NCCR

Government of India
National Centre for Coastal Research
Ministry of Earth Sciences

Highways and Minor Ports Department
Government of Tamil Nadu

# Marine Spatial Planning

## Workshop on for Tamil Nadu

**10th January, 2023**

## Marine Spatial Planning – An Overview

The Government of **India's vision of New India by 2030 highlights blue economy as one of the ten core dimensions of growth.** Marine Spatial Planning (MSP) has been identified globally as a tool for sustainable and integrated ocean management which is an integral part of blue economy.

MSP is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic and social objectives that have been specified through a political process. MSP is not an end in itself but a practical way to create and establish a more rational use of marine space and the interactions among its uses, to balance demands for development with the need to protect the environment, and to deliver social and economic outcomes in an open and planned way. MSP is the comprehensive knowledge process that formulates coordinated policies for the sustainable utilization of marine resources in energy, industry, ports & harbours, environment, fisheries, tourism etc for economic development.

## Need for Marine Spatial Planning for Tamil Nadu

Tamil Nadu with a coastal length of approximately 1,076 kilometres, has the second longest coastline, accounting for more than 13 per cent of India's total coastline (Fig.1). Tamil Nadu is endowed with a variety of coastal and marine ecosystems, which are ecologically sensitive regions of extraordinary biological productivity.

They include mangroves, coral reefs, seagrass beds, sand dunes, beaches, mudflats, coastal wetlands, and estuaries. Economic activities that takes place along the coast of Tamil Nadu includes maritime trade, tourism, fishing and allied activities, agriculture, industrial activities etc. Increasing human population and urbanisation in the coastal areas of Tamil Nadu coupled with accelerated economic activities exerts significant pressure on coastal and marine areas. Moreover, in the past few years, there has been a increased demand for marine space for economic activities thereby increasing the pressure on the coastal areas and resources.


Fig. 1. Tamil Nadu Coast

In this scenario to promote a sustainable and integrated use of marine space and minimize conflict between the various economic sectors and the environment it is highly important that the state of Tamil Nadu starts working on adopting marine spatial planning for sustainable use of marine resources and for better management of maritime activities, both existing and new.

## About the Workshop:

The overall objective of this workshop is to set a base for developing a marine spatial planning framework for the state of Tamil Nadu which would provide decision makers with a spatial and temporal context to better manage and understand the marine environment in a way that processes become more transparent with a greater certainty in permitting, planning and resource allocation for the benefit of both the economy and environment.

The workshop is being jointly organized by the National Centre for Coastal Research (NCCR), Ministry of Earth Sciences, GoI & Highways and Minor Ports Department, GoTN on 10th January, 2023 to bring the various Government organizations and coastal stakeholders to understand the sectoral activities and pressures of the coastal areas and work towards minimizing conflict by clearly mapping the various activities along the Tamil Nadu coast and to develop a framework for integrated, eco-system based marine spatial planning for Tamil Nadu

Stakeholders from various Departments of the Government of Tamil Nadu such as Highways and Minor Ports Department, Department of Environment, Climate Change and Forest, PWD, WRD, TNPCB, Animal Husbandry, Dairy, Fisheries and Fishermen Welfare Department, Department of Tourism along with Central Government research organizations, NGOs and Academia including NCCR, NCSCM, CIBA, CMFRI, NIO, and IIT-Madras are participating in this first workshop.

The workshop will have detailed deliberations from Eminent Speakers with expertise in the following subject domains :

a) Coastal Protection and Shoreline Management in MSP
b) Environment and CRZ in MSP
c) Fisheries and Tourism in MSP

With emphasis on :

- Defining and analyzing existing conditions
- Defining the kind of spatial data and information needed for MSP
- Defining the current human activities (and pressures) along the coast
- Possible conflicts and compatibilities among existing human uses and environment
- Identifying data gaps and uncertainties and Spatial representation in MSP

## About NCCR

NCCR undertakes multi-disciplinary research relating to marine and coastal pollution, coastal processes and hazards, coastal habitats and ecosystems and provides scientific and technical support to the coastal states in activities related to sustainable management of the coastal areas (Fig.2).


Fig. 2. NCCR's Activities

The activities of NCCR aids in addressing the requirements of country's commitment towards Sustainable Development Goal (SDG-14), UN Decade of the Oceans Science for Sustainable Development (2021-2030) and Sendai Framework for Disaster Risk Reduction (2015-2030).

# MINOR PORTS IN TAMILNADU

Tamil Nadu is the Southernmost State in India bound by Bay of Bengal on the East, Indian Ocean on the South, Arabian Sea and the States of Kerala and Karnataka on the West and the States of Karnataka and Andhra Pradesh on the North. It has a coastline of about 1076 KMs long with plain landmass as its hinterland. The Maritime State of Tamil Nadu has a glorious history dating back to some 6000 years. The well-known dynasties of Chola, Chera and Pandya had maritime trade with Far East Burma, Indonesia and other Indo-Chinese region. Because of the coastline, Tamil Nadu had emerged as a hub for Industry, Trade and Commerce.

Today, the State of Tamil Nadu has emerged as the most industrialized State in India and the eastern gateway of India to the world.

In order to develop the minor ports, the Government of Tamil Nadu has established the Tamil Nadu Maritime Board, an autonomous body under the Tamil Nadu Maritime Board Act, 1995. Tamil Nadu Maritime Board's main function is to develop Captive and Commercial Ports and to co-ordinate the activities of the minor ports, to optimise their efficiency and effectiveness, to reduce congestion and to ensure efficient material handling and provide an integrated solution to the problems of the ports operation and management. In order to meet the growing demands of Industry, Trade and Commerce, there is a need to involve private investments in development of the minor ports.


Fig. 3. Minor ports in Tamil Nadu

The private participation in the construction / development of ports / jetties and improvement of the existing minor ports or the facilities of the existing minor ports will be encouraged, and each proposal will be considered on its own merits as per the port policy. The thrust of the policy will be to encourage effective private participation and speedy implementation of the projects. There are 17 Notified Minor Ports along the Coastline of Tamil Nadu, under the control of Government of Tamil Nadu apart from 3 Major Ports (Chennai, Kamarajar (Ennore) & V.O.Chidambaranar (Thoothukudi)), which are under the control of Government of India (Fig.3.).

# NCCR activities along the Tamil Nadu coast

## Sea Water Quality Monitoring along Tamil Nadu Coast

The Sea Water Quality Monitoring (SWQM) program of NCCR, monitors 17 locations along the Tamil Nadu coast (Fig.4) for various physicochemical, biological and microbiological parameters. The Coastal Water Quality Index (CWQI) calculated from selected parameters categorizes coastal waters of Tamil Nadu as moderate. The data on coastal water quality is periodically shared with the Department of Environment, Government of Tamil Nadu and the Tamil Nadu Pollution Control Board. Additionally, the coastal waters of Chennai are being regularly monitored under the Prediction of Water Quality (PWQ) program and a water quality buoy system is deployed off Marina beach for continuous monitoring of water quality parameters. An app called "Clean Coast" provides 5-days forecast on water quality for the beaches along Chennai coast.

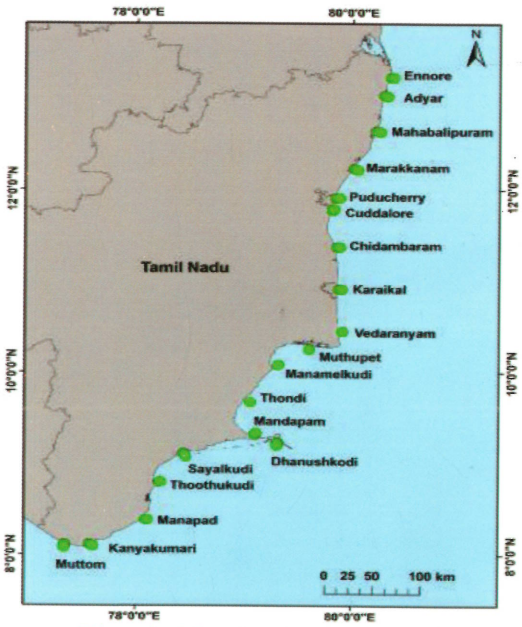



Fig. 4. Monitoring locations along Tamil Nadu coast.

## Shoreline Changes along the Tamil Nadu Coast

NCCR has carried out a extensive study on shoreline changes along the mainland of India and has developed a digital database entitled "**National Shoreline Assessment System (N-SAS)**, for the entire Indian coast.


Fig. 5. Shoreline Changes along TN Coast

This database captures shoreline changes pertaining to different years and provides information on shoreline changes for almost three decades (1990 to 2020) using remote sensing & GIS datasets and extensive field data. The shoreline changes have been classified into seven categories, i.e. low erosion, moderate erosion, high erosion, stable coast and low accretion, moderate accretion and high accretion. Hot spots of erosion have been identified all along the Indian coast. This information is crucial to evolve suitable shoreline protection strategies for eroding sites to protect property and livelihood of the people. The Shoreline Change Atlas has been prepared for Tamil Nadu Coast and the status of the Tamil Nadu coastal protection structures along the coast have been mapped (Fig. 5).

## Integrated Flood Warning System for Chennai (iFLOWS-Chennai)

iFLOWS – Chennai: An operational state-of-art early flood warning system for Chennai has been developed and integrated with TN-SMART, the disaster management portal of the Tamil Nadu state Government. In 2018, a MoU was signed between NCCR and Tamil Nadu Revenue Administration, Disaster Management and Mitigation Department for coastal hazards and vulnerability services including flood warning.

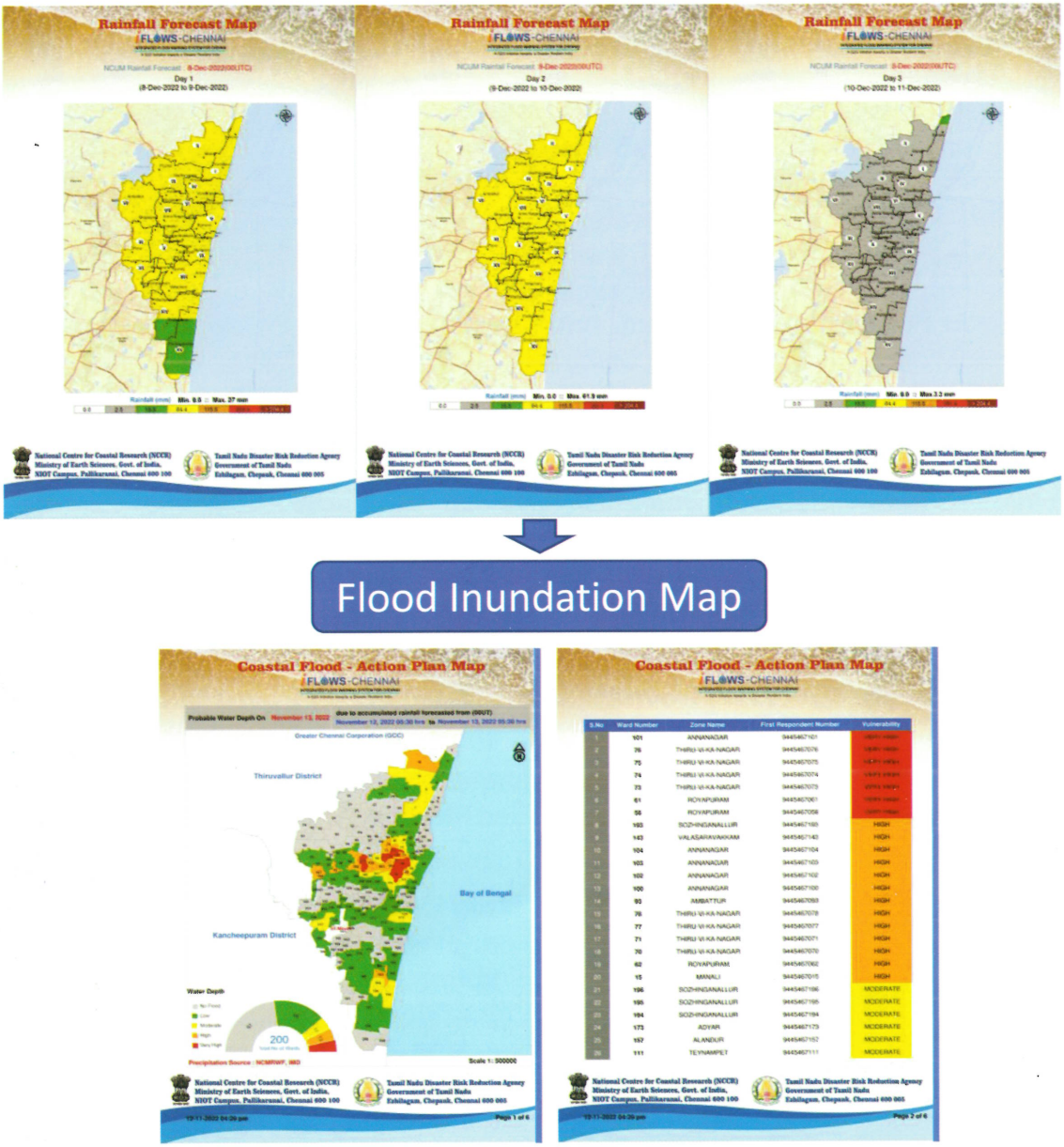



Fig. 6. iFLOWS-Chennai Rainfall forecast Map (above) & Inundation Map (below)

IFLOWS-Chennai incorporates weather models from NCMRWF and IMD, thematic layers on landuse, bathymetry, infrastructure etc provided by TNSDMA and GCC. Based on inputs from weather models, Hydrologic models are used to transform rainfall into runoff and provides inflow inputs into the river systems. Hydraulic models are used to solve equations of fluid motion to replicate the movement of water to assess flooding. The hydro-dynamic models and storm surge model are used to calculate the tide and storm surge impacts into the model domain. The system uses forecasted rainfall from the numerical weather models and probable flood inundation is estimated for Chennai three days in advance and the reports and maps are generated at ward level for mitigation measures (Fig.6).

## Tsunami Hazard Maps for Tamil Nadu Coast

NCCR has undertaken modelling and mapping for Tsunami vulnerability of Tamil Nadu Coast. Large scale Tsunami hazard maps (1:25,000) have been generated for the Tamil Nadu coast and handed over to the state government for planning and mitigation measures (Fig.7). The hazard maps essential show the extent of vulnerability of the coastal zone along with details on landuse, elevation, cadastral land parcels, infrastructure, High tide line, coastal regulation buffer zones etc.

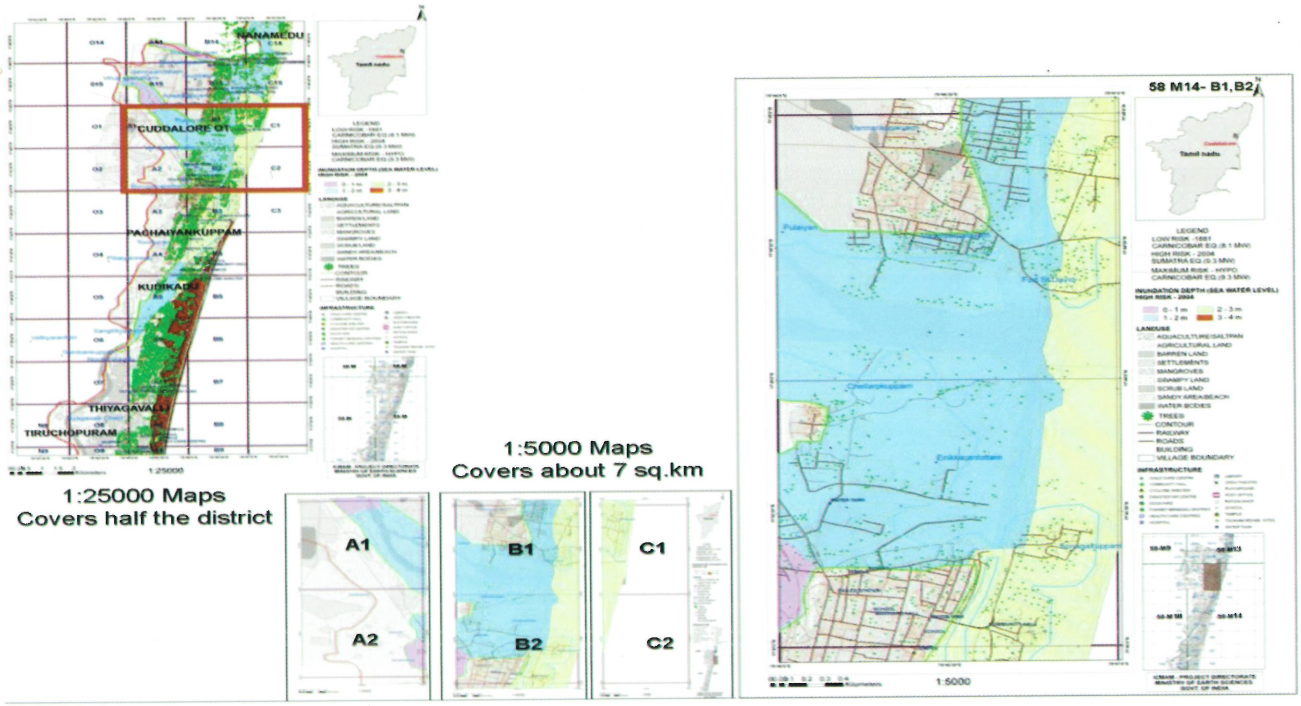



Fig. 7. Tsunami Hazard Maps

## Thoondil Mobile App

For the safety and security of the fishermen at sea a user-friendly mobile application named "Thoondil" meaning fishing rod in Tamil was developed by NCCR and Department of Fisheries, Government of Tamil Nadu (Fig.8). The Thoondil app is available in Tamil for the benefit of the local fishing community. The mobile app has weather information from IMD, route information, boundary alerts, offline maps that work even when there is no Internet connectivity, PFZ information from INCOIS, emergency contact capability in times of distress, options for reporting incidents using geo-tagged photos, etc. The dashboard installed in the Department of Fisheries provides administrators with information on the fishermen at sea for effective mitigation and planning, especially during hazards.


Fig. 8. Thoondil Mobile Application for Fishermen

## Climate Change Risk Information System (CCRIS)

CCRIS is developed for Tamil Nadu coast to show the vulnerability of the coast to climate change and sea level rise. The risk assessment carried out based on the hazard, exposure and vulnerability indices. The risk index varies from very low to very high for the Tamil Nadu coast (Fig.9).

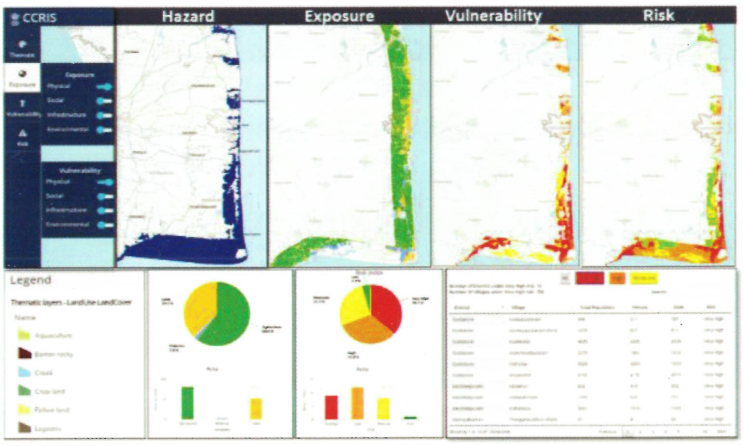



Fig. 9. CCRIS for TN Coast

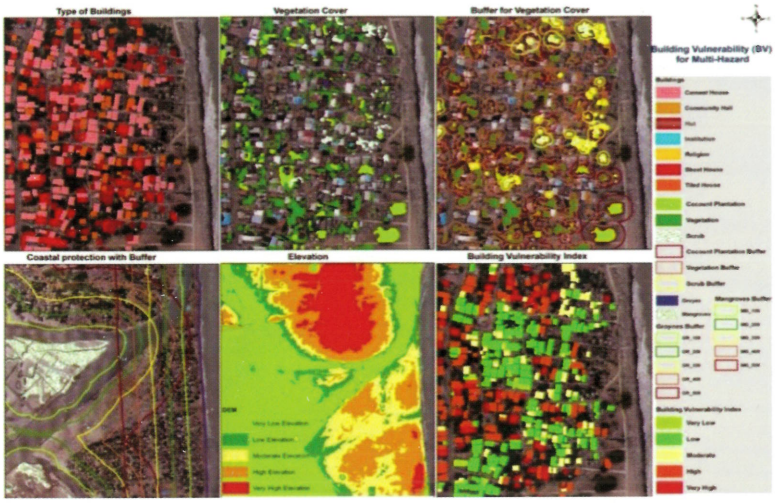



Fig. 10. Building Vulnerability Index Map

The multi hazard vulnerability assessment being carried out for the Tamil Nadu coast based on drone data which is provided by TNSDMA. Initially the building vulnerability Index are being prepared with metrological and topographic parameters for the Tamil Nadu Coast (Fig.10)

## Coastal Critical Habitats and Ecosystem Modelling

Ecosystem-based models have been developed for critical ecosystems such as Pulicat Lagoon, Pichavaram mangroves (Fig. 11), the Gulf of Mannar, and the Southeast coast of India, to understand the ecosystem functioning. The assessment of Ecosystem Services in Pulicat Lagoon and the Gulf of Mannar and valuation would enable better management of these critical habitats.

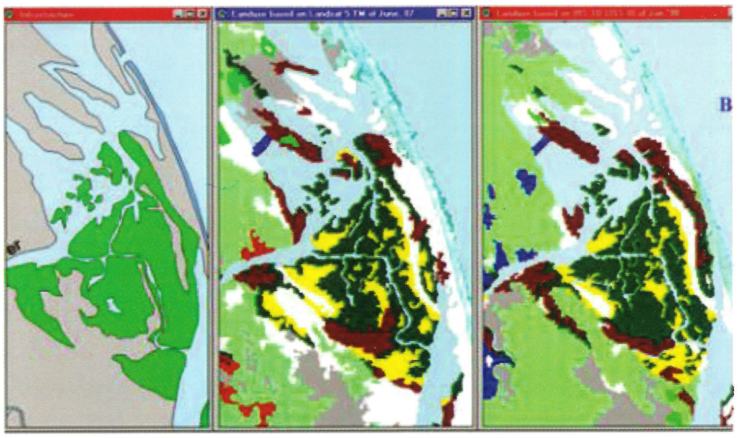
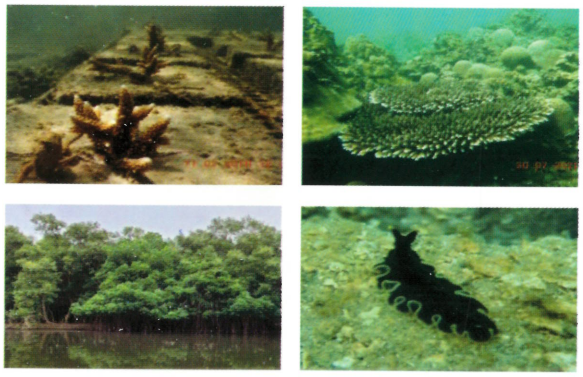


Fig. 11. Changes in Pichavaram Mangrove cover

The primary objective is to create a modular framework to evaluate the ecosystem functions and services affected by natural, anthropogenic, and climate change scenarios in critical habitats. Protecting and managing coastal ecosystems have co-benefits; enhancing ecosystem services of environmental, economic, social, cultural and recreational value for achieving Sustainable Development Goals (SDGs).

## Coral Reef Monitoring and Restoration Activities in Gulf of Mannar and Palk Bay

NCCR has established a Field Research Centre at Mandapam, Tamil Nadu to enable effective and continuous monitoring, management and conservation of coastal marine resources, striving towards long-term livelihood improvement of the local fisher community.



The project has undertaken coastal habitat monitoring and coral restoration activities. Health of natural and restored corals is also being assessed periodically. At the Mandapam Field Site, hatcheries will be set up to promote coastal aquaculture in a sustainable manner. Sea ranching of commercially and economically important marine fauna will be taken up (Fig.12).

Fig. 12. Coral Reef Monitoring

The project, which ultimately aims towards creating livelihood options for coastal communities, conducts several outreach and awareness programmes by involving governmental and non-governmental stakeholders. Seaweed Cultivation Training Programme for fisherfolk was organised in fishing village of Palk Bay, by NCCR, along with an experimental set-up of the same, and distribution of bamboo rafts to fishermen. At the proposed field site, plans have been made to set up a techno-park to develop new technologies in sustainable fishery-related livelihood options and transfer this knowledge to the locals.

## Marine Spatial Planning

NCCR is presently working on development of Marine Spatial Plans for two pilot areas namely **UT Puducherry** (a well developed urban area in the mainland) and **UT Lakshadweep** (an ecologically sensitive island ecosystem). These activities are being carried out as part of the Indo-Norwegian collaboration on Integrated Ocean Management (Fig.13).


Fig. 13. Dashboard depicting the Marine Spatial Planning for UT Puducherry and UT Lakshadweep

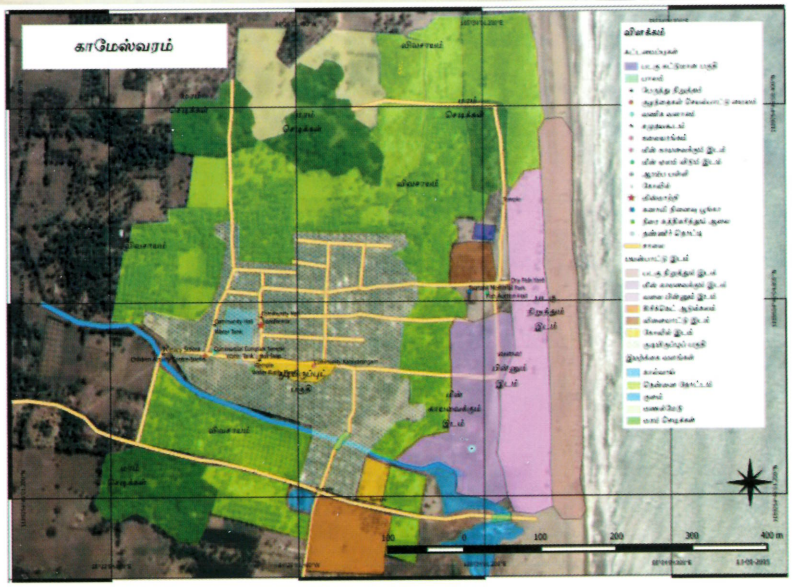
# Capacity Building and Training

NCCR conducts training programmes on various domains of coastal zone management to technical personnel of coastal states on topics like marine pollution, shoreline changes, coastal zone management, Remote Sensing, Geographic Information System (GIS) and Tsunami hazard mapping





SAARC Countries




NGOs- From trainee to trainer….

## Date: 10th January, 2023 (Tuesday)

| | |
|---|---|
| **08:00-08:45 AM** | **Registration of Participants** |
| 08:45-08:48 AM | Invocation |
| 08:48-08:50 AM | Lighting the lamp |
| 08:50-08:53 AM | Welcome address by Dr. M.V. Ramana Murthy, Director, NCCR, MoES |
| 08:53-08:55 AM | Felicitation of Guests |
| 08:55-09:00 AM | Address by Thiru. Senthil Pandian, IAS, Joint Secretary, MoES |
| 09:00-09.05 AM | Address by Dr. Deepak Apte, MD, Srushti Conservation Foundation, Pune |
| 09:05-09:10 AM | Address by Dr. Supriya Sahu, IAS, Addl. Chief Secretary, DoECC&F, GoTN |
| 09:10-09:15 AM | Address by Dr. Sandeep Saxena, IAS, Addl. Chief Secretary, WRD |
| 09:15-09:17 AM | Release of Shoreline Change Atlas for Tamil Nadu |
| 09:17-09:27 AM | **Inaugural speech by**<br>**Thiru. E. V. Velu**<br>**Hon'ble. Minister for Public Works, Highways and Minor Ports Department, Government of Tamil Nadu** |
| 09:27-09:30 AM | Vote of Thanks – Dr. Tune Usha, Scientist G, NCCR |
| **09:30-09:40 AM** | **Group Photo** |
| 09:40-09:50 AM | Blue Economy – An Overview – Dr. Vijay Kumar, Scientist G, MoES |
| 09:50-10:00 AM | Brief Overview of NCCR and MSP – Dr. Tune Usha, Scientist G, NCCR |

## Date: 10th January, 2023 (Tuesday)

| | | |
|---|---|---|
| **10:00-11:00 AM** | **Session I : Coastal Protection and Shoreline Management in MSP** | |
| | Chair : | Shri. Pradeep Yadav, IAS, Addl. Chief Secretary, Highways and Minor Ports Dept, GoTN |
| | Co-Chair: | Thiru. Senthil Pandian, IAS, Joint Secretary, MoES |
| | Speakers: | Dr. M.V. Ramana Murthy, Director & Scientist-G, NCCR |
| | | Dr. S.A. Sannasiraj, Professor, Dept. of Ocean Engg., IIT-Madras |
| | | Dr. Jaya Kumar Seelam, Chief Scientist, NIO-CSIR |
| **11:00-11:30 AM** | **High Tea** | |
| **11:30-12:30 PM** | **Session II : Environment & CRZ in MSP** | |
| | Chair: | Dr. Deepak Apte, MD, Srushti Conservation Foundation |
| | Co-Chair: | Shri. Manmohan Singh Negi, IFS (Retd.) ADG Forests (Wildlife) & Director, Wildlife Preservation, MoEF&CC |
| | Speakers: | Dr. Jayanthi Murali, IFS, Chairperson TN Pollution Control Board |
| | | Dr. Purvaja Ramachandran, Director, NCSCM-MoEF&CC |
| | | Dr. H. Kharkwal, Scientist-E, Addl. Director & MS CRZ, MoEF&CC |
| | | Thiru. Deepak S. Bilgi, IFS, Director, DoECC&F, GoTN |
| **12:30-01:30 PM** | **Session III : Fisheries and Tourism in MSP** | |
| | Chair: | Thiru. A. Karthik, IAS, Principal Secretary, Animal Husbandry, Dairy, Fisheries & Fishermen Welfare Dept, GoTN |
| | Co-Chair: | Dr. S.T. Balasubramanian, Former VC, Chettinad University |
| | Speakers: | Thiru. Sandeep Nanduri, IAS, Director of Tourism & MD-TTDC |
| | | Dr. M. Jayanthi, Principal Scientist, CIBA – ICAR |
| | | Dr. E Vivekanandan, Principal Scientist (Retd.), CMFRI-ICAR |
| **01:30-01:45 PM** | **Discussions & Wrap – up** | |
| **01:45 PM** | **Lunch** | |

सत्यमेव जयते

**NCCR**

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