



Enhancing Climate Resilience of India's Coastal Communities



KENDRAPARA DISTRICT ECRICC ODISHA



GREEN
CLIMATE
FUND





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1. Background

Coastal areas are among the most dynamic and resource-rich regions on Earth, serving as vital hubs for economic, ecological, and social activities. The Odisha coast, stretching over 480 kilometres along the eastern coastline of India, exemplifies the complexity of coastal dynamics. It hosts diverse ecosystems such as mangroves, seagrass meadows, estuaries, mudflats, and sand dunes, which support both biodiversity and human livelihoods. The Enhancing Climate Resilience of India's Coastal Communities (ECRICC) project is designed to strengthen the resilience of the most vulnerable populations, particularly women, in India's coastal areas against the impacts of climate change and extreme weather events. In Odisha, the project covers seven key landscapes identified for their ecological significance and vulnerability. These include Talsari (Balasore district), Chilika-Ganjam & Bahuda (Ganjam district), Bhitarkanika and Mahanadi Mouth landscape (Kendrapara district) and Chilika-Puri and Devi mouth landscape (Puri District).

1.1. About Kendrapara District

Kendrapara district, located in the eastern coastal region of Odisha, is known for its rich biodiversity, fertile agricultural lands, and vibrant cultural heritage. It has 9 blocks, 249 GP, 1592 villages and population of 1440361. Out of these 9 blocks Rajnagar and Mahakalpada blocks are near to the shore. There is 48 kms of coastal shoreline is present in the Kendrapara district.

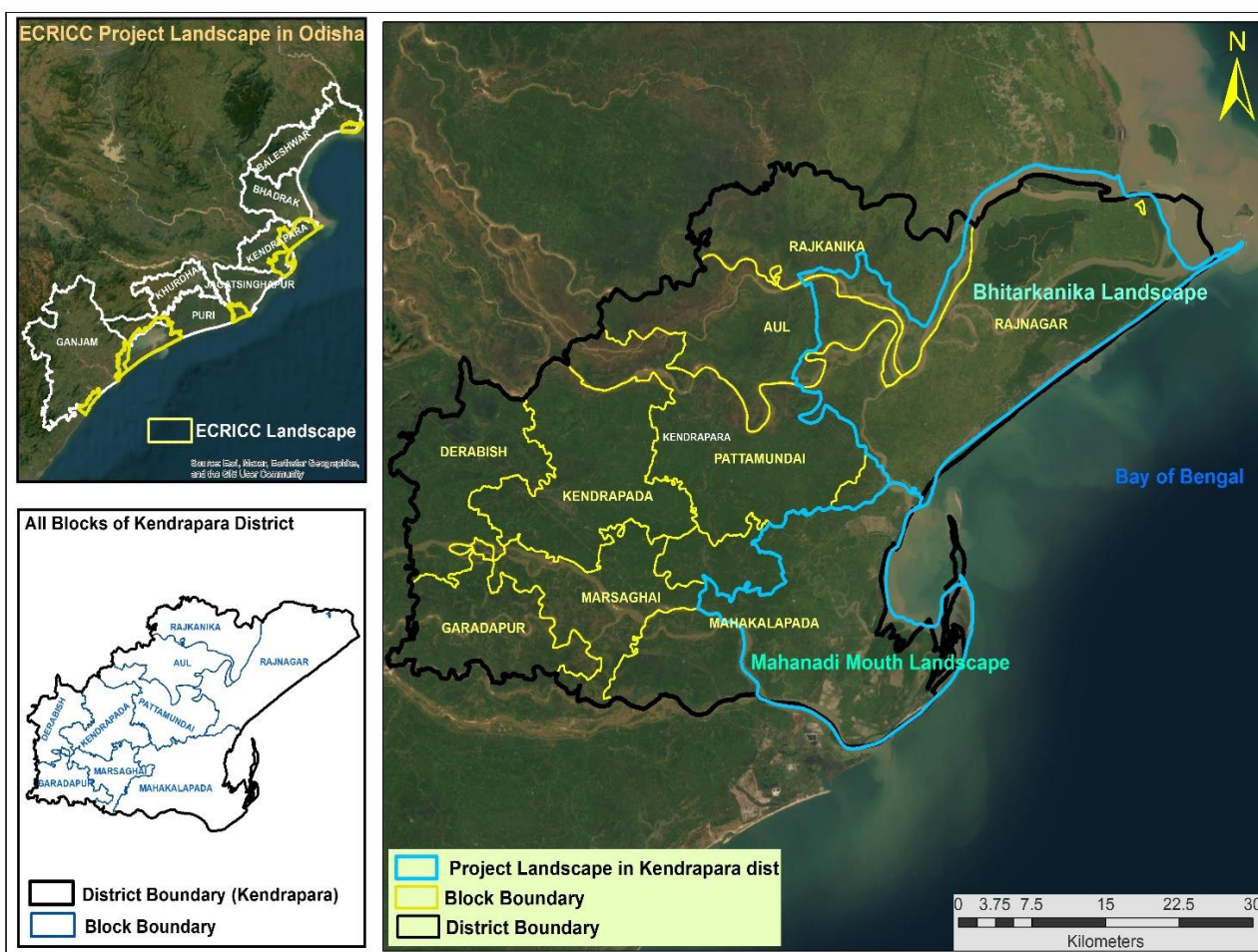


Figure 1: Location Map of ECRICC landscape in the Kendrapara District

Kendrapara district exhibits diverse geological, geomorphological, and coastal features that shape its unique landscape and ecological significance. Geologically, the region is part of the Mahanadi Delta and consists primarily of Quaternary alluvial deposits, including clay, silt, sand, and lateritic formations. The district's geomorphology is dominated by deltaic plains, estuarine formations, tidal flats, and mangrove swamps, which play a crucial role in coastal dynamics. The coastline of Kendrapara is characterized by sandy beaches, barrier islands, mudflats, and tidal creeks, contributing to rich marine and estuarine biodiversity. Bhitarkanika National Park, a vital Ramsar site, is one of the most significant wildlife habitats in the district, hosting the largest population of saltwater crocodiles in India, along with spotted deer, wild boars, monitor lizards, and a variety of avian species, including migratory birds.

2. ECRICC Presence in Kendrapara District

There are two landscapes namely Mahanadi mouth landscape and Bhitarkanika landscape are in the Kendrapara district. Bhitarkanika landscape is in the Rajnagar and Rajkanika block whereas Mahanadi Mouth Landscape is in Mahakalpada Block. The various ecosystem activities under the output-1 of the ECRICC project are intervened/operational like Mangrove Plantation, Fishbone Channel creation, Creek Deepening, Mangrove Nursery raising, GI Fencing, Foraging ground, Avenue plantation, Saltmarsh restoration. Seagrass and Watershed restoration under this project are not feasible in this landscape. Seagrass restoration is confined to Chilika landscape of Puri and Ganjam district.

Administrative details of project landscape

District	Project Landscapes	Forest Division & Project DPMUs	Blocks Covered	Total No. of GPs	Total No. of Villages
Kendrapada	Bhitarkanika	DFO (WL), Rajnagar	Rajnagar	18	238
			Rajkanika	11	52
	Mahanadi Mouth		Mahakalpada	17	112
Total				46	402

3. Ecosystem Restoration Activities

Mangrove restoration activities encompass a range of ecological interventions aimed at revitalizing degraded mangrove ecosystems and enhancing their resilience. These activities include mangrove plantation, creek deepening, meadow development, GI fencing, the establishment of foraging grounds, mangrove maintenance, and fishbone channel creation. Each of these initiatives plays a crucial role in restoring and sustaining the ecological balance



of the mangrove habitat.

As of 2024, extensive restoration efforts have been undertaken in both the Bhitarkanika Landscape and the Mahanadi Mouth Landscape, situated in Kendrapara district. A total of 1894 hectares have been successfully restored through these activities, significantly contributing to the conservation and sustainability of the region's mangrove ecosystems. In addition, mangroves maintenance is ongoing in 249. Ha. area.

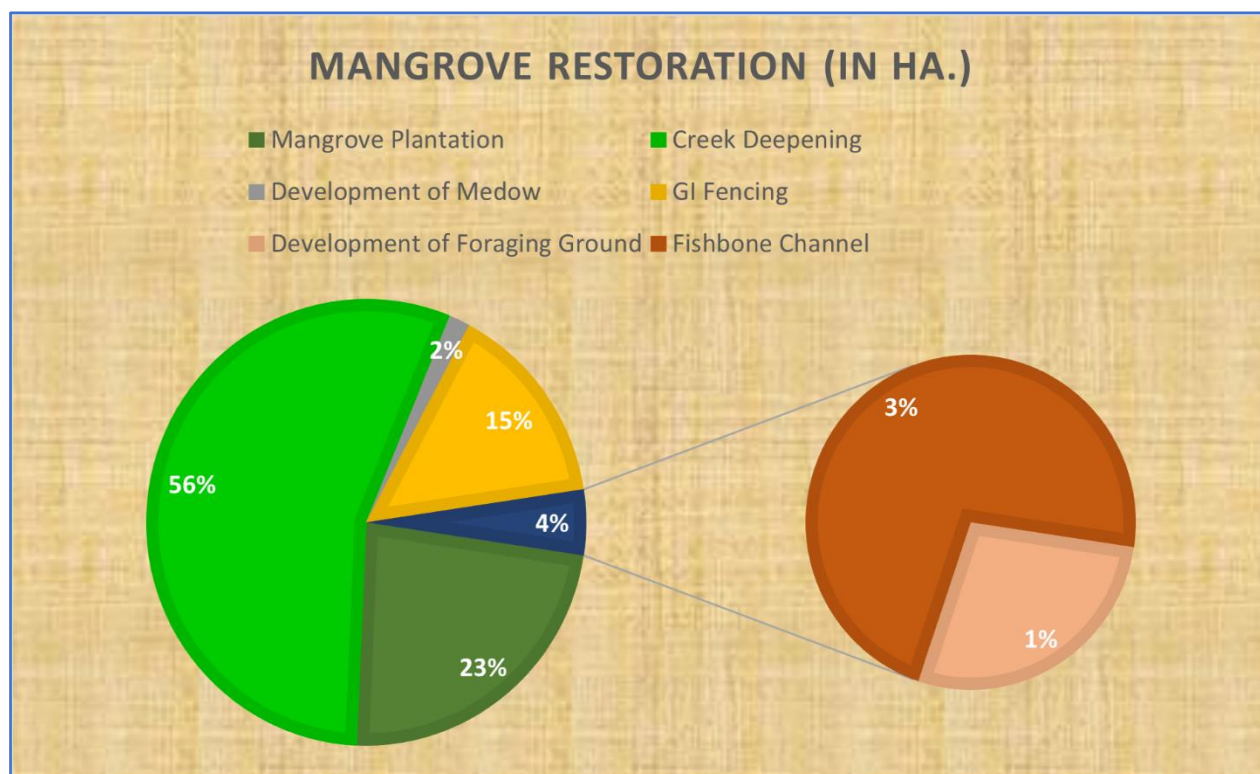


Figure 2: Different Eco-Restoration activity of ECRICC Landscape of Kendrapara District

GI Chain Link Fencing details in Bhitarkanika Landscape

SN	GI Chain Link Fencing	Length	Restoration Area in Ha.	Landscape
1	Baghamari to Talchua	2kms	18	Bhitarkanika Landscape
2	Banipal to Keruanpal	1kms	24	
3	Bagapatia to Thaithan	1kms	28	
4	Hatiagand to Bangamari	1kms	25	
5	Kanaknagar to Dal Khai	3kms	95	
6	Khola Bridge to Baisigi	3kms	90	
	Total	11km	280	



Figure 3: Mangrove Plantation and community engagement



Figure 4: Mangrove Plantation near Sailendranagar (2024)



Species: Rai (*Rhizophora mangle*)

Latitude: 20.653637
 Longitude: 86.847701
 Elevation: 22.47±12 m
 Accuracy: 5.0 m
 Time: 11-13-2024 10:25
 Note: Junusnagar

Powered by NoteCam

Figure 5: Mangrove Plantation near Junus Nagar (2024)

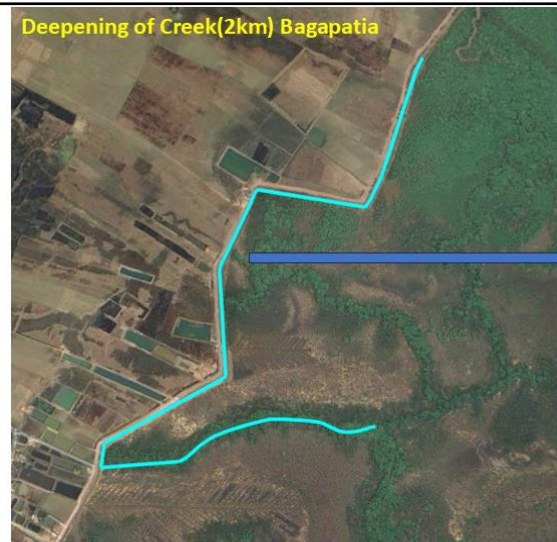


Figure 6: Creek Deepening of 2kms near Bagapatia, Bhitarkanika Landscape



Figure 7: Fishbone Channel of 8 ha near Hetamundia, Mahanadi Mouth Landscape



Figure 8: Mangrove Plantation at Dibakarpur (27Ha.)

4. Climate-Adaptive Livelihoods

To ensure long-term sustainability, ECRICC prioritizes climate-resilient livelihoods, equipping local communities with the skills, knowledge, and resources necessary to adapt to changing environmental conditions. This includes promoting sustainable fishing practices, introducing climate-smart agriculture, and fostering nature-based enterprises that reduce dependency on climate-vulnerable income sources. The project also places a strong emphasis on community engagement, ensuring that local stakeholders, including Self-Help Groups (SHGs), fisherfolk, and farmers, actively participate in decision-making and implementation processes.

Through strategic partnerships with government agencies, research institutions, NGOs, and international organizations, the project leverages technical expertise to implement innovative approaches to climate adaptation. These include use of traditional knowledge for sustainable resource management. Furthermore, capacity building is a cornerstone of the initiative, with extensive training programs aimed at strengthening institutional and community-level resilience. By fostering a multi-stakeholder, science-based, and community-driven approach, ECRICC ensures that Odisha's coastal communities are better equipped to withstand and adapt to the growing threats posed by climate change.

4.1 System of Rice Intensification (SRI)

The System of Rice Intensification (SRI) is gaining recognition globally as an important climate-resilient practice for paddy cultivation. The SRI is an agroecological method that can help mitigate greenhouse gas emissions and improve soil health. SRI emphasizes efficient water management, making it particularly relevant for regions facing water scarcity and climate change impacts. The ECRICC project has identified SRI as a key intervention to enhance the resilience of rice farming communities in coastal areas. In the Kendrapara district landscape, a total of 5,407 farmers have adopted the System of Rice Intensification (SRI) method, covering an extensive crop land area of 518.92 hectares. This innovative agricultural practice has led to a significant improvement in paddy productivity, with an average yield increase of 34.07%.

4.1.1 Estimation of Methane Gas Emission Reduction through SRI Interventions

The ECRICC project in Odisha collaborated with National Rice Research Institute (NRRI), Cuttack for study to explore the potential of the System of Rice Intensification (SRI) to reduce methane (CH_4) emissions from rice cultivation. This initiative aims to assess how SRI interventions contribute to lowering greenhouse gas (GHG) emissions, enhancing climate resilience, and improving farmer incomes through increased yields. Methane and nitrous oxide, major contributors to GHG emissions from rice fields, are monitored to establish evidence-based policies for emission reduction and sustainable farming practices. The study employs a rigorous methodology, including weekly GHG sample collection using the Closed Chamber Technique from SRI and non-SRI fields during Rabi (2024-25) and Kharif (2025) seasons across project blocks in Odisha. Samples are analyzed using gas chromatography, while soil samples are studied for biochemical properties and nutrient content to understand variations influencing emissions.



Figure 9: Weeding in SRI field (Weeder are provided under ECRICC project)



Figure 10: Collection of Samples for Estimation of GHG in the SRI field

4.2 Crab Culture Interventions

Mud crab culture is effectively initiated in the year 2024 under both Bhitarkanika and Mahanadi mouth landscapes, which are part of the ECRICC Project intervention. Three farmers were encouraged and supported under the project for crab culture in 2024 with technical guidance of MPEDA, MoC&I, Govt. of India and 17 Nos. of more farmers have been identified for crab culture in 2025. With availability of local knowledge and market, the condition is favourable for scale up in future years. Under the ECRICC project, a state-of-the-art crab hatchery will be established near Paradip, leveraging an existing facility previously developed by the Odisha Fisheries Department. To optimize its potential, the department has handed over the hatchery to the ECRICC project for operational management, renovation, and enhancement of infrastructure and related facilities. This initiative aims to modernize the hatchery with innovative technologies, improve breeding efficiency, and boost sustainable crab aquaculture in the region. By integrating advanced hatchery management practices, the project seeks to enhance seed production, support local livelihoods, and contribute to the long-term economic and ecological benefits of coastal aquaculture. To foster transparency, knowledge sharing, and direct engagement, a state-level Farmer and Crab Exporter Meet has been organized, creating a dynamic platform for farmers and exporters to interact. This innovative initiative enables one-on-one discussions, allowing farmers to gain insights into market demands, pricing strategies, and best practices for crab export. By facilitating direct communication, the meet enhances farmers' understanding of export procedures, quality standards, and value addition techniques, ultimately helping them secure better prices for their produce. Additionally, the event promotes the adoption of improved aquaculture techniques and sustainable harvesting methods, ensuring long-term profitability and competitiveness in the global seafood market.



Figure 11:(a)Crablets received from IMPEDA, RGCA (b) Harvesting of Crab from Crab Pond

Crab farmers' meet to strengthen sustainable aquaculture

POST NEWS NETWORK

Bhubaneswar, Dec 12: The State Project Management Unit of the Enhancing Climate Resilience of India's Coastal Communities (ECRICC) initiative organised a crab farmers' and exporters' meet at the State Institute for Rural Development (SIRD) campus, Thursday.

The event aimed to bring together crab farmers, exporters, government officials, and technical experts to foster sustainable aquaculture practices and strengthen market linkages for Odisha's mud crab sector.

Inaugurating the event, Forest, Environment, and Climate Change department's Environment-cum-Special Secretary director and ECRICC state

project director, Prem Kumar Jha highlighted the importance of mud crab aquaculture in bolstering Odisha's fisheries sector.

He noted that the initiative offers a sustainable source of income for coastal communities and detailed the project's progress, challenges, and opportunities in crab export.

Marine Products Export Development Authority (MPEDA) deputy director Archiman Lahiri underscored the rising global demand for high-quality mud crabs and Odisha's potential to become a leading exporter. Lahiri emphasised that the state could capitalise on international markets by adopting quality-oriented practices.

The ECRICC project, supported by the Green Climate



Fund, aims to enhance the livelihoods of vulnerable coastal populations across three states—Odisha, Maharashtra, and Andhra Pradesh. It focuses on climate-adaptive livelihoods and strengthening communi-

ty resilience to climate change impacts.

In Odisha, the project is being implemented in seven landscapes across four districts—Puri, Ganjam, Kendrapara, and Balasore—by the Forest, Environment, and

Climate Change department under the supervision of the Ministry of Environment, Forest, and Climate Change (MoEFCC), Government of India. The United Nations Development Programme (UNDP), as the Green Climate Fund's official agency, ensures quality assurance for the initiative.

Discussions at the event included plans for scaling crab aquaculture practices, establishing a crab hatchery in Odisha by 2025, and identifying additional farmers for capacity-building programmes. Officials stressed improving access to international markets through quality checks and streamlined export documentation.

Representatives from MPE-

DA, Fisheries and Animal Resource Development (F&ARD) department, and exporters from West Bengal and Tamil Nadu attended the workshop, sharing insights and best practices. ECRICC state project manager Spandita Kar and her team coordinated the event's proceedings.

The meet marked a significant step in forging partnerships between government bodies, NGOs, and exporters, with a shared vision of driving transformative changes in Odisha's coastal communities. By addressing key challenges and leveraging opportunities, the initiative aims to create a sustainable and thriving aquaculture ecosystem in the state.



Figure 12: Technical Discussion among MPEDA team, SPMU Team, Exporter and Farmer

4.3 Honey Bee Keeping

The Enhancing Climate Resilience of India's Coastal Communities (ECRICC) project is a six-year initiative aimed at strengthening the resilience of vulnerable coastal populations, particularly women, against climate change and extreme events. The project employs an ecosystem-centered and community-based approach to achieve its objectives. By integrating mangrove beekeeping into its framework, the ECRICC project not only enhances the livelihoods of coastal communities but also promotes the preservation of vital ecosystems, thereby contributing to broader climate resilience efforts. Thirty farmers received support in the form of bee boxes, bee colonies, and other essential equipment through the Odisha Khadi & Village Industries Board (KVB), Bhubaneswar, under the MSME Department, Government of Odisha. This initiative was facilitated through the convergence efforts of the District Project Management Unit (DPMU), Kendrapada.



Figure 13::(a) Meeting on Honey Bee Culture(b) Distribution of Honey Bee Box to Beneficiaries

4.4 Ornamental Fishery

As part of its efforts to enhance climate resilience and sustainable livelihoods, the ECRICC project in Odisha has made significant strides in promoting ornamental fisheries as an alternative income-generating activity for coastal communities. To facilitate capacity building and technical expertise, the ECRICC project collaborated with the Central Institute of Freshwater Aquaculture (CIFA), a premier institution specializing in aquaculture research, training, and technology transfer. As part of this partnership, a three-day residential training program titled “Breeding & Culture of Ornamental Fisheries” was conducted from 18–20 December 2024 at the CIFA campus. In Kendrapada district, 10 Nos of farmers have been identified for Ornamental fisheries intervention in 2025.



Figure 14: Training on Ornamental fishery by CIFA, Bhubaneswar to Farmer and Project staff

5. Training & Awareness Programs organized for the Communities

Awareness of the communities especially women of Self Help Groups (SHGs) and other marginalized groups on Climate Change , Climate Resilience , Climate Adaptive livelihoods, restoration of coastal eco-system have been organized by DPMUs through the Facilitating Non-Government Organizations (FNGOs) engaged under ECRICC Project. School students have also been sensitized on various issues of climate change and technical training have been conducted for project beneficiaries on climate resilient agriculture (System of Rice Intensification- SRI, Organic farming etc) and fisheries activities.

Topic	Total No. of Events	Total No. of Participants	Male	Female
Awareness on Climate Change, climate resilience, restoration of eco-system , awareness to school children, observation of important days etc.	2182	26735	9358	17377
Technical Training on SRI, climate resilient agriculture and Fisheries etc.	49	2036	775	1261
Total	2231	28771	10133	18638



Figure 15: Technical training to farmers on System of Rice Intensification (SRI)

6. Engagement of Climate Champions to initiate climate action

Women youth have been engaged as Climate Champions in project villages under the ECRICC project through FNGOs for community mobilization especially women, support climate change awareness activities in project landscapes, initiate climate action , provide handholding support during implementation of project activities , convergence and empower future generations on climate resilience. The role of women climate champions in the project have been recognized by the project, district administration and other donors for the contribution.

Project Landscape	Number of Women Climate Champions engaged
Bhitarkanika	56
Mahanadi Mouth	65
Total	121



Figure 16: Climate Champions providing training to farmer on organic manure preparation

7. Strengthened governance and institutional frameworks

District-level coordination committees (DLCCs) and block- and gram-panchayat-level arrangements in Odisha have played a crucial role in driving project activities. DLCCs meet regularly to review progress, plan interventions as per project requirements, and facilitate the convergence of existing government schemes with the ECRICC project. Climate Champions have been instrumental in raising community awareness about climate change and ensuring grassroots-level implementation. 4 Nos of DLCC meetings have been organized by DPMUs.

8. Convergence through ECRICC Project

The convergence approach integrates multiple state and central government schemes related to livelihood development, ecosystem restoration, fisheries, agriculture, and climate adaptation. These include flagship programs such as MGNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme), National Adaptation Fund for Climate Change (NAFCC), Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), Rashtriya Krishi Vikas Yojana (RKVY), and schemes under the Forest and Fisheries Departments. By leveraging these funds, ECRICC has facilitated the construction of climate-resilient infrastructure, promoted sustainable agriculture and fisheries practices, and supported mangrove and seagrass restoration projects. The convergence program under the ECRICC project in Kendrapara district has benefited 1,227 individuals, with a total economic value of ₹29,72,525. This initiative supports climate-adaptive livelihoods like honey beekeeping, aquaculture, and sustainable agriculture, enhancing the resilience of coastal communities.







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FOREST, ENVIRONMENT & CLIMATE CHANGE DEPARTMENT



Enhancing Climate Resilience of India's Coastal Communities (ECRICC)



MANGROVE NURSERY

Harihans

N. 20° 34' 18", E. 86° 49' 07"

No. of seedlings raised- 8250

Year 2022 - 23

GERMPLASM OF SPECIES USED

Avicennia officinalis (ବନ୍ଦି), *Excoecaria agallocha* (ଗୁଆଁ)
Bruguiera cylindrica (କାଳିଆଗୁଆ), *Aegialitis rotundifolia* (ବଣଗୁଆ)
Rhizophora mucronata (ରାଜ), *Kandelia candel* (ସିନ୍ଧୁକା)

MANGROVE FOREST DIVISION (WILDLIFE) RAJNAGAR

RAJNAGAR (WILDLIFE) RANGE, RAJNAGAR



Enhancing Climate Resilience of India's Coastal Communities

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