

REPORT ON
ISLAND COASTAL REGULATION ZONE (ICRZ) FOR
GREAT NICOBAR ISLAND
Andaman & Nicobar Islands
AS PER ICRZ NOTIFICATION, 2019

PREPARED BY



National Centre for Sustainable Coastal Management (NCSCM)
Ministry of Environment, Forest and Climate Change
GOVERNMENT OF INDIA

Submitted to
Department of Environment & Forest
Andaman & Nicobar Administration

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Director, NCSCM

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LIST OF ABBREVIATIONS

ICRZ	Island Coastal Regulation Zone
IPZ	Island Protection Zone
IIMP	Integrated Island Management Plan
ESA	Ecologically Sensitive Areas
GIS	Geographic Information System
HTL	High Tide Line
NDZ	No Development Zone
EMP	Environment Management Plan
ANCZMA	Andaman & Nicobar Coastal Zone Management Authority
LTL	Low Tide Line
MOEF&CC	Ministry of Environment, Forest and Climate Change
NCSCM	National Centre for Sustainable Coastal Management
NCZMA	National Coastal Zone Management Authority
Sol	Survey of India
OSM	Open Series Map published by Survey of India

EXECUTIVE SUMMARY

The Ministry of Environment, Forest and Climate Change, Government of India, New Delhi issued Notification No. S.O.1242(E) dated 8th March, 2019, referred to as the Island Coastal Regulation Zone (ICRZ) Notification, 2019, in supersession of IPZ Notification 2011, declaring the designated areas as Island Coastal Regulation Zone (ICRZ), with a view to conserving and protecting the unique environment of coastal stretches and marine areas, besides ensuring livelihood security to the fisher communities and other local communities in the coastal areas and to promote sustainable development based on scientific principles, taking into account the dangers of natural hazards and sea level rise due to global warming. The ICRZ notification, 2019 declares the coastal stretches of the eight bigger oceanic islands in Andaman and Nicobar such as Middle Andaman, North Andaman, South Andaman, Baratang, Havelock, Little Andaman, Car Nicobar and Great Nicobar Islands and the water area up to territorial water limits of the country, as the Island Coastal Regulation Zone (hereinafter referred to as the ICRZ).

The Union Territory Administration was directed to revise or update the Island Coastal Zone Management Plan (ICRZP) framed under IPZ Notification, 2011 number S.O. 20(E), dated 6th January, 2011. All the project activities attracting the provisions of ICRZ notification, 2019 shall be required to be appraised as per the updated ICRZP under this notification and until and unless the ICRZP is so revised or updated, provisions of this notification shall not apply and the plans prepared as per provisions of IPZ Notification, 2011 shall continue to be followed for appraisal and CRZ clearance to such projects.

As per the provisions of the ICRZ Notification, 2019, the Department of Environment & Forest, Andaman & Nicobar Administration entrusted the responsibility of preparation of the Island Coastal Regulation Zone Plan to the National Centre for Sustainable Coastal Management (NCSCM), Chennai, which is an authorized agency approved by the Government of India, for the said purpose, vide Ministry of Environment & Forest Government of India order No. J-17011/8/92-IAIII dated 8th August, 2019. The NCSCM, Chennai has completed the preparation of ICRZP of Great Nicobar Island on 1:25000 scale as per the guidelines of ICRZ Notification 2019. The Island Coastal Regulation Zone Plan (ICRZP) of Great Nicobar Island comprises of HTL, LTL, various regulation lines such as 20m, 50m, and 100m, ICRZ classes such as ICRZ I, ICRZ III, and ICRZ IV etc.

The ICRZ Plans database (shapefiles) prepared as per the IPZ Notification, 2011 which were finalized by the National Centre for Sustainable Coastal Management (NCSCM) and approved by the MoEFCC, have been used as the base for revision or updation of the ICRZ plans, as per the provisions contained in the ICRZ Notification, 2019. The HTL, LTL, ESAs, & the other data were taken from above database in preparation/updation the ICRZ plan, as required under the provisions of the ICRZ Notification, 2019. Based on the

ICRZ notification, 2019, various regulatory lines viz. at a distance of 20 metres, 50 metres, and 100 metres landward from HTL respectively, as applicable in various ICRZ categories were demarcated. Classification of different ICRZ categories was done as per the ICRZ notification, 2019. In case of mangrove areas of greater than 1000 sq.m, a mangrove buffer of 20m has been provided. Other buffer lines were drawn wherever necessary, as specified in the ICRZ Notification, 2019. HTL, LTL, ICRZ categories, and infrastructure were superimposed on the cadastral map and the ICRZ maps on 1:25,000 scale were prepared with Survey of India toposheets as base maps.

The turtle nesting grounds, coral reefs, megapod nesting ground, biosphere reserve, National park, tribal reserve area etc were as provided by Department of Environment and Forest, Union Territory of Andaman and Nicobar Administration were used for the preparation of ICRZ Plans of Great Nicobar Island.

Geo-referenced cadastral maps in soft copies (shapefile format) were obtained from the Department of Environment and Forest, Union Territory of Andaman and Nicobar Administration. The datum used for preparation of the ICRZ maps of Great Nicobar Island was WGS 84 and the projection was UTM Zone 46N. Field work was carried out all along the coast of Great Nicobar Island during 2019-2020 to validate the details and to collect better ground truth/data for the preparation of coastal land use maps. At the same time, various location errors and spatial errors that could get magnified in large-scale maps such as cadastral maps were contained through appropriate spatial approaches. Two sets of maps were prepared in 1:25,000 scale namely (i) ICRZ map depicting different ICRZ categories; and (ii) Coastal land use maps (i.e., land use map used to define ICRZ). There are 11 ICRZ maps covering the coastal areas of Great Nicobar Island on 1:25,000 scale and 11 corresponding Coastal land use maps on 1:25,000 scale.

The ICRZ of Great Nicobar Island consists of ICRZ I (ICRZ IA & ICRZ IB), ICRZ III (NDZ, 50 to 100m from HTL) and ICRZ IV (ICRZ IVA & ICRZ IVB). ICRZ area statistics is shown in Table 4 of the report.

1. INTRODUCTION

The Coastal Regulation Zone (CRZ) Notification was first issued by the Government of India on 19.2.1991 under sub-section (1) of section and clause (V) of subsection (2) of section 3 of the Environment (Protection) Act, 1986 with the aim to provide comprehensive measures for the protection and conservation of India's coastal environment. The notification was reissued in 2011 vide notification No S. O 19 (E), dated 6th January, 2011. The MOEF&CC once again issued ICRZ notification, 2019 vide No. S.O.1242(E) dated 8th March, 2019 in supersession of the Island Protection Zone Notification, 2011 vide S.O. 20(E), dated the 6th January, 2011.

By the ICRZ notification, 2019, a specified width of the coast is sought to be protected by restricting setting up and expansion of any industry, operation or process and manufacture or handling or storage or disposal of hazardous substances. The objective of the ICRZ Notification, 2019 is to conserve and protect the unique environment of coastal stretches and marine areas, besides ensuring livelihood security to the fisher communities and other local communities in the coastal areas and to promote sustainable development based on scientific principles taking into account the dangers of natural hazards and sea level rise due to global warming. The coastal zone, consisting of ecologically sensitive areas and other geomorphological features play a vital role in maintaining the integrity of the coast. These ecological sensitive areas that are extremely vulnerable have to be managed judiciously by maintaining a balance between ecology and development. The ICRZ Notification regulates human activities on the coast with a view to maintaining coastal sustainability.

As per the ICRZ notification, 2019, the eight bigger oceanic islands in Andaman and Nicobar (ICRZ Islands) such as South Andaman, Middle Andaman and North Andaman, Baratang, Little Andaman, Havelock, Car Nicobar and Great Nicobar Islands are grouped as (a) Group-I: Islands with geographical areas >1000 sq.km and (b) Group-II: Islands with geographical areas >100 sq.km but < 1000 sq.km. The Great Nicobar Island falls under the the Group-II Island category (Amendment to the ICRZ notification 2019 vide S.O.2. (E) dated 1st January 2021).

As per the ICRZ notification, 2019, ICRZ of Great Nicobar Island is the land area from High Tide Line (HTL) up to 100m on the landward side along the sea front and 20 m or width of the creek whichever is less for the tidal influenced water bodies; the inter-tidal zone and water and the bed area between the LTL to the territorial water limit (12 Nm) in case of sea and the water and the bed area between LTL at the bank to the LTL on the opposite side of the bank, in case of tidal influenced water bodies.

1.1. ICRZP Planning Process

Para 5(i) of the ICRZ Notification of 2019 inter-alia provides that the Union Territory shall revise or update their respective island coastal zone management plan (ICRZP) framed under IPZ Notification, 2011 number, as per provisions of this notification and submit to the Ministry of Environment, Forest and Climate Change for approval at the earliest.

The Union territories of Andman and Nicobar administration shall prepare draft ICRZ plans in 1:25,000 scale map identifying and classifying the ICRZ areas within the territories in accordance with the guidelines given in Annexure-IV to this notification, which involve public consultation. All developmental activities listed in this notification shall be regulated by the Union territory administration, the local authority or the Andaman and Nicobar Coastal Zone Management Authority within the framework of such approved ICRZP, as the case may be, in accordance with provisions of this notification.

Para 5(iv) of the said Notification of 2019 further provides that the ICRZ plans may be prepared or updated by the Union territory by engaging reputed and experienced scientific institution(s) or the agencies including the National Centre for Sustainable Coastal Management (hereinafter referred to as the NCSCM) of Ministry of Environment, Forest and Climate Change and in consultation with the concerned stakeholders. Para 3(ii) of Annexure -IVA of ICRZ notification, 2019 stipulates that ICRZ Maps on scale 1:25,000 shall be got prepared by any of the agencies identified by the MoEF&CC vide its Office order number J-17011/8/92-IA-III dated 14th March 2014 using the demarcation of the High Tide Line or LTL, as carried out by NCSCM.

As per the ICRZ Notification, 2019, the draft ICRZ plan shall be submitted to the A&N CZMA for appraisal, including appropriate consultations and recommendations in accordance with the procedure(s) laid down in the Environment (Protection) Act, 1986. Thereafter, the the Ministry of Environment, Forest and Climate Change shall consider and approve the draft plans.

1.2. Development of a coastal database and information system

Coastal Information System refers to Geographic Information System (GIS) applied to the coastal zones for acquiring, storing, organizing, analysing, modelling and managing geospatial data. The approved database as per IPZ notification, 2011 will be utilized for updating the existing ICRZ plans and it comprises information on the following areas:

- a) coastal protection
- b) fisheries
- c) aquaculture
- d) tourism
- e) mining

- f) ports and harbours
- g) coastal resource management
- h) infrastructure development and planning, etc
- i) coastal land use/land cover including ESAs
- j) coastal population

The above database was enriched based on the requirement as per ICRZ notification, 2019. For the updation/preparation of the ICRZPs, the above essential details were inducted in the information system.

1.3. Generation of ICRZ maps

As per the ICRZ Notification, 2019, ICRZ Maps on scale 1:25,000 shall be got prepared by any of the agencies identified by the MoEF&CC vide its Office order number J-17011/8/92-IA-III dated 14th March 2014 using the demarcation of the High Tide Line or LTL, as carried out by NCSCM. Various regulatory lines viz. at a distance of 20 metres, 50 metres, and 100 metres from HTL respectively, as applicable in various ICRZ categories, were demarcated and superimposed in the ICRZ Maps. HTL, LTL and ICRZ boundaries, as applicable, were also demarcated in the ICRZ maps along the banks of tidal influenced inland water bodies. The ICRZ classification such as CRZ I (ESAs, archaeological and heritage sites), ICRZ II (Developed area/ municipal areas), ICRZ III (undeveloped /rural areas) and ICRZ IV (water body) have been incorporated in the plans. In case of mangrove areas of greater than 1000 sq.m, a buffer line of 20m has been provided and the buffer zone is classified as ICRZ IA. With the above information, including other data as mentioned in the notification, the draft ICRZ maps on 1: 25,000 scale were generated as per the Annexure -IVA of the of the ICRZ Notification, 2019. The same were submitted to the Department of Environment and Forest, U.T. of Andaman and Nicobar Administration.

2. GREAT NICOBAR ISLAND, UNION TERRITORY OF ANDAMAN AND NICOBAR ISLAND

2.1 Union Territory of Andaman and Nicobar Islands

The Islands are situated in the Bay of Bengal between 60° 45' and 130° 41' North Latitudes and 92° 12' and 93° 57' East Longitudes (Figure 1). The Islands located North of 10° North Latitude are known as Andaman Group of Islands while Islands located South of 10° North Latitude are called Nicobar Group of Islands. The total area of ANIs is 8249 Sq. Km There are about 572 islands, islets and rocks with a coastal line of about 1962 Kms. As per Census, 2011, 21 major islands in Andaman Group and 10 major islands in Nicobar Group are inhabited (Forest Statistics, 2019).

The original inhabitants of the Andaman Group of Islands are the tribes such as the Great Andamanese, the Jarawas, the Onges, and the Sentinelese. The Nicobar Group of Islands are occupied by people of Mongoloid origin and two major distinct groups of tribal people are present (Nicobaris and the Shompens). Though there has been substantial increase in the human population of the Islands, the population of most of the indigenous tribes, Particularly Vulnerable Tribal Groups has marginally increased. The increase in human population has been mainly due to settlement under colonization schemes and immigration from other parts of the country (Forest Statistics, 2019).

The population of A & N Islands as per 2011 census is 3, 80,581 of which 2, 02,871 are males and 1, 77,710 females and this contributes to 0.031 % of the country's total population. The population density as per 2011 Census is 46 persons per sq.km against 43 persons per sq.km recorded in 2001 Census. There is only one urban area, of 16.6 per Sq. km. (Port Blair Municipal town), which caters to a population of 1,08,058 persons as per census 2011. The total population of the ANI is 3,80,581. (South Andaman District: 2,38,142; North & Middle Andaman District: 1,05,597 and Nicobar District: 36,842). Rural population constitute 62.29% and urban population constitute 37.70 %. An overview of the Andaman and Nicobar Island is given in Table 1 and 2

Table 1: Overview of A&N Islands

1	Geographical Area of A & N Islands	8249 sq km
2	Population	3,80,581(as per 2011 census)
3	Forest Cover	6742 Km ² (ISFR, 2019)
4	Percentage of Forest Cover	81.74 %
5	Reserved Forest	5613 sq km
6	Protected Forest	1558 sq km
7	Total Recorded Forest/Recorded Forest Area	7171 sq km
8	Mangrove Cover	616 sq km
9	Mini rehabilitation centre	1No.

10	Biological Park	1No.
11	National Park	06 Nos.
12	Wildlife Sanctuaries	01 No.
13	Biosphere Reserve	01 No.
14	State Bird	Andaman Wood Pigeon (Columba palumboides)
15	State Tree	Andaman Padauk (Pterocarpusdalbergioides)
16	State Animal	Dugong or Sea Cow (Dugong dugon)
17	State Flower	Pyinma (Lagerstroemia hypoleuca)
18	Actual Rainfall at Port Blair 2019	3405.4 mm
19	Mean Maximum Temperature Recorded at Port Blair during the year 2019	31.0 mm
20	Mean Minimum Temperature Recorded at Port Blair during the year 2019	24.5 mm
21	Highest Point in A&N Islands	Saddle Peak (732 m above Mean North Andaman Sea Level)
22	Highest Point in South Andaman Dist.	Mt. Harriet (365 m above Mean Sea Level)
23	Highest Point in Nicobar Dist.	Mt. Thullier (642 m above Mean Sea Level)
24	Distance by Sea (a) Port Blair to Kolkata (b) Port Blair to Chennai (c) Port Blair to Visakhapatnam	1255 Km 1190 Km 1200 Km
25	Distance by Air (a) Port Blair to Kolkata (b) Port Blair to Chennai (c) Port Blair to Visakhapatnam	1303 Km 1330 Km 1220 Km

Source: - Directorate of Economics & Statistics; Forest Statistics, 2019.

Table 2: General information about A&N Islands

26	Location	Bay of Bengal
	Longitude	92° 12' to 94° 16' E
	Latitude	6° 45' to 13° 41' N
27	Altitude	
	Saddle Peak (North Andaman Islands)	732 m AMSL
	Mt.Thullier (Great Nicobar Islands)	642 m AMSL
28	Length and Breadth of Andaman Group of Islands	
	Total length (in Km.)	467
	Maximum Width (in Km.)	52
	Average Width (in Km.)	24

29	Length and Breadth of Nicobar Group of Islands	
	Total Length (in Km.)	259
	Maximum Width (in Km.)	58
30	*Islands/Villages	
	Revenue villages	209
	Census Villages	555
	Inhabited Villages	396
	Uninhabited villages	159
	Total Islands/Islets (approx.)	572
	i) Inhabited Islands	38
	ii) Uninhabited Islands and rocks	541
	1. Largest inhabited islands in Andaman Group	
	Middle Andaman Island (Area in Sq.Km.)	1536
	2. Largest inhabited island in Nicobar Group	
	Great Nicobar Island (Area in Sq.Km.)	1045
	3. Smallest inhabited island in Andaman Group	
Curlew Island (Area in Sq.Km.)		
4. Smallest inhabited island in Nicobar Group		
Pillomillow Island (Area in Sq.Km.)	1.3	
31	i) Area of A & N Islands (in Sq. Km)	
	Total Area	8249
	South Andaman District	2672
	Nicobar District	1841
	North & Middle Andaman District	3736
	Urban area	37.92
	1. Rural area	8211.08
	2. Per capita Land Area (As per 2011 Census)	0.022
3. Per Capita Forest & Tree Cover (As per ISFR-2019)	1.77 ha	
32	4. Length of Coast line (in Km.)	1962

Source: - Directorate of Economics & Statistics; Forest Statistics, 2019.

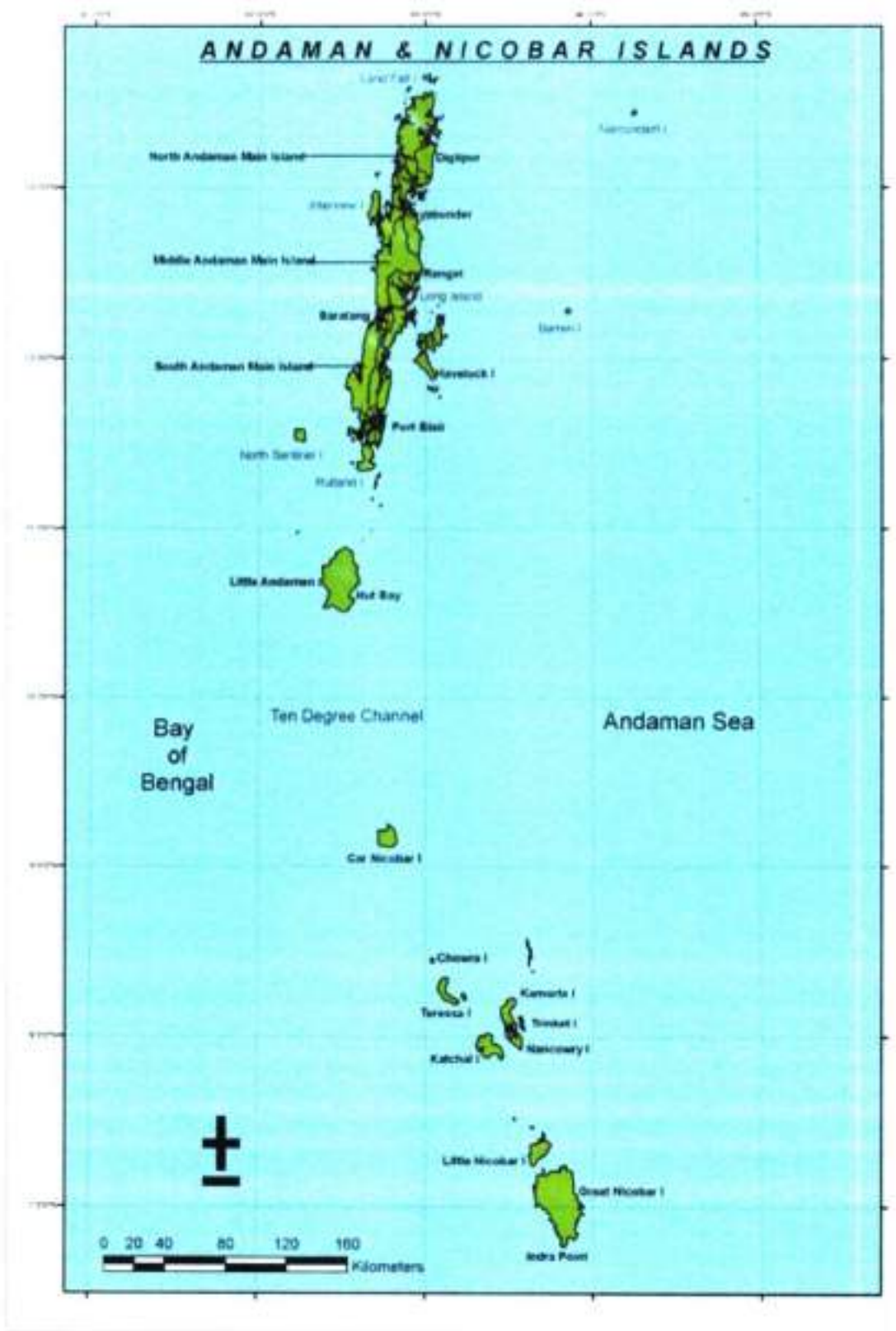


Figure 1: Map of the Andaman & Nicobar Islands

2.2. Great Nicobar Island (GNI)

2.2.1. Location:

The Great Nicobar Island (GNI) is located in the Nicobar district to the south of the Andaman Islands (Figure 2). It is the largest of the cluster of islands with an area of about 910.074 sq. km and the southernmost of the group of Nicobar Islands located at a distance of approximately 520 km from Port Blair. Indira Point, earlier known as Pygmalion Point, lies at the southern tip of the GNI and is the southernmost point of the country. It is at an approximate distance of 144 km from the Sumatra Island of Indonesia. The GNI is situated between $6^{\circ}44'52.94''\text{N}$ to $7^{\circ}14'57.76''\text{N}$ and $93^{\circ}38'43.07''\text{E}$ to $93^{\circ}57'5.91''\text{E}$. The headquarters of the GNI is Campbell Bay, where most of the Government offices are situated. The total length of the coast is approximately 202 km.

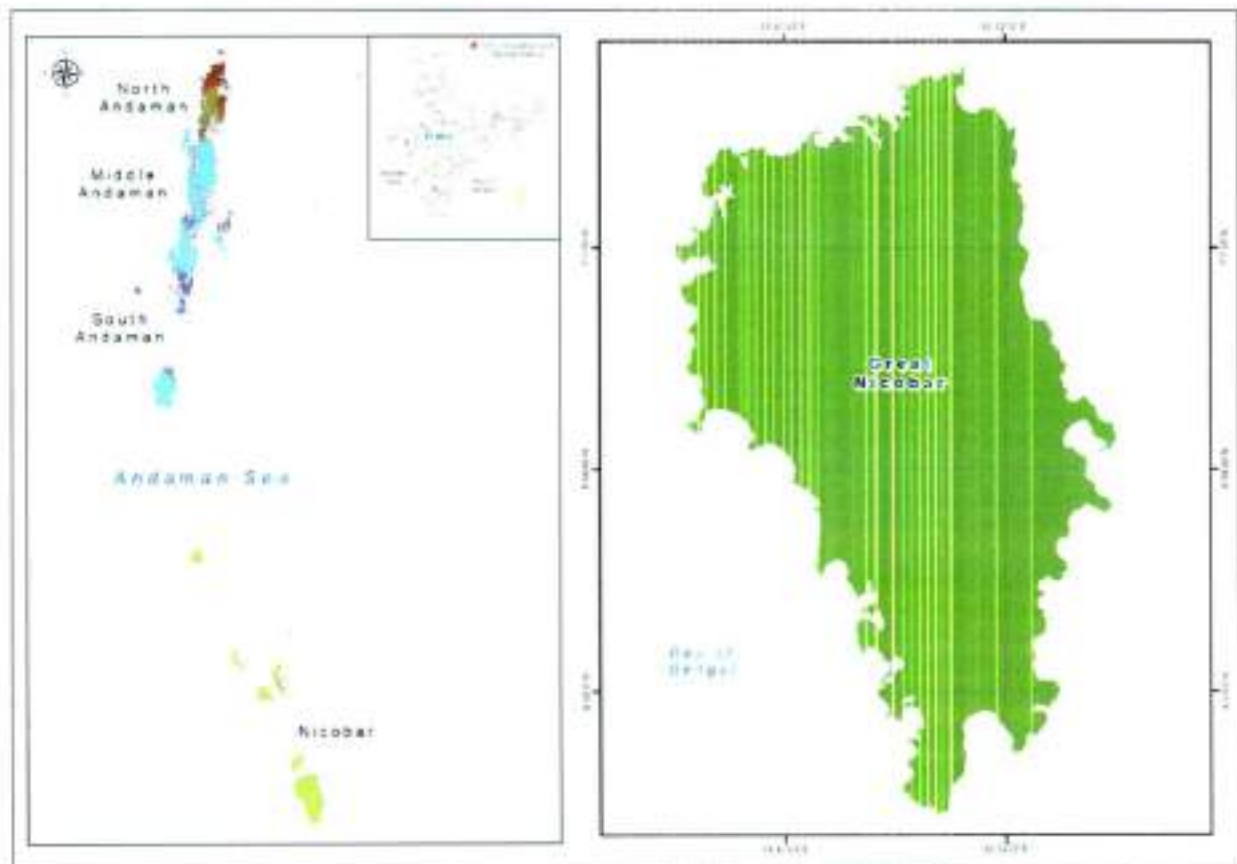


Figure 2: Location Map of Great Nicobar Island

2.2.2. Topography

The island is highly rugged with very narrow flat land along the sea coasts and hill ranges running in north south direction. The reef consists of numerous spurs and ridges enclosing narrow valleys which culminate in a peak known as the Mt. Thullier (670m above M.S.L.). From this peak, 5 main ranges of hills radiate i.e. Das range, Chaturvedi range, Nanda range, Shani range and Mani range. These hill ranges rise abruptly to substantial height from the seashore/resulting in a spectacular panoramic view of the island.

The island is about 55km long between Murray point in the north to Indira point in the south. It has a width of about 30km in the north but the island narrows down to only about 3km in the southern tip.

2.2.3. Demography

As per 2011 census, the total population of Nicobar district is 36,842, with Great Nicobar Tehsil having a population of 8367 persons which includes 5025 males and 3342 females respectively. The Primary occupation of the tribal population is agriculture, which is basically limited to coconut, arecanut and banana plantations. (<https://nicobars.andaman.nic.in/demography/>)

2.2.4. Coastal Geomorphology and Ecosystem

The coastline is highly indented and several creeks penetrate into the island from inland bays. Some of the bay mouths are studded with several damaged and partially submerged rocky pinnacles which become visible at low tide. The principal bays around the island are Galathea, Casuarina, Ganges harbor, Valdora and Trinkat Champlong. The coastline is generally coralline with magnificent coral reefs at certain places, extending far away from the shoreline. ([https://bsi.gov.in/uploads/documents/Public Information/publication/books/district_flora/Flora%20of%20Great%20Nicobar%20Island.pdf](https://bsi.gov.in/uploads/documents/Public%20Information/publication/books/district_flora/Flora%20of%20Great%20Nicobar%20Island.pdf))

The Galathea Bay Wildlife Sanctuary hosts diverse habitats. The sanctuary is shaped by the Galathea River that originates on Mount Thullier, the island's tallest peak at the northeastern end of the island, and empties on its southern bay. This teal river cuts through hilly tropical evergreen rainforests and marches towards a coralline coast. The rainforests shelter several species including the endemic Nicobar tree shrew (*Tupaia nicobarica*) and the Nicobari scrubfowl (*Megapodius nicobariensis*). Just before the river meets the sea, it feeds mangrove-lined marshlands and lagoons that shelter saltwater crocodiles. But the silver beaches that form at the river's mouth are its most spectacular habitats. They are India's and Southeast Asia's largest nesting site for leatherbacks. (<https://roundglassustain.com/habitats/galathea>)

The Great Nicobar Biosphere Reserve harbours a wide spectrum of ecosystems comprising tropical wet evergreen forests, mountain ranges reaching a height of 642 m (Mt. Thullier) above sea level, and coastal plains. The region is noted for its rich

biodiversity. It houses 650 species of angiosperms, ferns, gymnosperms, bryophytes and lichens among others. The tract is rich in plant diversity and fosters a number of rare and endemic species, including *Cyathea alboretacea* (tree fern) and *Phalaenopsis speciosa* (orchid). A total of 14 species of mammals, 71 species of birds, 26 species of reptiles, 10 species of amphibians and 113 species of fish have been reported. The region also harbours a large number of endemic and endangered species of fauna. To date, 11 species of mammals, 32 species of birds, 7 species of reptiles and 4 species of amphibians have been found to be endemic. Of these, the well-known Crab-eating Macaque, Nicobar Tree Shrew, Dugong, Nicobar Megapode, Serpent Eagle, salt water crocodile, marine turtles and Reticulated Python are endemic and/or endangered. (<https://en.unesco.org/biosphere/aspac/great-nicobar>)

3. PURPOSE & SCOPE OF ICRZ Plans

The primary purpose and utility of the ICRZ plans is to describe proposed actions to be implemented by administrative or other public authorities and potentially by the private sector to address priority management issues in the coastal zone over a defined implementation period. These issues include:

1. Ensuring livelihood security to the fisher communities and other local communities, living in the coastal areas
2. Conserving and protecting coastal stretches, its unique environment and its marine area and
3. Promoting sustainable development.

The ICRZ plans should support the goals and objectives of the ICRZ Notification, 2019 and assist in implementing an integrated coastal zone management plan. The ICRZ plans has to be prepared in accordance with Annexure - IVA of the ICRZ Notification, 2019. The ICRZ notification, 2019 has made it mandatory for the U.T. to prepare/update the Island Coastal Zone Management Plan (ICRZP) as per the provision of ICRZ notification, 2019 and get it approved by the Government of India. Island Coastal Regulation Zone map for Great Nicobar Island has been prepared accordingly as part of the study and submitted to the Department of Environment and Forest, Andaman and Nicobar Administration for their review, public consultation and acceptance. Thereafter, the maps were appraised by the ANZMA. The A&N administration subsequently submitted the final ICRZ map to the Ministry of Environment Forest and Climate Change for their approval for implementation.

4. ISLAND COASTAL REGULATION ZONE PLAN

The Island Coastal Regulation Zone maps are prepared on 1:25,000 scale with Survey of India toposheets as base maps. The maps were submitted to MoEF&CC, Government of India for approval after stakeholder/public consultations. The local level ICRZ maps of 1:4000 cadastral scale will be prepared for the use of local bodies and other agencies to facilitate implementation of the ICRZ plans. The present study and report provide the ICRZ maps on 1:25,000 scale.

4.1. Demarcation of High Tide Line (HTL) and Low Tide Line (LTL)

The HTL is defined as “the line on the land up to which the highest waterline reaches during the spring tide” which is different from the well-known and widely accepted definition of High Tide Level. The above definition of HTL takes into consideration not only the level of inundation due to maximum tide (spring tide) but also the wave set up (having a seasonal periodicity). The sea level thus formed due to the combined effect of spring tide and wave set up gives the line of maximum reach of water on the land. Unlike the HTL, the Low Tide Line (LTL) has not been defined for ICRZ. The HTL required specific definition since the 50, 200 and 500m setback lines are defined with respect to the HTL. The conventional definition of lowest low water level and the resultant low water line during spring tide is taken as the LTL.

As per Para IB.8 of Annexure-I of CRZ notification 2011, the following geomorphological features shall be considered while demarcating in HTL or LTL:

- Landward (monsoonal) berm crest in the case of sandy beaches
- Rocks, Headlands, Cliffs
- Seawalls or revetments or embankments.

Morphological signatures are good indicators of shoreline oscillation and inundation of coastal waters, which could be used for identifying the HTL. The inundation of coastal waters on to the land and seasonal shoreline oscillations are dependent on coastal morphology. Shoreline remains stable and would not retreat significantly along cliffy coasts. The shoreline retreats up to the cliff base along pocket beaches. Artificial morphologies like seawalls confine the oscillation of shoreline along the line of the structure itself. Sandy beaches are prone to seasonal and long-term shoreline oscillation. Long-term stability of the beach and the position of the stable part of the beach would be evident from morphological signatures such as berm and berm crest.

This has been done by using satellite data. Manual on “Demarcation of High Tide Line and Low Tide line” prepared by NCSCM is referred during the delineation of HTL and LTL.

The following signatures/ geomorphologic/ man-made structures used to demarcate the HTL are explained below using suitable illustrations.

4.1.1. Landward (monsoonal) berm crest for beaches

In all the well-formed wide beaches, one or more berms (which are the nearly horizontal part of the beach formed by the deposition of sand by wave action) are usually observed. The seaward end of the berm, which shows a sudden downward slope, is called the berm crest. When there is only one berm, it normally gets eroded during the monsoon with a berm crest on the landward side. But when there are two berms, the landward berm is the monsoonal berm, which normally does not get eroded. Or else we can say that the erosion reaches only to the second berm crest. Since the tidal waters do not reach the coast beyond this landward berm crest, it is taken as the HTL.

4.1.2. Seawall/revetments/embankments

In highly erosion-prone areas, there are no landward second berms. Such locations will be protected mostly by seawalls. During monsoon season, a majority of these are devoid of beaches. The waves impinge upon the seawall during the monsoon season, especially during high tide. Thus, they are the artificial barriers stopping the waves/tides at the coast. Since the seaward part of the seawall in most cases is defaced due to erosion, the landward toe is taken as the HTL boundary in such locations.

4.1.3. Permanent Vegetation Line

Permanent vegetation develops on the stable part of the beach. The part of the beach landward of monsoon berm crest is mostly stable. Hence, the line of permanent vegetation/perennial plants normally follows the line of monsoon berm crest, which is considered as the HTL.

4.1.4. Coastal sand dune

Coastal sand dunes are ridges or a series of ridges that form at the rear of the beach. Sometimes sand dunes are covered with vegetation. If the vegetation is present then the seaward limit of vegetation boundary is considered as HTL. For eroding dunes, the toe of the foreshore face of dune is considered as HTL.

4.1.5. Mangroves

These are evergreen, tropical coastal plants/ trees occurring in the intertidal zone, bays, estuaries, deltas, lagoons, creeks or any low energy zones of the coast. Landward boundary of mangrove to the extent where tidal water reaches, is considered as the HTL.

4.1.6. Rocks, Headlands, Cliffs

At rock outcrops, headlands and cliffs, the water is quite deep in that there is virtually no spatial displacement in the waterline. Hence, the High-Water Line available in the topographical maps (transferred to the base map) can be taken as such.

4.1.7. Other geomorphic/land cover features

Some coasts have a fairly large inter-tidal zone fringed by vegetation or coastal alluvial plain. In such cases, the HTL is demarcated using tonal differentiation between clayey or silty clay region along with salt encrustation upto supra- tidal mudflat and adjoining

sandy alluvial plain. Other geomorphic/ land cover features such as marshes, mangroves, fringing corals, salt pans, aquaculture ponds, and seaward side of agricultural/ horticulture land are also used for some of the coastal regions.

4.1.8. Influence of Tidal action

The distance up to which CRZ is applicable upstream of estuaries, creeks, backwaters and lagoons depends on the extent of tidal influence. The distance up to which tidal influence is experienced is dependent on salinity concentration: if it is 5 ppt or more (during the driest month) the water body is considered to be influenced by tidal action (CRZ, 2011). Salinity measurements are carried out during the driest month (usually during March-April) to determine the limit. Tidal barrages/lock and bunds constructed are also taken as the limit of tidal influence.

High Tide Line (HTL) and Low Tide Line (LTL), demarcated by NCSCM, Chennai, were used for preparation the ICRZPs, as required under the provisions of the ICRZ Notification, 2019.

4.2. Demarcation of Ecologically Sensitive Areas

Ecologically Sensitive Areas (ESAs), demarcated by NCSCM, Chennai using high resolution satellite imageries and the data provided by the A&N Administration were used for preparation the ICRZPs, as required under the provisions of the IPZ Notification, 2011. The database of ICRZ plan of Great Nicobar Island prepared as per the IPZ Notification, 2011 which have been scrutinized by the Technical Scrutiny Committee, finalized by NCSCM and approved by the MoEFCC, were used as the base for revision or updation of the ICRZP, as per the provisions contained in the ICRZ Notification, 2019. Apart from the above database, Hydrographic charts of Naval Hydrographic Office, Toposheets of the Survey of India, and Satellite image were used. In the present work, the above approved database including HTL, LTL, ESAs, etc. were used as a base database for updation of draft ICRZ maps prepared as per ICRZ notification, 2019. However, the data provided by the A&N Administration comprises Administrative Boundaries, Fish landing Centre, National Park, Wild Life Sanctuaries, Biosphere Reserve, Tribal and Jarawa Reserve Boundaries, etc.

5. ECOLOGICALLY SENSITIVE AREAS AND COASTAL LAND USE

Coastal land use is one of the most essential information for assessing the status of natural resources and the coastal environment. It is also a pre-requisite for zonations of the coast as well as for making a sustainable coastal zone management plan. As per the "Manual on Demarcation of High Tide Line and Low Tide Line and Preparation of CZMP of the Coast of India", the coastal land use maps on 1:25000 scale were prepared using satellite images during 2018 - 2019. The landward extent of coastal land use area is the landward limit of CRZ boundary or hazard line whichever is more landward. For classification of coastal land use, the classification system mentions in the "HTL Manual" was followed (Annexure - I). The coastal land use map also depicted the ESAs, HTL and other details within the ICRZ jurisdiction of Great Nicobar Island. Administrative boundaries, infrastructure details etc. were superimposed on the map and the draft map was prepared.

In Great Nicobar Island, coral reefs are the largest component of land use, occupies 161.18 sq km. The second largest component is the Biosphere reserve which occupies 43.57 sq km. Protected Forest occupies 19.16 sq km. The total area covered by mangroves in is 4.53 sq. km. Table 3 provides the details of the coastal land use classes for Great Nicobar Island.

Table 3: Area statistics of coastal land use classes (within ICRZ Jurisdiction)

Landuse classes	Area in sq km
Coral Reefs	161.18
Biosphere reserve	43.57
National Park	19.30
Protected forest	19.16
Mangroves	4.53
20m Mangroves Buffer	2.48
Turtle nesting site	1.77
Megapod nesting site	1.33
Beach	3.27
Creek or river	21.96
Agriculture land	2.57
Habitation/Settlement	0.08
Jetty	0.03
Tribal area with in ICRZ	69.79

5.1. Mangroves

Mangroves are trees of various species of several families, which grows only where they can come into permanent contact with sea water or brackish water. They occur at the edges of the tropical or subtropical seas, bays, lagoons and estuarine regions (Gerlech, 1973). Mangroves occur in quiet depositional coastal environments. Although mangroves grow in a variety of sediments including coral sands, they attain full development on the fine grained, soft organic mud deposited on the sheltered coast. Mangrove roots help accumulation of the silt, which gradually builds up to, form dry land, thus extending the coastline. Mangroves support in maintaining a rich coastal biodiversity.

Total mangroves area of Great Nicobar island is 4.53 sq km. Most of the mangroves in Great Nicobar island are of the patches along the river or estuarine banks. A mangroves area greater than 1000 sq m, a buffer of 20m has been provided as per the ICRZ notification, 2019. However, mangroves in private land will not require a buffer.

Mangroves are found in the mangrove swamp north of Campbell bay near Pigeon island, near Tenlao and also to its north, east of Magarnala beach near Campbell bay, near Anderson bay and a small patch to the north of Matait Anla. In the south, it is it is found inside the Galathea bay wildlife sanctuary along the Galathea river. Whereas, in the west mangroves are found near Kokeon and a small patch is found to its north.

5.2. Coral Reefs

Corals are exclusively polypoid, marine organisms which belong to Class: Anthozoa of Phylum: Coelenterata/ Cnidaria, capable of secreting a massive calcareous skeleton. Hermotypic or reef building corals, colonize suitable sea floor substrates in tropical and sub-tropical shallow waters with appropriate ecological conditions (summer maximum mean temperature of 28°C and winter minimum mean temperature generally above 18°C, colonizing mainly photic depths, salinity 35±2 psu etc (SAC, 2012). Coral reef is defined as 'a complex organogenic framework of calcium carbonate (primarily of corals), which forms a rocky eminence on the sea floor and customarily grows upwards to the tide limit' (Fairbridge, 1968). Coral reefs are one of the most productive and complex coastal ecosystems with high biological diversity. The high productivity is owing to the combination of its own primary production and support from its surrounding habitat. All corals are protected in India as they are listed as Schedule I species under the Wildlife Protection Act, 1972. This implies that touching, removing, dislocating corals in any fashion is a prohibited activity in the Indian territorial waters.

In Great Nicobar Island, coral reef is linear and extensively well-developed fringing reef. The coral reef data was provided by the Environment and Forest department, Andaman

and Nicobar Administration. The total area of Corals reef in Great Nicobar island is 161.80 sq km

5.3. Protected Forests:

The Indian Forest Act, 1927 contains provisions pertaining to reserved forest whereby the state government could constitute any forest land or wasteland as a reserved forest or protected forest by a notification in the official gazette. Forest conservation act 1980 defines the term "Forest". No state government or other authority can, without the prior approval of the central Government, make any order to: (1) de-reserve forest, (ii) use any forest land for non-forestry purpose; (iii) lease out forest land to a private agency; (iv) cut naturally grown trees in forest land for the purpose of using it for re-forestation. Total Protected forest area of great Nicobar island is 19.16 sq. km.

5.4. Nesting Ground of Birds

Nesting Ground of Birds are the designated area where large number of birds/migratory birds are nesting and that area is highly susceptible to changes by human activities and requires special protection. Megapod Nesting ground data provided by the Environment and Forest department, Andaman and Nicobar Administration. The total area of Megapod nesting area in Great Nicobar island is 1.33 sq km. Megapod nesting sites are found in the north of crocodile creek, to the south of Laful south, to the south of Pigeon island, and near Tenlao. On the south it is found in the Galathea bay wildlife sanctuary. It is also found to the north and south of Casuariana bay near Pulo Kunji, Teesta point and north of Alexandra river mouth.

5.5. Turtle Nesting Grounds:

Sea turtles or marine turtles are generally found in waters over continental shelves; females come ashore to sandy beaches where they were born where they dig nests and lay eggs during the nesting season. These beaches are known as turtle nesting grounds/sites. India has five of the seven species of known sea turtles. Mass nesting occurs along sandy beaches on the west and east coast. After hatching, the turtles find their way back to the sea.

The Turtle nesting ground data was provided by the Environment and Forest department, Andaman and Nicobar Administration. It covers total area of 1.77 sq km in Great Nicobar island.

5.6. Biosphere reserve

The Great Nicobar Biosphere Reserve harbours a wide spectrum of ecosystems comprising tropical wet evergreen forests, mountain ranges and coastal plains. The

region is noted for its rich biodiversity. It houses 650 species of angiosperms, ferns, gymnosperms, bryophytes and lichens among others. The tract is rich in plant diversity and fosters a number of rare and endemic species, including *Cyathea albosetacea* (tree fern) and *Phalaenopsis speciosa* (orchid). A total of 14 species of mammals, 71 species of birds, 26 species of reptiles, 10 species of amphibians and 113 species of fish have been reported. The region also harbours a large number of endemic and endangered species of fauna. To date, 11 species of mammals, 32 species of birds, 7 species of reptiles and 4 species of amphibians have been found to be endemic. Of these, the well-known Crab-eating Macaque, Nicobar Tree Shrew, Dugong, Nicobar Megapode, Serpent Eagle, salt water crocodile, marine turtles and Reticulated Python are endemic and/or endangered. (<https://en.unesco.org/biosphere/aspac/great-nicobar>).

The Biosphere reserve data was provided by the Environment and Forest department, Andaman and Nicobar Administration. It covers total area of 43.57 sq km in Great Nicobar island.

5.7. National Park

An area, whether within a sanctuary or not, can be notified by the state government to be constituted as a National Park, by reason of its ecological, faunal, floral, geomorphological, or zoological association or importance, needed to for the purpose of protecting & propagating or developing wildlife therein or its environment. No human activity is permitted inside the national park except for the ones permitted by the Chief Wildlife Warden of the state under the conditions given in CHAPTER IV, WPA 1972. (http://www.wiienviis.nic.in/Database/npa_8231.aspx).

In Great Nicobar Island having two national parks. One is Campbell Bay national park which cover an area of 15.22 sq km and another is Galathia national park which cover an area of 4.08 sq km.

The details of data used in preparation of ICRZ plan is shown Annexure -II.

6. METHODOLOGY FOR PREPARATION OF ICRZ Plans

The ICRZ Plans database (shapefiles) prepared as per the IPZ Notification, 2011 which have been scrutinized by the Technical Scrutiny Committee, finalized by the National Centre for Sustainable Coastal Management (NCSCM) and approved by the MoEFCC, have been used as the base for revision or updation of the ICRZ plans, as per the provisions contained in the ICRZ Notification, 2019. The HTL, LTL, ESAs, & the other data were taken from above database in preparation/updation the ICRZ plan, as required under the provisions of the ICRZ Notification, 2019. Based on the ICRZ notification, 2019, various regulatory lines viz. at a distance of 20 metres, 50 metres, and 100 metres landward from HTL respectively, as applicable in various ICRZ categories were demarcated. Classification of different ICRZ categories were done as per the ICRZ notification, 2019. In case of mangrove areas of greater than 1000 sq.m, a buffer line of 20m has been provided. Other buffer lines were drawn wherever necessary, as specified in the CRZ Notification, 2019. HTL, LTL, ICRZ categories, and infrastructure were superimposed on the cadastral map and a ICRZ maps in 1:25,000 scale was prepared with Survey of India toposheets as base maps.

The turtle nesting grounds, coral reefs, megapod nesting ground, biosphere reserve, national park, tribal reserve area etc were as provided by Department of Environment and Forest, Union Territory of Andaman and Nicobar Administration were used for the preparation of ICRZ Plans of Great Nicobar Island. Data sources used in the preparation of ICRZ plans is given in Annexure II.

6.1. Field mapping and map preparation

Geo-referenced cadastral maps in soft copies (shapefile format) for Department of Environment and Forest, Union Territory of Andaman and Nicobar Administration. The datum used was WGS 84 and the projection was UTM Zone 46N for Great Nicobar island. In addition of the above database, fieldwork was carried out all along the coast during 2019-2020 to validate the details and to provide better results in the preparation of coastal land use maps. At the same time, various location and spatial errors that could get magnified in large-scale maps such as cadastral maps were contained through appropriate approaches. Photographs taken during the fieldwork has been given as Annexure-III. Steps involved in the preparation of ICRZ maps are shown in Figure 3.

Two sets of maps were prepared on 1:25000 scale namely (i) **ICRZ map depicting different ICRZ categories;** and (ii) **Coastal land use maps** (i.e. land use map used to define ICRZ).

With the above information, the draft maps in 1: 25,000 scales were generated as per ICRZ Notification, 2019 and were submitted to the Department of Environment and Forest, Union Territory of Andaman and Nicobar Administration.

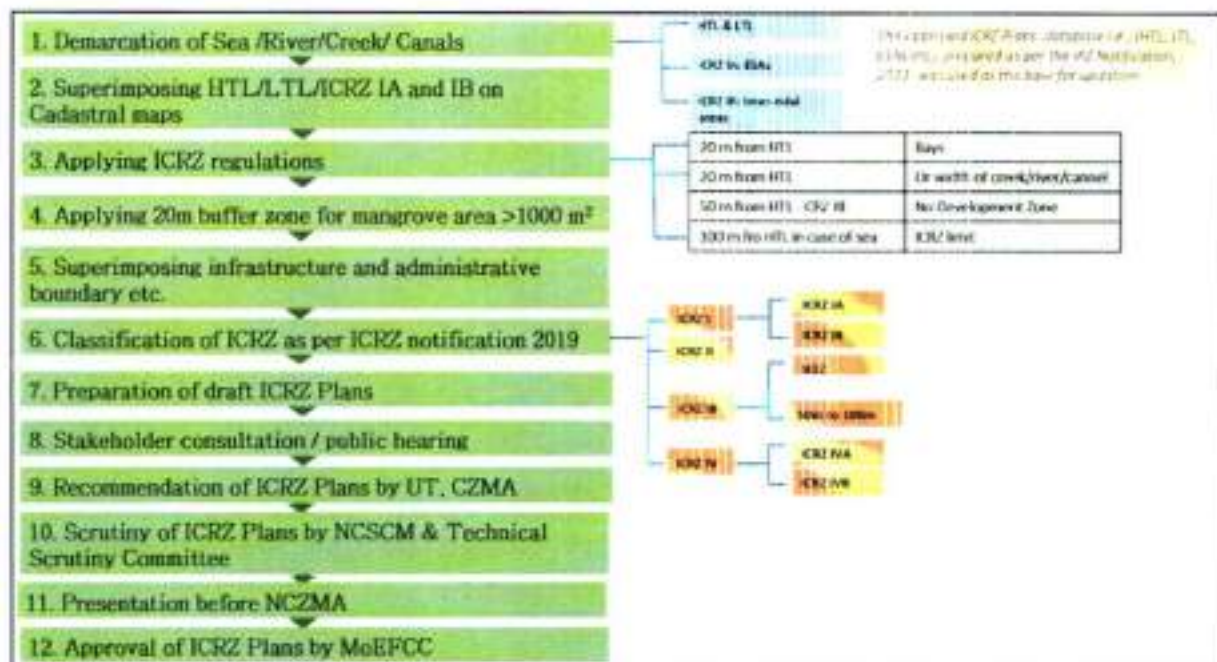


Figure 3: Various steps involved in the preparation of ICRZ Plans

The 33rd Meeting of the National Coastal Zone Management Authority (NCZMA) was held on 24.05.2018 under the chairmanship of Secretary (EF&CC). The relevant portion of the Minutes of the meeting is given below for ready reference

4. Draft CZMPs/ICRZPs presented by the respective States were deliberated upon and the Chairman, NCZMA directed as under:

“All the draft CZMPs shall be routed through NCSCM for a final round of technical scrutiny. Additional inputs, information and clarification etc., if any, envisaged by the States to be incorporated in their CZMPs, may be provided to NCSCM in the intervening period. After the technical scrutiny, a briefing note may be prepared for the guidance of the NCZMA”

Accordingly, NCSCM constituted a Technical Scrutiny Committee under the Chairmanship of Dr. Shailesh Nayak, former Secretary, Ministry of Earth Sciences, Govt. of India, to scrutinize the Coastal Zone Management Plans (CZMPs) and Island Coastal Regulation Zone (ICRZPs) and Integrated Island Management Plans (IIMPs) prepared by agencies authorized by MoEF&CC and provide recommendation for NCZMA.

Hence, after the public hearing the modified maps need to be presented before the TSC for scrutiny and recommendation. After that the maps need to be appraised by the ANCZMA. The final draft map need to be presented to the NCZMA for recommendation and finally to the MoEF&CC for approval.

Accordingly, the ICRZ maps of Great Nicobar Island were prepared on 1:2500 scale to clearly identify, demarcate and represent different categories of Island coastal regulation zone such as ICRZ IA, ICRZ IB, ICRZ NDZ-CRZ III, 50 to 100m - ICRZ -III, ICRZ IVA, ICRZ IVB in distinct colors and symbols. Whereas, in coastal land use map (used to define ICRZ Plans) Ecologically Sensitive Areas (ESAs) such as biosphere reserve, coral reefs, national park, megapod nesting ground, protected forest, mangroves, turtle nesting ground, etc etc as required under the ICRZ Notification, 2019 were integrated.

7. ICRZ CLASSIFICATIONS

For the purpose of conserving and protecting the coastal areas and marine waters, the ICRZ areas were classified as follows. ICRZ I which includes ecologically sensitive areas and the geomorphological features which play a role in maintaining the integrity of the coast (ICRZ IA) as well as the inter-tidal zone (ICRZ IB) and in case of mangrove areas of greater than 1000 sq.m, a buffer line of 20m has been provided which is considered as ICRZ IA; ICRZ II - the developed land areas up to or close to the shoreline; ICRZ III are land areas that are relatively undisturbed (viz. rural areas, etc.) and those which do not fall under ICRZ-I, ICRZ-II and ICRZ IV (the water and bed) area as per the ICRZ Notification 2019. The ICRZ III area has been classified into two categories such as No Development Zone (NDZ) and 50m to 100m from HTL.

The schematic diagram showing various ICRZ categories is given below (Figure 4).

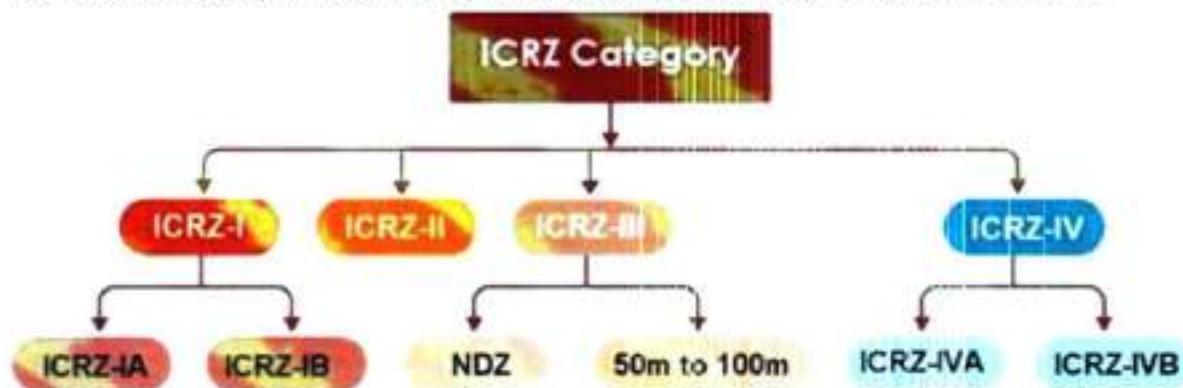


Figure 4: Classification of CRZ area

7.1. ICRZ I

For the purpose of conserving and protecting the coastal areas and marine waters, the ICRZ area shall be classified as follows, namely: -

- (i) ICRZ-I areas are environmentally most critical and shall be further classified as under:

ICRZ IA:

(a) areas are ecologically sensitive and the geomorphological features which play a role in the maintaining the integrity of the coast, include the following:

- (i) Mangroves (in case mangrove area is more than 1000 square meters, a buffer of 20 meters along the mangroves shall be provided and such area shall also constitute ICRZ-I A);

- (ii) Corals and coral reefs;
- (iii) Sand dunes;
- (iv) Biologically active mudflats;
- (v) National parks, marine parks, sanctuaries, reserve forests, wildlife habitats and other protected areas under the provisions of Wild Life (Protection) Act, 1972 (53 of 1972), Forest (Conservation) Act, 1980 (69 of 1980) or Environment (Protection) Act, 1986 (29 Of 1986), including Biosphere Reserves;
- (vi) Salt marshes;
- (vii) Turtle nesting grounds;
- (viii) Horse shoe crabs' habitats;
- (ix) Sea grass beds;
- (x) Seaweeds
- (xi) Nesting grounds of birds;
- (xii) Areas or structures of archaeological importance and heritage sites.

- (b) A detailed environment management plan shall be formulated by the Union territories for such ecologically sensitive areas (ESAs) in respective territories, as mapped out by NCSCM, based on guidelines as contained in Annexure-I and integrated in the ICRZ Plans.

ICRZ IB: The area between Low Tide Line and High Tide Line is the Inter Tidal Zone and categorized as ICRZ IB.

7.2. ICRZ II

(a) The ICRZ-II shall constitute the developed land areas up to or close to the shoreline, within the existing municipal limits or in other existing legally designated urban areas, which are substantially built-up with a ratio of built up plots to that of total plots being more than 50% and have been provided with drainage and approach roads and other infrastructural facilities, such as water supply and sewerage mains etc.

(b) The developed Land areas along the creeks or tidal influence water bodies, located in the ICRZ II shall also be earmarked as ICRZ II and the distance upto which the ICRZ is to be reckoned as the land area between HTL to 20 meters or width of the creek, whichever is less on the landward side along the tidal influenced water bodies that are connected to the sea and the distance upto which development along such tidal influenced water bodies is to be regulated shall be governed by the distance upto which the tidal effects are experienced which shall be determined based on salinity

concentration of five parts per thousand (ppt) measured during the driest period of the year and distance up to which tidal effects are experienced shall be clearly identified and demarcated accordingly in the Island Coastal Regional Zone Plans (hereinafter referred to as the ICRZ Plans).

7.3. ICRZ III

The land areas that are relatively undisturbed (viz. rural areas etc.) and those do not fall under ICRZ-II, shall constitute ICRZ-III

Explanation: -

1. For Group-I Islands, the area up to 100 meter from the HTL on the landward side shall be earmarked as the No Development Zone (NDZ). Provided that the NDZ for development of eco-tourism activities shall be 50 m and the Andaman and Nicobar administration shall ensure that the concerns of the fishing community are fully protected.

2. For Group-II Islands, the area up to 50 mts from the HTL on the landward side shall be earmarked as the No Development Zone (NDZ). Provided that the NDZ for development of eco-tourism activities shall be 20 m and the A&N administration shall ensure that the concerns of the fishing community are fully protected.

As per paragraph 1, clause (ii) of ICRZ notification 2019, the Great Nicobar Island falls under the ICRZ (Group-II) Island category (Amendment to the ICRZ notification 2019 vide S.O.2. (E) dated 1st January 2021).

(vi) Land area up to 20 m from the HTL, or width of the creek whichever is less, along the tidal influenced water bodies in the ICRZ III, shall also be earmarked as the NDZ and the distance upto which the NDZ is to be reckoned as the land area between HTL to 20 meters or width of the creek, whichever is less on the landward side along the tidal influenced water bodies that are connected to the sea and the distance upto which development along such tidal influenced water bodies is to be regulated shall be governed by the distance upto which the tidal effects are experienced which shall be determined based on salinity concentration of five parts per thousand (ppt) measured during the driest period of the year and distance up to which tidal effects are experienced shall be clearly identified and demarcated accordingly in the Island Coastal Regional Zone Plans (hereinafter referred to as the ICRZ Plans). Note: The NDZ shall not be applicable in such areas falling within notified Port limits.

7.4. CRZ IV

The ICRZ - IV shall constitute the water area and shall be further classified as under..

ICRZ- IVA: The water area and the sea bed area between the Low Tide Line up to twelve (12) nautical miles on the seaward side shall constitute ICRZ-IV A.

ICRZ- IVB: ICRZ-IV B areas shall include the water area and the bed area between LTL at the bank of the tidal influenced water body to the LTL on the opposite side of the bank, extending from the mouth of the water body at the sea up to the influence of tide, i.e., salinity of five parts per thousand (ppt) during the driest season of the year.

7.5. Regulation lines

The 20, 50 and 100m regulated lines were drawn landward from the HTL. Once the HTL, bays are well defined and demarcated, the above CRZ lines could be drawn without any ambiguity following planimetric spatial methods. In case of mangrove area >1000 sq. m, a 20 m buffer zone was drawn which is also considered as ICRZ IA.

8. HAZARD LINE

As per para 2 of Annexure -IVA, A 'Hazard line' being demarcated by the Survey of India (SOI) taking into account the extent of the flooding on the land area due to water level fluctuations, sea level rise and shoreline changes(erosion/accretion) occurring over a period of time. The hazard line shall be used as a tool for disaster management plan for the coastal environment, including planning of adaptive and mitigation measures. With a view to reduce the vulnerability of the coastal communities and ensuring sustainable livelihood, while drawing the CZMPs, the land use planning for the area between the Hazard line and HTL shall take into account such impacts of climate change and shoreline changes. However, the Hazard line for the Andman and Nicobar island is not available. Hence, it is not shown in the ICRZ Maps.

9. ICRZ CATEGORIES OF GREAT NICOBAR ISLAND

9.1 ICRZ categories of Great Nicobar Island

The ICRZ of Great Nicobar Island consists of ICRZ I (ICRZ IA & ICRZ IB), CRZ III (NDZ, 50 to 100m from HTL) and ICRZ IV (ICRZ IVA & ICRZ IVB). ICRZ area statistics is shown in Table 4. Figure 5 displays the Index map showing the numbering of ICRZ maps at Great Nicobar Island.

Table 4: Area statistics in different ICRZ categories

ICRZ Category	Area in sq km
ICRZ - IA	212.32
ICRZ - IB	14.96
No Development Zone	2.13
50m to 100m from HTL	0.53
ICRZ IVB	13.54
Total ICRZ area (except ICRZ IVA)	243.48

9.1.1. ICRZ I

The ICRZ IA are those ecologically sensitive and the geomorphological features which play a role in maintaining the integrity of the coast. These are Mangroves, Coral reefs, Turtle nesting grounds, Protected Forest, Megapod Nesting ground, National Park, Biosphere reserve are available in Great Nicobar Island coast. The above mention features/ thematic layer was merged to make ICRZ IA. Mangroves area greater than 1000 sq m, a 20m buffer has been provided which is also considered as ICRZ IA.

Total CRZ IA area of Great Nicobar Island is 212.32 sq. km. which includes the mangroves buffer area. The ICRZ IB (Intertidal Zone) is the area between HTL and LTL which covers total area of 14.96 sq km. Total ICRZ I area occupies 227.28 sq. km of Great Nicobar Island.

9.1.2. ICRZ II

CRZ-II shall constitute the developed land areas up to or close to the shoreline, within the existing municipal limits or in other existing legally designated urban areas, which are substantially built-up with a ratio of built-up plots to that of total plots being more than 50 per cent and have been provided with drainage and approach roads and other infrastructural facilities, such as water supply, sewerage mains, etc.

There is no ICRZ II area in Great Nicobar Island.

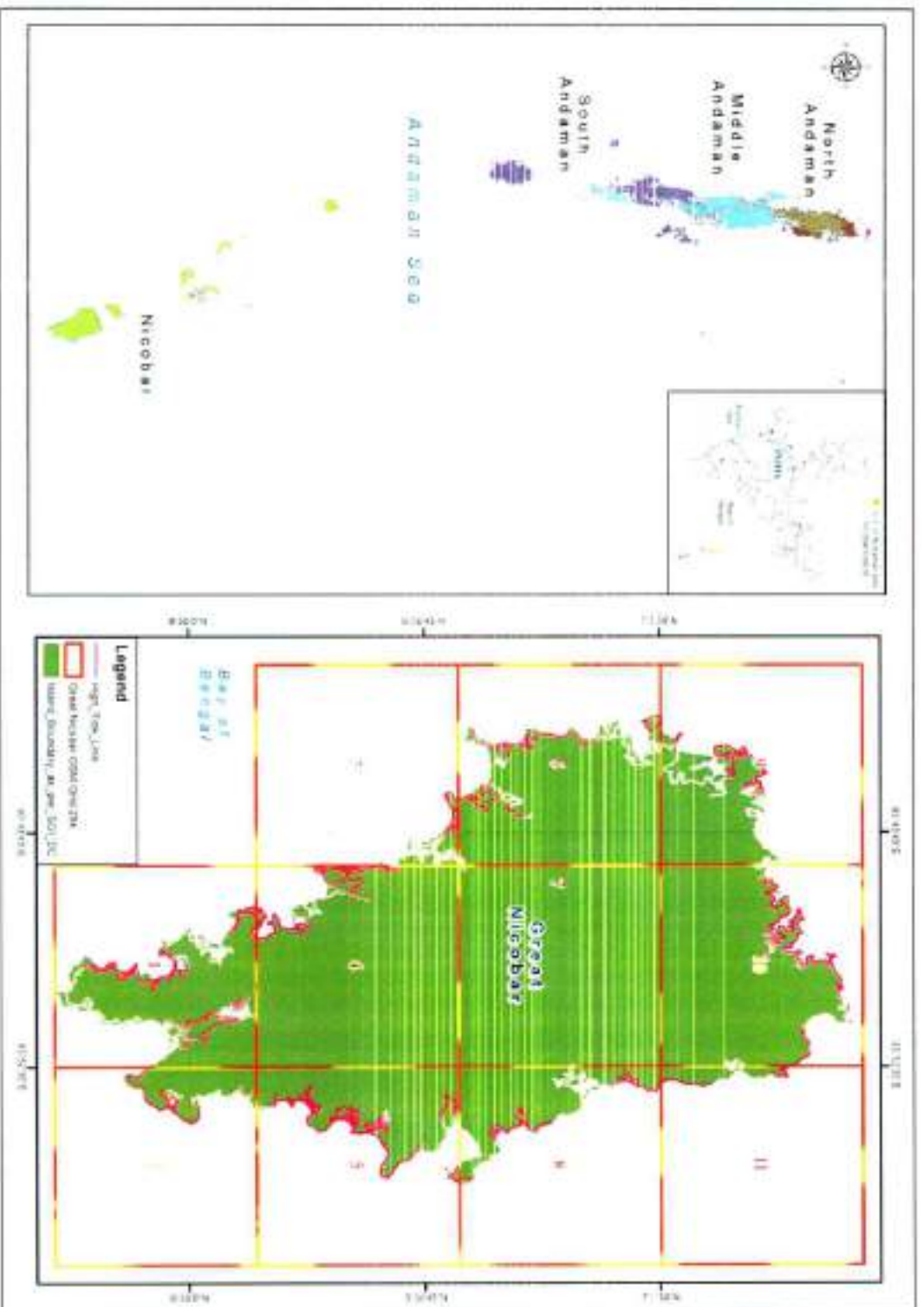


Figure 5: Index Map showing the number of ICZMP MAPs in Great Nicobar Island

9.1.3. ICRZ III

Land areas that are relatively undisturbed (viz. rural areas, etc.) and those which do not fall under ICRZ I, ICRZ-II, and ICRZ IV shall constitute ICRZ-III. ICRZ-III area are classified into two categories such as No Development Zone (NDZ), 50m to 100m landward from HTL.

The total ICRZ III area of Great Nicobar Island is 2.66 sq km. The calculated area of No Development Zone is 2.13 sq km and 50m to 100m from HTL is 0.53 sq km.

9.1.4. ICRZ IV

The water area comes under CRZ IV and is further classified into IVA and IVB.

- i. ICRZ IVA: The water area and the sea bed area between the Low Tide Line up to twelve nautical miles on the seaward side;
- ii. ICRZ-IV B areas shall include the water area and the bed area between LTL at the bank of the tidal influenced water body to the LTL on the opposite side of the bank, extending from the mouth of the water body at the sea up to the influence of tide, i.e., salinity of five parts per thousand (ppt) during the driest season of the year.

The ICRZIVB category covers an area of 13.54sq km at Great Nicobar Island.

10. CONCLUSIONS

- High Tide Line (HTL), Low Tide Line (LTL) and Ecologically Sensitive Areas (ESAs), demarcated by the National Centre for Sustainable Coastal Management (NCSCM), Chennai, were used in preparation/updation the ICRZPs, as required under the provisions of the ICRZ Notification, 2019.
- Based on the ICRZ notification, 2019, various regulatory lines viz. at a distance of 20 metres, 50 metres, and 100 metres from HTL respectively, as applicable in various ICRZ categories, were superimposed in the ICRZ maps.
- Survey of India topographical sheets were used as base maps.
- HTL, LTL, ESAs etc. were superimposed over the cadastral map. Various administrative boundaries, infrastructure etc. as required in ICRZ notification 2019 were overlaid over the above map.
- The draft ICRZ maps were published on the website seeking suggestions/comments from the public and stakeholders.
- Island Coastal Regulation Zone Plan (ICRZPs) of Great Nicobar Island on 1:25000 scale has been prepared as per the provision of ICRZ notification 2019
- Coastal land use maps (i.e. land use map used to define ICRZ including Ecologically Sensitive Areas) were prepared on 1: 25000 scale.
- There are eleven ICRZ maps and corresponding 11 numbers of coastal land use maps covering the coastal areas of Great Nicobar Island in 1:25000 scale.
- The dominant ESAs are Coral reefs, Mangroves, Turtle nesting grounds, Protected Forest, Megapod Nesting sites, National Park, Biosphere reserve etc.
- The calculated area of ICRZ I is 227.28 sq km (including ICRZ IA and IB), NDZ area is 2.13 sq km and 50m to 100m from HTL is 0.53 sq km in Great Nicobar Island.
- The ICRZ Plans of Great Nicobar Island were approved by MoEF&CC, Government of India, vide MOEF&CC letter No. F. No. 12-3/2021-IA.III dated 1/06/2021 (enclosed at Annexure-IV).
- All developmental activities listed in the ICRZ notification 2019 shall be regulated by the Union Territory administration, the local authority or the A&N CZMA within the framework of the approved ICRZ plan prepared under ICRZ notification, 2019

REFERENCES

- Census of India, 2011, Ministry of Home Affairs, Government of India, www.censusindia.gov.in
- CRZ notification, 2011 (<https://parivesh.nic.in/writereaddata/ENV/crz23.PDF>)
- CRZ notification, 2019. Available at http://environmentclearance.nic.in/report/CRZ_Notifications.aspx
- <https://nicobars.andaman.nic.in/demography/>
- https://bsi.gov.in/uploads/documents/Public_Information/publication/books/district_flora/Flora%20of%20Great%20Nicobar%20Island.pdf
- http://cgwb.gov.in/District_Profile/AandN/Nicobar.pdf
- <https://nicobars.andaman.nic.in/demography/>
- <https://en.unesco.org/biosphere/aspac/great-nicobar>
- <https://roundglasssustain.com/habitats/galathea>
- <https://www.fao.org/3/x5627e/x5627e06.htm>
- <https://roundglasssustain.com/species/nicobar-megapode>
- <https://www.seaturtlesofindia.org/about/species/leatherback/#:~:text=In%20India%2C%20they%20are%20found,Island%20from%20the%20Nicobar%20group>
- <https://www.green.earth/blog/intertidal-zone-ecosystems-what-are-they-and-why-are-they-under-threat>
- Central Pollution Control Board, Government of India, (https://cpcb.nic.in/uploads/plasticwaste/Annual_Report_2018-19_PWM.pdf)
- Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India, (https://agricoop.nic.in/sites/default/files/Maharashtra-SAP_V1.3-2.pdf)

ANNEXURES

- I. Classification system for coastal land use
- II. Data sources used in the preparation of ICRZP maps
- III. Photographs taken during field work
- IV. Approval of ICRZ Plans of Great Nicobar Island as per ICRZ Notification, 2019
- MOEFCC letter dated 1/06/2021

CLASSIFICATION SYSTEM FOR COASTAL LAND USE

Level I	Level II	Level III
Agricultural land		
Forest (Non-tidal)	Natural	
	Manmade	
Wetlands	Mud/tidal flat	Sub-tidal
		Inter-tidal
		High tidal (with/without salt encrustations)
		Mud with vegetation
	Sand	Beach/ Sand Patch
		Spit
		Sand Bar/ Barrier Island
		Shoals
		Sand vegetation
	Rocks	Rocky coast
		Rock exposure
	Coral Reef	Reef flat
		Sand Patch /Beach
Coral Lagoon		
Coralline shelf		
Mangroves	Dense/sparse/degraded	
Marsh vegetation	(Density wise)	
Algae	(Density wise)	
Seagrass	Dense/sparse/degraded	
Water bodies	Estuary	
	Creek	
	Lagoon	
	Bay	
Barren land	Mining areas /dumps	
	Rock outcrops/ Gullied land	
Shoreland	Saline area	Vegetated
	Coastal dune	Vegetated
	Reclaimed mudflat	
Built-up land	Habitation/ settlement	With vegetation
	Open/vacant land	
	Transportation	Roads
		Railways
		Port/Harbour/ jetty
Waterways		
Airport		
Other features	Aquaculture pond	
	Reclaimed area	
	Salt pan	
	Seawall / Embankment	
	Tanks/ Ponds/ Lakes	

Level I	Level II	Level III
	Rivers/ streams/ Drains	
	outfalls/effluents/ canals	
HTL		
LTL		
Hazard Line		
Village/ Taluk/ District/ State/ MPA/ Forest boundary		
CRZ boundary	100m/ 200m/ 500m/ 50m buffer zone of mangroves/ width of the creek/	

DATA SOURCES

Data Source used in the preparation of ICRZ maps

Source	Data
Department of Environment & Forest Andaman and Nicobar Administration /ANCZMA, U.T. of Andaman & Nicobar	<ul style="list-style-type: none"> • Administrative boundaries • Cadastral data in 1:4,000 scale • Fish Landing Centre • Road • National Park • Wild Life Sanctuaries • Biosphere Reserve • Turtle nesting grounds • Megapod nesting site • Coral reefs • Tribal and Jarawa Reserve Boundary
Survey of India	<ul style="list-style-type: none"> • Open Series Maps (OSM) Grid • Toposheets on 1:25,000 scale
NCSCM	<ul style="list-style-type: none"> • Lighthouse • High Tide Line • Low Tide Line • Breakwater/Jetty • ESAs and geomorphological features • ICRZ Regulation Line, boundary, categories and coastal land use
Others	<ul style="list-style-type: none"> • NHO charts • High Resolution Satellite images

PHOTOGRAPHS TAKEN DURING FIELD WORK



View of jetty at Campbell Bay



Another view of jetty at Campbell Bay



View of breakwater at Campbell Bay



Another view of breakwater at Campbell Bay



Another view of breakwater at Campbell Bay



View of the exposed corals near Campbell Bay port during low tide



Another view of the exposed corals and dead trees near Campbell Bay during low tide



View of existing infrastructure facility (Bridge) near Magarnala Beach



View of Magarnala beach



Turtle hatchery at Joginder Nagar beach



Another view of Joginder Nagar beach



Land cultivated with areca nut, coconut and other crops near Joginder Nagar



Another view of the cultivated land near Joginder nagar



Afforestation of mangrove, south of Joginder nagar beach



Another view of the existing mangrove trees near by the agricultural land, south of Goginder nagar beach



View of jetty at Nemo beach



View of the intertidal area near Shastri nagar



Another view of the intertidal area near Shastri nagar



View of the turtle hatchery at Shastri nagar beach



View of Shastri nagar beach with the coastal protection



Another view of Shastri nagar beach with the coastal protection



Another view of Shastri Nagar beach with the coastal protection



View of Indira point light house



View of Galathea Bay



Another view of Galathea Bay



Another view of Galathea Bay



Leatherback turtle hatchery at Galathea Bay wildlife sanctuary



Another view of the leatherback turtle hatchery at Galathea Bay wildlife sanctuary



View of the turtle nesting beach at Galathea Bay



View of Galathea River joining the sea water at Galathea Bay



Temporary road across the Galathea River that leads into wildlife sanctuary



Another view of the Galathea river from the temporary bridge



Settlements near Shastri Nagar



Coconut plantation near Shastri nagar settlement along with the infrastructure facility



Government Primary School at Shastri nagar



Agricultural plantation on the way to Joginder nagar from Shastri nagar



View of Laxman beach, near Campbell Bay



View of mangroves near Laxman beach



View of B-Quarry Beach



Another view of B-Quarry Beach



Intertidal zone with mangroves, north of Tenlao



Another view of the intertidal area with mangroves

F. No. 12-3/2021-IA.III
Government of India
Ministry of Environment, Forest and Climate Change
IA-III Division (CRZ)

Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi -3
Dated: 1st June, 2021

To,

The Member Secretary,
Andaman & Nicobar Coastal Zone Management Authority,
Department of Environment & Forests,
Van Sadan, Haddo, Port Blair-744101

Subject: Island Coastal Regulation Zone Plans of Great Nicobar Island as per ICRZ Notification, 2019 -regarding.

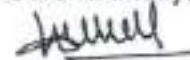
Sir,

This has reference to letter No. PCCF/EPA/1/Vol-XVI/493, dated 24/02/2021 furnishing therein the Island Coastal Regulation Zone (ICRZ) Plans of Great Nicobar Island, drawn as per the provisions of the Island Coastal Regulation Zone (ICRZ) Notification, 2019.

2. In this regard, it is to state that based on recommendation of the National Coastal Zone Management Authority in its 42nd meeting held on 23/03/2021, the Ministry of Environment, Forest and Climate Change hereby conveys its approval of the ICRZ Plans for the Great Nicobar Island. Further, it is to inform that all proposals received henceforth for ICRZ clearance shall be considered as per ICRZ Notification, 2019 only. However, pending proposals under IPZ Notification 2011, if any, may be considered at the discretion of project proponent.

This issues with the approval of the Hon'ble Minister, EFCC.

Yours faithfully,

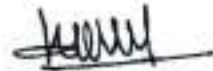


(Dr. H. Kharkwal)
Additional Director /
Scientist 'E' & MS CRZ

Copy to:

1. The Chief Secretary, Andaman & Nicobar Administration, Department of Environment & Forests, Van Sadan, Haddo, Port Blair-744101
2. The Deputy Director General of Forests (C), Integrated Regional Office, Chennai, Ministry of Environment, Forest and Climate Change, I and II Floor, Handloom Export Promotion Council, 34, Cathedral Garden Road, Nungambakkam, Chennai - 600034, Tamil Nadu

3. The Director, National Centre for Sustainable Coastal Management, Anna University, Chennai - 600025, Tamil Nadu
4. Office copy/Guard file



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