground situation for developing a legal strategy to counter the increasing anthropogenic activities in the region. During the study period, as the final Coastal Zone Management map of West Bengal with necessary demarcations was not available, activities within 0 to 1.5 kms of distance from shore/bank have been considered in this study. We have also tried to specify the probable CRZ area for each site.

Observation

Field visit was done during the month of February in 2020. Background information such as activity type, geographical coordinates, approximate area, approximate distance from bank/coast, for the selected 50 locations (Site code 1 to 50) was collected before the visits. Of these fifty locations, 22 locations (site code 10 to 23 on banks of Haldi river in Purba Medinipur; site code 28 to 36 in Sagar Island in South 24 Parganas) were covered during this visit. Three locations (Site code 15, 28 and 31) have been found wrongly identified in the previous satellite image-based study. Information about the activity type, stage of development during visit, ownership and miscellaneous issues, was collected during the visit, along with pictures from the ground. Collected information for each visited site has been tabulated below.

1. Annexure IV, Guidelines for Preparation of Coastal Zone Management Plans, Coastal Regulation Zone Notification, 2019.
2. RTI reply from Department of Environment, Government of West Bengal dated 26th April, 2019



Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Aquaculture	Site Code: 17
	Village: Harikhali	District: Purba Medinipur
	Coordinates: 22.126,87.943	Approximate Area: 151 ha
	Approximate Distance from bank/coast: 350m from Haldi River.	
Information Collected	Ownership: Private (multiple stakeholders)	
	Stage during visit: Preparing the tanks for new cycle of production.	
Miscellaneous Information	The area under aquaculture was being expanded. Soil and clay were being extracted and transferred to the nearest brick kiln.	
Concerns	May fall under CRZ III B area. As High Tide Line (HTL) is not demarcated, exact distance from HTL cannot be calculated.	



Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Aquaculture	Site Code: 16
	Village: Harikhali	District: Purba Medinipur
	Coordinates: 22.134,87.933	Approximate Area: 140 ha
	Approximate Distance from bank/coast: 530m from Haldi River.	
Information Collected	Ownership: Private (multiple stakeholders)	
	Stage during visit: Shrimp was being produced in some tanks while rest were being prepared for next cycle of production.	
Miscellaneous Information	Surrounded by village. Privately-owned small-scale mixed culture farm were present along the periphery of the cluster.	
Concerns	Some part may fall under CRZ III B area. As HTL is not demarcated, exact distance from HTL cannot be calculated.	



Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Aquaculture	Site Code: 14
	Village: Saoraberia Jalpai	District: Purba Medinipur
	Coordinates: 22.176,87.862	Approximate Area: 626 ha
	Approximate Distance from bank/coast: 950m from Haldi River.	
Information Collected	Ownership: Private (multiple stakeholders)	
	Stage during visit: Preparing the tanks for new cycle of production.	
Miscellaneous Information	There is a small village within the whole area. There are also some old plots around the area. May not fall under CRZ area.	



Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Brickkiln & Aquaculture	Site Code: 13
	Village: Narikeldaha	District: Purba Medinipur
	Coordinates: 22.168,87.824	Approximate Area: 144 ha
	Approximate Distance from bank/coast: 5m from Haldi River.	
Information Collected	Ownership: Private	
	Stage during visit: Preparation of the tanks for new cycle of production. Setup of the aeration machinery, oxygen supply line was ongoing. Inward pumping of water was yet to start end of February.	
Miscellaneous Information	Owned by a single person.	
Concerns	Area probably falls under CRZ III B and also may fall under No Development Zone as it is located just beside a tidally affected waterbody.	

Site 5

Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Aquaculture	Site Code: 12
	Village: Narikeldaha	District: Purba Medinipur
	Coordinates: 22.169,87.816	Approximate Area: 40 ha
	Approximate Distance from bank/coast: 122m from Haldi River.	
Information Collected	Ownership: Private (multiple stakeholders)	
	Stage during visit: The tank was being dried and preparations for next cycle of production were to be initiated from February end.	
Miscellaneous Information	Applied Dolomite after drying the tank.	
Concerns	May fall under CRZ III B area. As HTL not demarcated it is not possible to calculate exact distance from HTL.	

Site 6

Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Brickkiln & Aquaculture	Site Code: 11
	Village: Chandibeniya	District: Purba Medinipur
	Coordinates: 22.168,87.804	Approximate Area: 39 ha
	Approximate Distance from bank/coast: 5m from Haldi River.	
Information Collected	Ownership: Private (multiple stakeholders)	
	Stage during visit: Preparation of the tanks for new cycle of production.	
Miscellaneous Information	Just near the bank of Haldi River. Cleaning, drying of tank was taking place. Some tanks were operational.	
Concerns	Area probably falls under CRZ III B and also may fall under No Development Zone as it is located just beside tidally-affected waterbodies.	

Site 7

Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Brickkiln & Aquaculture	Site Code: 10
	Village: Chandibeniya	District: Purba Medinipur
	Coordinates: 22.167,87.793	Approximate Area: 38 ha
	Approximate Distance from bank/coast: 2m from Haldi River.	
Information Collected	Ownership: Private (multiple stakeholders)	
	Stage during visit: Preparing the tanks for new cycle of production.	
Miscellaneous Information	There were two brick kilns nearby. Brick production was taking place along with drying of tanks.	
Concerns	Area probably falls under CRZ III B and also may fall under No Development Zone as it is located just beside tidally-affected waterbodies.	

Site 8

Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: New Jetty	Site Code: 29
	Village: Benuban	District: South 24 Parganas
	Coordinates: 22.678,88.149	Approximate Area: 23 ha
	Approximate Distance from bank/coast: Just beside the creek.	
Information Collected	Ownership: Government (Joint venture of Sagar Block Development and Gangasagar Bakkhali Development Authority)	
	Stage during visit: Operational	
Miscellaneous Information	Second public jetty in Sagar Island. Connected with Namkhana via ferry service. Fishers trawler were also found anchored near the creek. Surrounded by patch of mangroves.	
Concerns	Area comes under CRZ-I A as a buffer of 50 meters along the mangroves constitute CRZ-I A.	

Site 9

Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Traditional Aquaculture	Site Code: 29
	Village: Benuban	District: South 24 Parganas
	Coordinates: 22.678,88.140	Approximate Area: 19 ha
	Approximate Distance from bank/coast: Just beside the creek.	
Information Collected	Ownership: Private	
	Stage during visit: Production	
Miscellaneous Information	Huge pond area for production of sweet water fishes viz. Rohu, Katla.	
Concerns	Area comes under CRZ-I A as a buffer of 50 meters along the mangroves constitute CRZ-I A.	

Site 10

Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: New Construction	Site Code: 36
	Village: Gangasagar	District: South 24 Parganas
	Coordinates: 22.637,88.075	Approximate Area: 11 ha
	Approximate Distance from bank/coast: 340m from Bay of Bengal	
Information Collected	Ownership: Government (Gangasagar Bakkhali Development Authority)	
	Stage during visit: Operational	
Miscellaneous Information	Shopping complex for Dala (needed for puja offering, typically contains flowers, sweets, incense stick etc).	
Concerns	Within CRZ areas as Sagar island is an island along the mainland coast. Area is probably coming under CRZ III B. Area may also come under No Development Zone. However, as the HTL is not demarcated it is difficult to conclude that the project area is within or outside 200 m from seafront.	

Site 11

Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: New Construction	Site Code: 35
	Village: Gangasagar	District: South 24 Parganas
	Coordinates: 22.640,88.075	Approximate Area: 5 ha
	Approximate Distance from bank/coast: 640 m from Bay of Bengal.	
Information Collected	Ownership: Government (Gangasagar Bakkhali Development Authority)	
	Stage during visit: Operational	
Miscellaneous Information	Administrative building of Gangasagar Bakkhali Development Authority	
Concerns	Within CRZ areas as Sagar island is an island along the mainland coast. Area probably falls under CRZ III and also may fall under No Development Zone as it is located just beside a tidally affected creek.	

Site 12

Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: New Construction	Site Code: 33
	Village: Gangasagar	District: South 24 Parganas
	Coordinates: 22.643,88.076	Approximate Area: 5 ha
	Approximate Distance from bank/coast: 970 m from Bay of Bengal.	
Information Collected	Ownership: Government (Gangasagar Bakkhali Development Authority)	
	Stage during visit: Newly constructed	
Miscellaneous Information	Constructed as a part of ecotourism activity. Supposed to be used during Gangasagar fair. Just beside a tidally affected creek.	
Concerns	Within CRZ areas as Sagar island is an island along the mainland coast. Area is probably falling under CRZ III and also may fall under No Development Zone as located just beside a Tidally affected creek.	

Site 13

Satellite Images



Picture from the visit



Background Information	Activity type: New Construction	Site Code: 34
	Village: Gangasagar	District: South 24 Parganas
	Coordinates: 22.641,88.073	Approximate Area: 6 ha
	Approximate Distance from bank/coast: 740 m from Bay of Bengal.	
Information Collected	Ownership: Government (Gangasagar Bakkhali Development Authority)	
	Stage during visit: Newly constructed	
Miscellaneous Information	Total 100 bed cottage prepared as a part of tourism activity. Supposed to be used during Gangasagar fair.	
Concerns	Within CRZ areas as Sagar Island is an island along the mainland coast. Area is probably falling under CRZ III and also may fall under No Development Zone as located just beside (within 50 m) a Tidally affected creek.	

Site 14

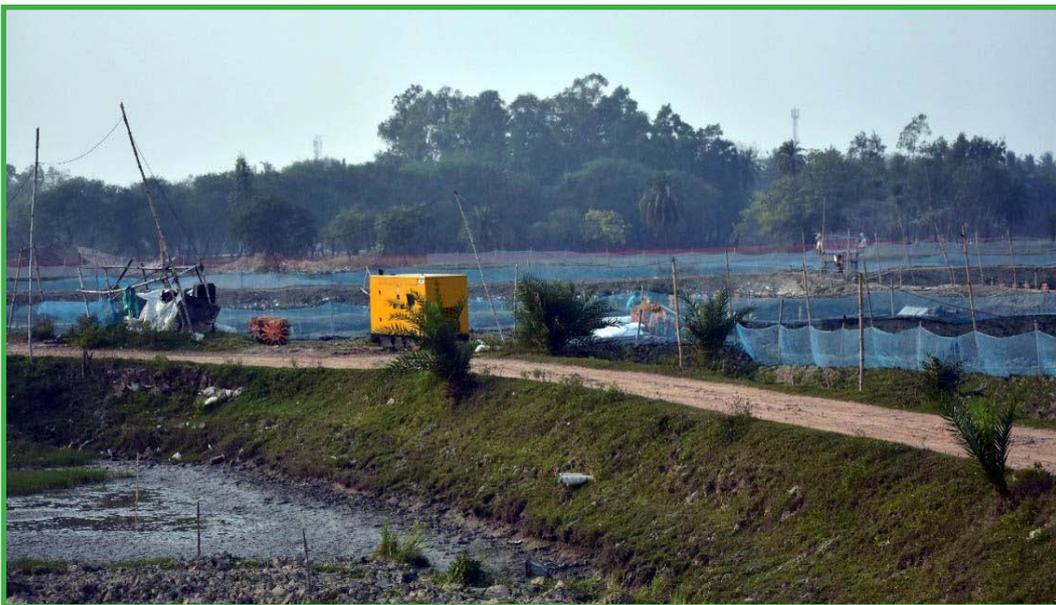
Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Aquaculture	Site Code: 18
	Village: Jalpai Part-III	District: Purba Medinipur
	Coordinates: 22.081,87.994	Approximate Area: 54 ha
	Approximate Distance from bank/coast: 30 m from Haldi River.	
Information Collected	Ownership: Private	
	Stage during visit: Some tanks were operational	
Miscellaneous Information	Just near the bank of Haldi River. Expansion was also taking place.	
Concerns	Probably falls under CRZ III B and also may fall under No Development Zone as it is located just beside a tidally affected waterbody.	

Site 15

Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Aquaculture	Site Code: 19
	Village: Jalpai Part-IV	District: Purba Medinipur
	Coordinates: 22.073,88.003	Approximate Area: 64 ha
	Approximate Distance from bank/coast: 10 m from Haldi River.	
Information Collected	Ownership: Private (Multiple stakeholders)	
	Stage during visit: Production of Shrimp was taking place in some tanks, rest were preparing for next cycle of production.	
Miscellaneous Information	Huge area was covered just near the bank of Haldi River. Tanks were in multiple stage.	
Concerns	Area probably falls under CRZ III B and also may fall under No Development Zone as it is located just beside a tidally affected waterbody.	

Site 16

Satellite Images



2010

2018



Picture from the visit



Background Information	Activity type: Aquaculture	Site Code: 20
	Village: Jalpai Part-V	District: Purba Medinipur
	Coordinates: 22.058,88.008	Approximate Area: 74 ha
	Approximate Distance from bank/coast: 5 m from Haldi River.	
Information Collected	Ownership: Private (Multiple stakeholders)	
	Stage during visit: Preparing for next cycle of production.	
Miscellaneous Information	Entry for commons is prohibited. Washing foot with potash water is required before entering. Secured with boundary wall.	
Concerns	Area probably falls under CRZ III B and also may fall under No Development Zone as it is located just beside tidally-affected waterbodies.	

Site 17

Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Brickkiln and Aquaculture	Site Code: 21
	Village: Dinabandhupur	District: Purba Medinipur
	Coordinates: 22.046,88.015	Approximate Area:
	Approximate Distance from bank/coast: 45 m from Haldi River.	
Information Collected	Ownership: Private	
	Stage during visit: Production of shrimp was taking place in some tanks rest were preparing for next cycle of production. Water extraction was taking place from Haldi river.	
Miscellaneous Information	There were two brick kilns just near the area.	
Concerns	Area probably falls under CRZ III B and also may fall under No Development Zone as it is located just beside tidally-affected waterbodies.	

Site 18

Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Aquaculture	Site Code: 22
	Village: Charkende	District: Purba Medinipur
	Coordinates: 22.008,88.020	Approximate Area: 84 ha
	Approximate Distance from bank/coast: 1.5 km from Haldi River.	
Information Collected	Ownership: Private	
	Stage during visit: Preparation of tank (expansion) is happening.	
Miscellaneous Information	Tractors carry clay and soil through the village from the aquaculture area. Surrounded by agricultural land. Probably does not fall under CRZ area.	

Site 19

Satellite Images

2018



2010

Picture from the visit



Background Information	Activity type: Aquaculture	Site Code: 23
	Village: Charkende	District: Purba Medinipur
	Coordinates: 22.999,88.022	Approximate Area: 51 ha
	Approximate Distance from bank/coast: 1.8 km from Haldi River.	
Information Collected	Ownership: Private	
	Stage during visit: Production of shrimp was taking place in some tanks, rest were preparing for next cycle of production.	
Miscellaneous Information	All the tanks were covered with net. Probably does not fall under CRZ area.	

Discussion

It is evident from site information that the key causes for change in coastal areas are new construction, aquaculture and brick kiln operations. In the Sagar Island of South 24 parganas district, agricultural land has been diverted for the construction of a government building and other tourism-related facilities whereas in Purba Medinipur the major drivers of change are aquaculture and brick kiln industries.

Issues of Coastal Aquaculture:

In last one decade, more than 1,529 ha agricultural land (equivalent to the size of 50 Salt Lake stadiums) has been diverted to aquaculture clusters on the banks of Haldi River in Purba Midnipur district (based on field survey of 12 locations). In each cluster, there are multiple small square/

Issues at a Glance

- ❑ Aquaculture diverts agricultural land.
- ❑ Causes loss of traditional farms and production of cash crops viz. betel leaf.
- ❑ Wastewater discharged untreated into open water systems.
- ❑ Monoculture of tiger prawns reduces aquatic biodiversity.

rectangular units called "tanks" that are usually five-six feet deep. Commonly, multiple farmers lease out their land to form a cluster of aquacultures. The lease rates vary from INR 25,000-55,000 /bigha depending on the distance from the nearest water source. The standard lease time is nine years and eleven months, though some people give their land for shorter duration. Other than this commercial production, multiple small-scale mixed aquaculture operations are also seen in the area. During February-March, water is pumped in the tanks. Usually, water is extracted in the time of high tide when the salinity is at least six parts per thousand (ppt). With

simple calculation of total volume of visited tanks in the area it can be found that more than 26 billion litres of water is taken from Haldi river each year. After extraction, the water is further bleached and disinfected using multiple chemicals (probiotics, nutrient supplement, disinfectant) such as Nuvan, Copper Sulfate, Clinzex Ds, Blesson, Dolomite, Zymaq, Envomin Osmin and Addoxy. This is essential for disinfecting the water and increasing the chances of survival of shrimp and prawn seed in artificial environment. The feed, which contains nitrogen, phosphorus and organic matter, is used to maximize growth and yield. However, after completion of the yearly production cycle, this water loaded with synthetic chemicals, is discharged in the river without treatment.



Picture 1: Feed-artificial food prepared for aquaculture. It is commonly known as "Juice", typically prepared by mixing crushed Atap rice, jaggery, yeast, peanut cover.



Picture 2: Oxygen supply setup under construction in preparation for the next production cycle.



Picture 3: Soil and clay being extracted and loaded in tractors.



Picture 4: Tractors loaded with soil and clay entering brickfield.



Picture 5: Clay and soil from aquaculture tank dumped roadside near the brick kiln.



Picture 6: Pump for extracting water from Haldi river.



Picture 7: Water pump extracting water from creek.



Picture 8: Entry gate of storage area of aquaculture farms. Entry is prohibited without permission. Washing feet with potash water is required before entering.

It has been found that aquaculture tanks are developing symbiotically with brick kilns. The soil and mud extracted during construction of tank are further used in brick kilns nearby.



Picture 9: Agricultural land in Purba Medinipur with a betel leaf garden (left and right).



Picture 10: Construction of aquaculture tank beside agricultural land. A betel leaf garden is also visible just beside the area.

Coastal Aquaculture Authority Act, 2005, mandates that coastal aquaculture should not be carried out within 200 m of the High Tide Line and that it should not be carried out in creeks, rivers and backwaters within the notified CRZ areas. Sub-section 1 of Section 13 of the Act also prohibits the establishment of coastal aquaculture pond within the notified CRZ area. As previously mentioned, due to the absence of a Coastal Zone Management map for West Bengal with detailed demarcation of High Tide Line, Low Tide Line, Hazard line, etc., it is unclear whether these activities violate the CRZ notification and Coastal Aquaculture Authority Act, 2005.

Issues of New Construction:

New construction is one of the major activities responsible for change. Government administrative buildings, shopping complex, a cottage and a rest house has been constructed by the Gangasagar Bakkhali Development Authority (GBDA) and West Bengal Tourism Department in the Sagar Island near Gangasagar. Up to 23 hectares (ha) of mangrove land has been diverted to construct the new Benuban jetty. Though the new jetty established better connectivity with Namkhana, it is greatly concerning because according to CRZ Notification 2019, in case the mangrove area is more than 1000 square meters, a buffer of 50 meters along the mangroves constitutes CRZ-I A. Mangroves are one of the most ecologically-sensitive regions and generally no activity is permitted in the CRZ-I A area. Other than that, construction of concrete structures near the coast changes its geological characteristics and causes irreversible damage. The increasing number of construction projects in the region by government departments raises serious doubts on the functioning of authorities tasked with preventing coastal land and forest diversion.

CRZ Notification dated January 6, 2011

3. Prohibited activities within CRZ:
(ix) Reclamation for commercial purposes such as shopping and housing complexes, hotels and entertainment activities.

Conclusion and Way Forward

The Supreme Court^[1] had observed while dealing with the case concerning the violation of CRZ Notification 1991 as follows:

Enactment of a law, but tolerating its infringement, is worse than not enacting law at all. The continued infringement of law, over a period of time, is made possible by adoption of such means which are best known to the violators of law. Continued tolerance of such violations of law not only renders legal provisions nugatory but such tolerance by the Enforcement Authorities encourages lawlessness and adoption of means which cannot, or ought not to, be tolerated in any civilized society.

The Sundarbans and the adjoining areas are already witnessing the impact of the changing climate. The destruction of mangroves – which acts as the first line of defense against cyclones – has already led to increase in loss of human life as well as of property. The diversion of coastal areas with mangroves and its replacement with manmade structure will greatly increase the vulnerability of the areas to climate change. Unfortunately, the manner in which coastal lands are being diverted in the coastal areas of West Bengal, it is clear that the very existence of the CRZ law is not known to the authorities. This is not a case of simple environmental violation: it is an instance of criminal negligence on the part of the State. The responsibility is at all levels: the District Administration, State Government as well as the Central Government. In addition, there is a need for a strong civil society voice against the continued violation of the law. To ensure that the coastal areas are protected it is imperative to undertake the following at the very least.

- ▣ Time bound action plan to be prepared by the State to ensure that all activities which are in violation of the CRZ notification are removed and the area restored.
- ▣ Fixing liability on the violators – private and government agencies for violation and undertaking construction activities. In addition, officers of the State who have turned a blind eye to the blatant illegality should be penalized and departmental proceedings initiated.
- ▣ The Coastal Zone Management Plan of West Bengal should be updated so that it is accordance with the mandate of the CRZ Notification, 2019 so that the need to protect the livelihood of the fisherfolks as well as protect the coastal stretches are ensured.

1

Time bound action plan to be prepared by the State to ensure that all activities which are in violation of the CRZ notification are removed and the area restored.

2

Fixing liability on the violators – private and government agencies for violation and undertaking construction activities. In addition, officers of the State who have turned a blind eye to the blatant illegality should be penalized and departmental proceedings initiated.

3

The Coastal Zone Management Plan of West Bengal should be updated so that it is accordance with the mandate of the CRZ Notification, 2019 so that the need to protect the livelihood of the fisherfolks as well as protect the coastal stretches are ensured.

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