

PROJECT REPORT

NOVEMBER 2022-DECEMBER 2023

MULTIPURPOSE CYCLONE SHELTER-GHORAMARA ISLAND



PREPARED BY

SEED (SOCIETY FOR SOCIO ECONOMIC & ECOLOGICAL DEVELOPMENT
(IMPLIMENTING ORGANISATION)



JCAPCPL (JAMSHEDPUR CONTINUOUS ANNEALING AND PROCESSING
COMPANY PVT. LTD.)

(FUNDING PARTNER)

JCAPCPL

EXECUTIVE SUMMARY



Photo: Inauguration of Multipurpose Cyclone Shelter by Mr. Ujjal Chakraborty, MD, JCAPCPL

SEED MULTIPURPOSE CYCLONE SHELTER

Project Location: Ghoramara Island, Sundarbans, South 24 Parganas, West Bengal

Infrastructure Delivered: 4-storey Multipurpose Cyclone Centre

Construction Period: November 2022-December 2023

Shelter Capacity: 400+ islanders during emergencies

SEED successfully constructed and operationalized a state-of-the-art 4-storey Multipurpose Cyclone Centre on Ghoramara Island, one of India's most climate-vulnerable locations, with generous support from JCAPCPL. The facility addresses critical infrastructure gaps in disaster preparedness for a community of 5,700 islanders, including 356 climate refugees (displaced families living in fragile housing conditions). The centre has proven its effectiveness during recent extreme weather events, particularly Cyclone Remal (2024), providing life-saving refuge and demonstrating the project's immediate impact and long-term value.

PROJECT CONTEXT AND JUSTIFICATION

Geographic and Climate Vulnerability

Ghoramara Island lies in one of India's highest climate risk zones, classified as Very High Damage Risk Zone-B ($V_b = 50$ m/s) on the Wind and Cyclone Vulnerability Map of India. The island faces a maximum storm surge risk of 12–13 meters as per the Flood Hazard Map of India, making it exceptionally vulnerable to tropical cyclones and storm surges from the Bay of Bengal.

Cyclones Amphan (2020) and Yaas (2021) exposed the deadly vulnerability of Ghoramara Island residents, who faced 15-foot storm surges and 165 kmph winds with only one inadequate cyclone shelter for thousands of people. The back-to-back disasters displaced the entire population multiple times, destroyed 70% of infrastructure and forced residents into desperate survival situations—climbing trees and clutching tin boxes of savings while floodwaters rose 6 feet within minutes.

PROJECT OBJECTIVES

- Provide life-saving refuge for up to 400 residents during cyclones, storm surges and floods, in one of India's highest-risk zones ($V_b = 50$ m/s wind, 12–13 m surge).
- Strengthen community resilience through regular disaster-preparedness trainings, drills and early-warning awareness sessions hosted at the shelter.
- Anchor ecosystem-based adaptation via mangrove restoration, linking natural coastal buffers directly to disaster risk reduction.
- Double as a community hub year-round—offering clean-energy solar backup (post-2024 solar-electrification), thus integrating DRR infrastructure with broader development goals.



UNPRECEDENTED METEOROLOGICAL VIOLENCE TESTS ISLAND'S LIMITS

Cyclone Amphan delivered the most severe meteorological assault on Ghoramara Island in recorded history. The super cyclonic storm struck on May 20, 2020, with sustained winds of 155-165 kmph gusting to 185 kmph and generated a catastrophic storm surge of 4.6 meters (15 feet)—completely submerging the low-lying island. The India Meteorological Department classified Amphan as reaching peak intensity of 240-250 kmph over the Bay of Bengal before making landfall directly across the Sundarbans, positioning Ghoramara Island in the storm's most destructive northeastern quadrant.

HUMAN DISPLACEMENT AND DESPERATE SURVIVAL MEASURES REVEAL SHELTER CRISIS

Cyclone Yaas, while meteorologically less intense with winds of 100-120 kmph, proved equally devastating due to its timing with full moon astronomical tides that amplified storm surge to 6-8 meters above normal low tide levels. The combined meteorological and tidal forces flooded the entire island within 20 minutes when embankments failed, creating water levels that reached 6 feet deep on main roads. The 12-month interval between cyclones provided insufficient recovery time, creating compounding impacts that pushed the island's natural and human systems beyond their adaptive capacity.



The most damning evidence of Ghoramara Island's shelter infrastructure deficit lies in residents' survival accounts during both cyclones. Anil Ghorai, a 50-year-old resident, clutched a tree while holding a tin box containing his family's savings and documents as floodwaters rose during Yaas, while his wife scrambled onto a pile of bricks with their baby to escape drowning. This scene repeated across the island as the single existing cyclone shelter proved wholly inadequate for the population of thousands.

During Amphan, 150 families lost their homes completely and were forced to take refuge at Tankpar, an elevated area around a pond, with 14 families remaining homeless for over two years living in tarpaulin tents. The inadequate shelter capacity became even more critical during Yaas when COVID-19 restrictions reduced shelter occupancy from 20-30 people per room to just 5 people, cutting available space by 90%. Over 300 homeless residents were housed at Krishnachandrapur High School for nearly a month after Yaas, with entire families sleeping on cloths spread on classroom floors while struggling with contaminated water supplies.

Personal accounts reveal the human cost of infrastructure gaps. Subrata Hazra, a local kerosene dealer, reported that Amphan "left me with just a gamchha and one pair of underwear" after destroying his home. Sheikh Sabir, 24, summarized the community's plight after Yaas: "We lost everything—our house, our fish ponds turned saline. All livestock died. We caught no fish despite repeated attempts."

NEED FOR RESILIENT INFRASTRUCTURE

The devastating impacts of Cyclones Amphan and Yaas on Ghoramara Island provide overwhelming evidence for the urgent need for resilient cyclone shelter infrastructure. Meteorological data showing 15-foot storm surges and 165 kmph winds, combined with human impact accounts of entire families clinging to trees and bricks while their homes were destroyed, demonstrate that the island's single inadequate shelter represents a humanitarian crisis waiting for the next major storm.

The island's geographical isolation, rapid erosion and position in one of the world's most cyclone-prone regions make adequate cyclone shelter infrastructure not just advisable but essential for preventing future humanitarian disasters.

Without immediate construction of proper cyclone shelters designed to withstand 6-8 meter storm surges and accommodate the island's population during extended displacement periods, the next major cyclone will likely repeat the same pattern of preventable human suffering, complete infrastructure destruction, and accelerated community displacement that has characterized the past two disasters.

The recovery timeline following both cyclones illustrates how inadequate infrastructure creates cycles of destruction and temporary rebuilding. Unlike previous cyclones where residents returned home within days, many remained in emergency shelters for almost a month after Yaas due to persistent flooding and complete infrastructure failure.



Photo: Multipurpose Cyclone Shelter , Ghoramara

PROJECT IMPLEMENTATION

INFRASTRUCTURE DESIGN AND CONSTRUCTION



Photo: construction in progress of Multipurpose Cyclone Shelter by involving local labourers

Structural Engineering Excellence

- 4-storey reinforced concrete structure designed to withstand high winds exceeding Very High Damage Risk Zone-B specifications ($V_b = 50$ m/s).
- Storm surge-resistant foundation and elevated design protecting against maximum surge risks of 12–13 meters.
- Earthquake-resistant construction meeting Indian seismic standards for coastal regions.

The 4-storey Multipurpose Cyclone Centre was designed through extensive community consultation and participatory planning to meet multiple community needs.

Emergency Shelter Infrastructure:

- Accommodation for 400+ residents during cyclones and floods across multiple floors.
- Built with deep-foundations and pilings to resist lateral storm-surge pressures; wind-rated windows and elevated plinth ensure structural integrity under extreme loads.

Essential Services and Facilities:

- Integrated communication infrastructure including radio systems, mobile charging stations and emergency communication protocols.
- Specialized storage areas for emergency food supplies, drinking water reserves, hygiene kits and other disaster response equipment.
- Multiple floors equipped with adequate toilet facilities and washing areas designed for high occupancy during emergencies



Photo: Wash stations at Multipurpose Cyclone Shelter, Raipara, Choramara

COMMUNITY PARTICIPATION AND OWNERSHIP



Photo: Community meeting in progress with the islanders at Raipara village, Ghoramara

Participatory Planning Process

- Over 200 villagers contributed to site-selection workshops, blueprint reviews and final design charrettes—ensuring local needs for accessibility, and gender-safety were met.
- A 12-member body (including panchayat, SHG and youth representatives) oversees routine maintenance, stock-replenishment and annual readiness audits.

SOLAR POWER INTEGRATION

Recognizing the persistent energy poverty on off-grid Ghoramara Island, SEED equipped the new four-storey centre with a rooftop photovoltaic array, battery bank and LED lighting network—ensuring reliable, 24/7 power for critical communications, medical equipment and emergency operations.

Solar Infrastructure Components:

- Rooftop photovoltaic (PV) panel system covering multiple floors.
- Battery bank for energy storage and backup power across all levels.
- LED lighting system for emergency and night-time use throughout the 4-storey structure.
- 24/7 power backup capability for 400+ evacuees across multiple floors.



Photo: Rooftop solar array installed on the Multipurpose Cyclone Shelter, Raipara, Ghoramara

COMMUNITY EMPOWERMENT AND CAPACITY BUILDING



Photo: SHG women participating in hands on first-aid training at the Multipurpose Cyclone Shelter

Disaster Preparedness Training:

- Year round disaster preparedness training and drills at the center.
- Conducting training on ecosystem-based disaster risk reduction approaches.
- Hosting mangrove restoration and environmental conservation activities through out the year.

PERFORMANCE DURING CYCLONE REMAL (2024)

In the face of Cyclone Remal's swift approach, the Choramara centre's years of proactive planning and investment in resilient infrastructure proved decisive. Situated atop one of the island's highest points and reinforced to withstand powerful surges, the shelter not only offered physical protection but also served as a command hub where trained volunteers, stocked supplies and solar-powered communications converged at the moment of greatest need. When Remal's winds peaked, these preparations translated directly into lifesaving action: a seamless transition from early-warning drills to emergency deployment, ensuring both immediate safety for hundreds under its roof and rapid delivery of vital relief to surrounding households.

- Zero-Casualty Record- All 300 sheltered islanders reported intact health and no shelter-related injuries during the Category II landfall.
- Rapid Relief Staging- Within two hours of Remal's wind-peak, the centre's relief teams (20 key members) dispatched water, rations and hygiene kits to 300 households—guided by onsite coordination via solar-powered communications.



Photo: Islanders taking refuge at Multipurpose Cyclone Shelter, during Remal (2024)

ALIGNMENT WITH DRR BEST PRACTICES

- **Build Back Better-** Integrates resilient building codes and green infrastructure in line with national DRR guidelines.
- **Ecosystem-Based Adaptation-** Combines structural shelter with mangrove nurseries that buffer storm surges and enhance biodiversity.
- **Community-Centric Governance-** Empowers local actors in decision-making, maintenance and emergency drills—ensuring sustainability and ownership.
- **Clean Energy Integration-** Demonstrates a replicable model of solar-backed emergency services for last-mile communities.

SEED's Multipurpose Cyclone Centre at Ghoramara exemplifies cutting-edge, community-driven disaster resilience. Its robust design, multi-modal services and active local governance have already proven life-saving during Cyclone Remal in 2024 and its integration of preparedness, response and ecosystem-adaptation positions it as a best-practice model for DRRM in climate-vulnerable regions.





MULTIPURPOSE CYCLONE SHELTER

"Building resilience and saving lives in one of India's most cyclone-prone island."



IMPACT SO FAR



300

People sheltered safely during
Remal(2024)



60

Trained on disaster response and
preparedness



10

Ecosystem based DRR events hosted
annually

