

Delineation and Mapping of Ecologically Sensitive Areas and Critical Vulnerable Coastal Areas along the Coast of India

India has large coastal wetlands which cover an area of over 40,230 km² along its coastline measuring over 7500 km. The coastline is jotted with different sensitive ecosystems like coral reefs, mangroves, tidal mudflats, estuaries, lagoons, marshes and vegetated wetlands. The coastal ecologically sensitive areas are home to a vast biodiversity. For example, coral reefs constitute less than 1% of the ocean floor but support over 25% of the marine biodiversity. Coastal ESAs contribute to maintaining the integrity of the coast and the life on the coast and in the sea as they are the habitats for vast coastal biodiversity representing different levels in the food chain. They provide various ecosystem services, which provide livelihood avenues to millions of coastal community directly and indirectly. Coastal ecosystems such as, mangroves and coral reefs aid in controlling coastal erosion and shoreline change and also serve as the natural defence against the fury of oceans.

The Indian government has classified the areas requiring special consideration into protected areas (eg. National parks, sanctuaries) and conservation areas (eg. biosphere reserve, tiger reserve) using appropriate legal instruments (Wildlife Protection Act, 1972; Environment Protection Act, 1986). The marine protected areas (MPAs) account for only 5.81% of the total surface area and about 5% of the total protected areas (PAs) of the country. The Coastal Regulation Zone (CRZ) 2011 notification, issued under the Environment Protection Act, 1986 provides for delineating the ecologically sensitive areas under CRZ I and thus expand the areas under conservation. NCSCM has undertaken the task of mapping the coastal ecologically sensitive areas (ESA).

A detailed research action plan with the breakup of work packages and framework of tasks for this NPMU project has been prepared. Seven work packages (WPs) are planned as listed below with specific tasks under each work package.

1. Mapping CRZ I Area
2. Mapping the Boundaries of Protected Areas
3. Development of criteria and guidelines for delineation of ESAs and CVCAs; Guidelines for IMPs
4. Identification of ESAs (highly sensitive and sensitive areas) and CVCAs
5. Stakeholder consultation and review
6. Delineation of ESAs (highly sensitive and sensitive areas) and CVCAs
7. Development of Knowledge System on ESAs/CVCAs

A series of expert consultations were held during 08-21 Oct 2013 in order to develop the criteria for primary screening of the ESAs listed in CRZ 2011 notification. 55 experts representing 42 institutions/ agencies participated in the three expert consultations. The criteria developed were deliberated among the officials of SICOM and Secretary, MoEF, GoI. These consultations helped in firming up the approach for ESA mapping.

The GIS-based maps for the ecosystems/habitats listed as CRZ I areas in the CRZ 2011 notification are pre-requisites to initiate the activities. NCSCM has taken necessary steps for acquiring the maps of mangroves, coral reefs, salt marshes and mudflats prepared by Space Application Centre, Ahmedabad under the

National Wetland Inventory and Assessment project supported by Ministry of Environment and Forests. NCSCM has undertaken the task of preparing the maps of coastal dunes and seagrasses as comprehensive national level maps are not available for these ecosystems. Similarly, for some of the habitats listed in the CRZ 2011 notification like turtle and bird nesting sites, it is not possible to develop maps based on remote sensing techniques and NCSCM will coordinate in developing boundary maps for such habitats by involving state forest departments and expert agencies. As per the CRZ 2011 notification, areas or structures of archaeological importance and heritage sites are among those listed under CRZ I. Special focus would be accorded to the underwater archeological sites for which boundaries are not demarcated.

The boundaries of marine protected areas (MPAs) would be obtained from the Wild life Institute of India, Dehradun and overlaid on the ecosystem maps. The outer most boundary of ecosystem and/or the MPA would be delineated as CRZ I area.

Subsequently, the conservation value of the ecologically sensitive areas located outside the Protected Areas will be assessed in order to identify the “highly sensitive areas”, for which management plans would be prepared. These could eventually be notified with specific regulatory provisions for conservation. The conservation value of ecosystems would be compared within the bio-geographic zones/ coastal sediment cells as demarcated by NCSCM which are geo-morphological boundaries of sediment movement.

Lastly, ESAs on which the local community have a significant dependence would be demarcated as Critically Vulnerable Coastal Areas (CVCA) and guidelines for Integrated Management Plans will be prepared. The threshold values for the conservation values and dependence values would be determined in consultation with the stakeholders so as to accommodate the location-specific ecological and social concerns.

It is planned to organize consultations with ecologists and sociologists to develop the framework for the assessment of conservation and dependence value and also to develop guidelines for the integrated management plans. The final ESA map prepared under this study would show the boundaries of *highly sensitive areas*, *sensitive areas* and the CVCA, which would be managed by the community as per the integrated management plans.