

Specification for coastal Regulation Zone chart and its development

By

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Abstract

Coastal Zone is always on the forefront of civilization and has been by far the most exploited geomorphological unit of earth. Its easy access and resourcefulness have always attracted human activities, but its complexity in understanding has led to misuse and abuse. In recent time, the coastal zone of world is under increasing pressure due to high rate of human population growth, development of various industries, fishing, mining, discharge of municipal sewage and industrial waste effluents. This industrial development on coast has resulted in degradation of coastal ecosystems and diminishing the living resources. Coastal area is vital to the prosperity of the country and are biologically most productive area, supporting wealth of living marine resources. Thus there is urgent need to conserve the coastal ecosystems and habitats by implementing the coastal regulation zone notification and integrated coastal zone management study.

The term coastal zone means the coastal water, wetland and shore land strongly influenced by marine waters. In other word, this is the area of interaction between land and sea, which is influenced by both terrestrial and marine environment. The coastal zone includes the area between high and low tide line, up to 10 nautical miles toward the sea from high tide line and up to 20 km. from high tide line towards land side. Environmentally affective coastal zone management requires accurate, up to date and comprehensive scientific data on which policy decision can be based. A basic problem in coastal zone study is limited availability of coastal data. Specific chart showing high and low tide lines as well as wetland and land use categories in coastal regulatory zones on large scale are extensively used for implementing guidelines for protection of coastal zone resources and habitats.

In view of above, there is a need to prepare coastal regulation zone plan and coastal zone management charts as per International standard of quality and accuracy for use by coastal states and coastal zone users. In the present paper, an attempt has been made to general discussion on planning of special coastal regulation zone chart for managing coastal zone and coastal features for sustainable use by demarcating high and low tide line on chart with the help of hydrographic survey carried out by Naval Hydrographic Department. The notification issued by government of India in connection with conservation of coastal resources and habitats has been discussed. The prohibited and regulation of permissible activities in coastal regulation zone along with coastal area classification are also reviewed in this paper.

INTRODUCTION

In recent time, the coastal zone of world is under increasing pressure due to high rate of human population growth, development of various industries, mining, fishing, industrial waste effluents and discharge of municipal sewage. Such industrial development along the coast has resulted in degradation of coastal ecosystems and diminishing the coastal resources. Thus there is an urgent need to protect the coastal ecosystems and habitats by implementing the coastal regulation zone notification and integrated coastal zone management study. Healthy coastal life needs understanding and proper planning of environment, on and around the coast. Perhaps with these views only the ministry of Environment and forest, Government of India issued a notification in the year 1991, under Environment protection act of 1986, declaring coastal stretches as coastal regulation zone (CRZ) and regulating activities in CRZ.

India has a coast of about 7516 km long and 4198 islands are spread along the main coast of Andaman, Nicobar and Lakshadweep group. The coastal zone means the coastal water, wetland and shore land strongly influenced by marine water. This is the area of interaction between land and sea, which is influenced by both terrestrial and marine environment. The coastal zone includes the area between high tide line (HTL) and low tide line(LTL), up to 10 nautical miles towards the seaside from HTL and up to 20 km from HTL towards the land side. The accurate demarcation of shoreline is very important for planning purposes. The prime requisite of coastal regulation zone plan chart is basically to manage coastal and coastal zone features for sustainable use by demarcating high and low tide line on chart with the help of hydrographic surveys.

ENVIRONMENT PROTECTION ACT

In order to conserve resources by controlling their depletion and manage development activities, Government of India had promulgated the Environmental (protection) act 1986. The ministry of Environment and Forest has notified in February 1991, the coastal stretches from HTL to 500 mts. towards land and from HTL to LTL towards sea as coastal regulation zone(CRZ). In view of above there is necessity to prepare CRZ plan and CZM charts for our coastal zone as per International standard of quality and accuracy for coastal zone users. Latest Hydrographic surveys of LTL, HTL, 200 mts. Line and 500mt line are the input source for the preparation of CRZ planning charts. Naval Hydrographic Department (NHD) of India is responsible for delineation of high tide line and low tide line, which are baseline for preparation of CRZ plan chart. Since NHD has the professional capacity and technology, the ministry of Environment and Forest has requested to NHD to verify coastal regulation zone plan prepared by states for precise depiction of HTL, LTL and control marks and prepare guidelines for CRZ/ coastal zone management chart.

IMPLIMENTATION OF CRZ NOTIFICATION AND ITS IMPLICATION

The CRZ notification has put too many restrictions on the development along the coast. In Maharastra, with its coast line 720 km and 54 river creeks, significant stretches in land are badly hit by the CRZ notification. It is posing several problems before the planners and decision makers on one side and investors and developers in other. The CRZ notification as mentioned earlier has put too many restrictions on the development

along the coast. Various important issues of CRZ notification and implication involved in the process of planning and development are as follow:

(a) DEMARCATION OF HIGH TIDE LINE

High tide line (HTL) in the coastal regulation zone notification is defined as line up to which highest high tide reaches in spring tides. It is delineated by walking over or remote sensing data or by helicopter survey. During delineation of HTL, the geographic coordinate of all-important landmarks is arrived at both in Everest and WGS 84 datum. The Chief Hydrographer to the Government of India is the authority to demarcate the high tide line and has got the proper expertise to demarcate such high tide line (HTL) during spring tide. This line is marked by bathymetric chart of the coastal area with the datum of chart being the lowest low tide.

(b) DEMARCATION OF LOW TIDE LINE

The low tide line is the limit up to which the lowest low tide recedes during spring tide. This line would be arrived at by making a bathymetric chart of the coastal area with the datum of chart being the lowest low tide. For this simultaneous tidal observation would be carried out while bathymetric data is collected by expert surveyors and sounding reduced to the lowest low tide. The line along which zero meter depth occurs on this bathymetric chart is the low tide line.

(c) DEALING WITH THE CREEKS

In case of creeks, CRZ notifications and subsequent supreme court judgment have stipulated that if the width of creek is up to 350 meters, the CRZ will be 100 meters from the creek and if the width exceeds 350 meters, it will be 150 meters from the creek. Now from where to measure the distance of 100 meters or 150 meters is a point of debate. Expert in the field of Hydrography say that it is possible to demarcate edge of the creek and in that case this distance can be measured from the edge. Other say that in case of creek, even the area up to the water spread will form coastal regulation zone.

Another point in respect of creeks is up to what distance inside the creek, the CRZ notification will be applied. British experts have opined that distance inside creek, where tidal effect of the wave comes to and end, should be considered as the distance inside creek for determine the coastal zone.

(d) CONDITION REGARDING MANGROOVES

It is stipulated that in case of mangrove with an area of 1000m² or more, would be classified as CRZ with a buffer zone of at least 50 mt. Mangrove is a tropical tree growing, along the coast and requires saline water for its growth. Expert in this field say that mangrove are very important along the coast for breaking of tides and it is valuable resources having several direct uses. Hence proper the protection of mangrove is very important.

(e) ECOLOGICALLY SENSITIVE FEATURES DEMARCATION

In order to implement CRZ Plan, it would be necessary to demarcate and survey of foreshore and offshore features which are ecologically sensitive such as mangrove, spawning ground of marine life, corals and other features like wetland, marsh, swamp, bays, estuaries, creeks, bunds and back waters that are influenced by Tidal action. Coral reefs are the spawning ground of aquatic life, and sea grass bed is important feeding ground for fishes. Mangrove and coral reefs also act as a buffer zone against wave and tidal force, for stabilizing and safeguarding the coast. Before planning to make the CRZ plan chart, the proper evaluation of the coastal features and their proper measure is highly essential.

CHARTING PLAN

The compilation of CZR Plan charts is carried out from latest special Hydrographic Survey showing HTL. The details are picked up from analog or digital information available in Hydrographic Survey using modern cartographic technique. The chart is prepared on 1:25,000 scales with demarcation of 200 Mt. & 500 Mt. Lines from HTL along with limit of ecological sensitive areas, extent of coastal stretches and other necessary information required for CZR implementation. The charts will have identical coverage as Survey of India sheet and will be on polyconic projection on WGS-84/ Everest datum. The digital copy of charts will be prepared for chart printing as and when required by users. Indian coastline and Island territories is estimated to be covered in about 265 CZR Plan charts.

An accuracy of ± 10.5 meters is required to be maintained over the ground with survey on scale of 1:25,000. Larger scales charting with better accuracy will be done in very sensitive areas. The horizontal distance line of 500 mt. and 200 mt. from the high Tide line is marked on chart using prominent land or built up features and description of the same noted for future reference.

CHART SPECIFICATION

Some specifications are considered for making the CRZ chart. Such specification covers limit of chart, no. of charts, scale, horizontal datum, projection, vertical datum (lowest Astronomical Tides for bathymetry and MSL for topography), unit of measurement and size of charts. The topographical heights are mentioned in meter as per Navigational charts. The neat line size 92x60 cm is used for preparation of CRZ Plan chart (DE), which will include index below the map. Such special chart will have title information including title of chart in one block suitably located in the land area if possible and cautionary note for National/International boundaries.

Marginal Details such as publication legend, copyright legend and chart numbering are shown as per standard procedure for nautical charting. Publication legend is inserted centrally below the southern border of the chart. Copyright legend is shown completely below the publication legend on all charts.

CHART CONTENTS

Coastal Zone Regulation Plan chart includes high tide line, low tide line and depiction of 500 mt. and 200 mt. Line from coastline as main contents. The limit and index of ecologically sensitive area such as National Park near shore, sanctuaries, reserved forest and wild life habitats are shown very accurately. The sensitive features like mangroves coral reefs and area close to breeding and spawning ground of fish and other marine life are depicted with standard symbol given in INT 5020. The area which

have already been developed up to shore line and partially built up urban area, near coast are shown on large scale CZR Plan charts. The new edition legend, adjoining chart number in magenta, panel box at top of right portion of chart and dimension in millimeter are very informatics content of CRZ Plan charts.

CHARTING SOURCE MATERIAL

The integration of numerous source materials such as topographic, hydrographic, bathymetric and coastal features data into a balanced and harmonic composition on specified scale and projection is required for preparation of CRZ Plan chart. The various source material used for CRZ Plan chart are named as follow: -

(a) Topography: A complete set of map on scale 1:25,000 published by Survey of India providing coastal coverage and cadastral map are used for depicting land detail and coastal stretches on CRZ chart. Aerial photographs are considered particularly for high tide and low tide period. Satellite imagery data both analog and digital form is used for demarcation and indexing of ecological sensitive features. The Geodetic data collected by Survey of India is also used for charting purpose.

(b) Hydrography: Hydrographic survey is regularly carried out in entire coastal water as per requirements of agencies and available in analog and digital format. Presently the hydrographic data including coastal information is also available on large scale. Survey Ship of Naval Hydrographic Department collects the hydrographic data and result of local survey is also received periodically from State Port Authorities, Maritime State Government and Minor Port Survey Organization of Ministry of Transport including the coastal details and low water features. Hydrographic survey specifically for demarcation of HTL, LTL, 200mt. and 500mt. Line is carried out periodically along the coast. The published Nautical Chart by National Hydrographic Office covering the coastal area on large scale is also used as hydrographic source for CRZ plan chart.

(c) Digital database: The CRZ Plan chart is digitized and composite design file of CRZ Plan chart is stored in database for each map project. The updation of this digital database is carried out regularly as and when new hydrographic or coastal data is received. Remote Sensing and Photogrammetry along with GIS technique play an important role to provide the various thematic data for charting. The data from Remote Sensing Satellite because of its synoptic and repetitive capability, have proved to be extremely useful in creating baseline inventories of coastal wetland, coral reef and mangroves, monitoring of protected area and detection of shore line change

COASTAL REGULATION ZONE

In general the land between low tide line and high tide line is the coastal Regulation Zone. The rapidly increasing human population and industrial development along coast have resulted degradation of coastal ecosystems and diminishing the living resources. In order to conserve coastal resources by controlling their depletion and manage the development activities, the government regulations prohibit certain activities and also list the permissible activities within the CRZ.

PROHOBITED ACTIVITIES

- (a) Setting of new industries and expansion of existing industries (except those directly related to waterfront or directly needing for shore facilities).
- (b) Manufacture, handling, storage or disposal of hazardous substances.
- (c) Setting up and expansion of fish processing units including warehousing
- (d) Discharge of untreated wastes and effluents from industries, cities and other human settlements.
- (e) Dumping of cities and town wastes for the purpose of land filling.
- (f) Dumping of ash or any wastes from thermal power station
- (g) Land reclamation bunding or disturbing the natural course of seawater with similar obstructions except those required for control of coastal erosion.
- (h) Mining of sands, rocks and others sub strain materials except other minerals not available out side the CRZ areas.
- (i) Construction activities in ecologically sensitive areas.
- (j) Any construction activities between the Low Tide line and high tide line except in permitted areas.
- (k) Dressing or altering of sand dunes, hills natural features including landscape changes.

REGULATION OF PERMISSIBLE ACTIVITIES

1. Clearance shall be given for any activities with in the Coastal Regulation Zone if it requires waterfronts and fore shore facilities.
2. The following activities will require environmental clearance from Ministry of Environment and Forest Govt. of India.
 - i) Construction activities related to Defense requirements for which fore shore facilities are required (e.g. Jetties etc.)
 - ii) Operational constructions for ports and harbors and lighthouses requiring water frontage Jetty, waves quays etc.
 - iii) Thermal Power Plants (only fore shore facilities for transport of raw materials for intake of cooling water and out fall for discharge of treated waste water).
 - iv) All other activities with investment exceeding rupees Five Crores.
3. j) The Coastal states and Union territory Administration shall prepare Coastal Zone Management Plans at the earliest and approval be taken from Central Govt. in the Ministry of Forest and Environment.

- ii) Within the Framework of such approval plans the State Govt./ U.T. Administration or local Authorities shall regulate all development and activities within the CRZ.

COASTAL AREA CLASSIFICATION AND DEVELOPMENT ZONE

For regulating developmental activities, the coastal stretches within 500 meters of HTL on the land ward side are classified into the following different categories of coastal regulation zones (CRZ) four categories.

CATEGORY I (CRZ-I)

The areas that are ecologically sensitive and important such as national parks, sanctuaries, reserve forest, wild life habitats, mangroves, coral reef area close to breeding spawning ground of fish and marine life, Historical heritage area, and areas likely to be inundated due to rise in sea level due to global warming. It covers the area between high tide line and low tide line.

CATEGORY II (CRZ-II)

The areas that have already been developed up to and close to the shoreline. For this purpose, developed area is referred to as that area within the municipal limits or in other legally designated urban area which is already substantially built up and which has been provided with drainage and approach roads and other infrastructure facilities, such as water supply and sewerage mains.

Some development on land ward side of existing road and structures and proposed road shown on the coastal zone management plan are permissible in this zone.

CATEGORY III (CRZ-III)

The area that are relatively undisturbed and those which do not belong to either category –I or ii. These will include coastal zone in the rural areas (developed and undeveloped) and also area within municipal limits or in other legally designated urban areas, which are not substantially built up.

CATEGORY IV (CRZ-IV)

Coastal stretches in the Andaman and Nicobar, Lakshadweep and small islands except those designated as CRZ-I, CRZ-II and CRZ-III.

CONCLUSION

Coastal area is vital to the prosperity of country and usually most productive areas, supporting a wealth of marine resources. In recent times, with rapid industrialization, urbanization, resultant pollutions and depleting resources along the coast have resulted in degradation of coastal ecosystem and diminishing the living resources. Environmentally effective coastal zone management requires accurate, up to date and comprehensive scientific data on which policy

decision can be based. The accurate delineation of high tide line and low tide line on the basis of hydrographic surveys is the important issues while making the CRZ plan charts for coastal zone management study and protection of coastal features.

In view of above, there is a necessity to prepare CRZ plan and CZM chart for entire coastal zone as per International standard of quality and accuracy. There is some specification of CRZ plan charts including scale, projection, size, limit, vertical datum etc. The CRZ plan should give us developed coast with less disturbance to the ecological balance rather than to have undeveloped coast. One should care about the content of CRZ plan chart and use as a tool for development along the coast. For better charting, accuracy up to ± 10.5 meters is required through out the surveys within large scale i.e. 1: 25000 scales. The coastal stretches within 500 meters of HTL on land ward side are classified into four categories of CRZ for regulating coastal activities.