

EXECUTIVE SUMMARY

Preparation of Island Coastal Regulation Zone (ICRZ) Plan As per ICRZ Notification 2019

South Andaman Island, Union Territory of Andaman and Nicobar Island

1. The Ministry of Environment, Forest and Climate Change, Government of India, New Delhi issued Notification No. **S.O.1242(E)** dated 8th March, 2019 which is 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 conserve and protect the unique environment of coastal stretches and marine areas, besides 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, sea level rise due to global warming.
2. As per the provisions of the ICRZ Notification, 2019, the Department of Environment & Forest, Andaman & Nicobar Administration have been entrusted with the responsibility of preparation of the Island Coastal Regulation Zone Plan to 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 & Forests Government of India order No. J-17011/8/92-IA-III dated 14th March 2014. NCSCM, Chennai has completed the preparation of draft ICRZP of South Andaman Island as per the guidelines of ICRZ Notification 2019.
3. With this background, NCSCM has prepared the draft Island Coastal Regulation Zone Plans on 1: 25000 scale as per the guidelines given in the ICRZ Notification 2019. The draft Plan has been prepared indicating the following:
 - a. ICRZ - IA (Ecological Sensitive Areas),
 - b. ICRZ – IB (Inter Tidal Zone),
 - c. ICRZ – II (Developed Area)
 - d. ICRZ III (Undeveloped Area), and
 - e. ICRZ - IV (Water Area), including Cadastral information, etc.,
4. **Definition of ICRZ under ICRZ Notification 2019:** Under the ICRZ Notification 2019, the following areas were notified as Island Coastal Regulation Zone (ICRZ):
 - (i) The eight larger oceanic islands in Andaman and Nicobar (ICRZ Islands) shall be grouped as follows:

Group-I: Islands with geographical areas >1000 sq.km such as South Andaman, Middle Andaman and North Andaman.

Group-II: Islands with geographical areas >100 sq.km but < 1000 sq.km such as Baratang, Little Andaman, Havelock, Car Nicobar and Great Nicobar.

- (ii) The land area from High Tide Line (hereinafter referred to as the HTL) to 200 meters on the landward side along the sea front for Group-I Islands and 100 meters on the landward side along the sea front for Group-II Islands.

Explanation- For the purposes of this Notification, the expression “High Tide Line” means the line on the land upto which the highest water line reaches during the spring tide, as demarcated by the NCSCM, Chennai in accordance with the laid down procedures.

- (iii) (a) The ICRZ shall apply to 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).

(b) The distance of the ICRZ along the tidal influence water bodies, thus determined, shall be demarcated accordingly in the Island Coastal Zone Management Plan (hereinafter referred to as the ICRZP).

(c) The ICRZ boundaries along the creeks etc. as above shall however be subject to revision and final approval of the respective ICRZ Plans as per this Notification, framed with due consultative process and public hearing etc. and environmental safeguards enlisted therein. Till such time the ICRZ Plans to this notification is approved, the limit of 100 meters or width of the creek whichever is less, shall continue to apply.

Explanation: For the purposes of this sub-paragraph the expression tidal influenced water bodies means the water bodies influenced by tidal effects from sea in the bays, estuaries, rivers, creeks, backwaters, lagoons and ponds etc. that are connected to the sea.

(d) The intertidal zone means the land area between the HTL and the Low Tide Line (hereinafter referred to as the LTL).

(e) The 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, of tidal influenced water bodies.

5. Prohibited Activities within ICRZ

The following activities shall be prohibited, in general, within the entire ICRZ. Exceptions to these and other permissible or regulated activities in specific ICRZ categories viz. ICRZ-I, II, III & IV, shall however be governed by the provisions under para 5 of this Notification:

- (i) Destruction of corals.
- (ii) Mining of sand from in and around coral areas, nesting and breeding grounds of endemic and endangered species.
- (iii) Shore protection works (hard constructions) on the seaward side of the corals.
- (iv) Setting up of new industries and expansion of existing industries, operations or processes.
- (v) Manufacture or handling of oil, storage or disposal of hazardous substances as specified in the notification of Ministry of Environment, Forest & Climate Change.
- (vi) Setting up of new fish processing units.
- (vii) Land reclamation, bunding or disturbing the natural course of seawater.
- (viii) Discharge of untreated waste and effluents from industries, cities or towns and other human settlements.
- (ix) Dumping of city or town wastes including construction debris, industrial solid wastes, fly ash for the purpose of land filling.
- (x) Port and harbor projects in high eroding stretches of the coast.
- (xi) Mining of sand, rocks and other sub-strata materials.
- (xii) Dressing or altering active sand dunes.
- (xiii) In order to safeguard the aquatic system and marine life, disposal of plastic into the coastal waters shall be prohibited. Adequate measures for management and disposal of plastic materials shall be undertaken in the ICRZ.
- (xiv) Drawl of ground water

6. Classification of the ICRZ

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:
- (ii) **ICRZ-IA:**
 - (a) The ICRZ-I A shall constitute the following ecologically sensitive areas and the geo- morphological features which play a role in the maintaining the integrity of the coast viz.:
 - (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 CRZ –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, the Forest (Conservation) Act or Environment (Protection) Act; including Biosphere Reserves;
 - (vi) Salt Marshes;
 - (vii) Turtle nesting grounds;
 - (viii) Horse shoe crab's habitat;
 - (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.
- (iii) **ICRZ-I B:** The ICRZ-IB shall consist of the intertidal zone i.e. the area between Low Tide Line and High Tide Line shall constitute the ICRZ-I B.
- (iv) **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 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).
- (v) **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.

- (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.

- (vii) **ICRZ-IV:** The ICRZ - IV shall constitute the water area and shall be further classified as under:
- (viii) **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.
- (ix) **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. Regulation of permissible activities in the ICRZ

ICRZ-I.

- (i) **ICRZ-IA:** These areas are ecologically most sensitive and generally no activities shall be permitted to be carried out in the ICRZ-I A areas, with following exceptions:
- (a) Eco-tourism activities such as mangrove walks, tree huts, nature trails, etc., in identified stretches areas subject to such eco-tourism plan featuring in the approved ICRZ Plans as per this Notification, framed with due consultative process/ public hearing etc. and further subject to environmental safeguards and precautions related to the Ecologically Sensitive Areas, as enlisted in the ICRZ Plans.
 - (b) In the mangrove buffer, only such activities shall be permitted like laying of pipelines, transmission lines, conveyance systems/mechanisms and construction of road on stilts etc. that are required for public utilities.
 - (c) Construction of roads and roads on stilts, by way of reclamation in ICRZ-IA areas, shall be permitted only in exceptional cases for defence , strategic purposes and public utilities, subject to a detailed marine or terrestrial environment impact assessment or both, to be recommended by the Coastal Zone Management Authority (CZMA) and approved by the Ministry of Environment, Forest and Climate Change; and in case construction of such roads passes through mangrove areas or is likely to damage the mangroves, a minimum three times the mangrove area affected or destroyed or cut during the construction process shall be taken up for compensatory plantation of mangroves.
- (ii) **ICRZ-IB:**

The activities shall be regulated or permissible in the ICRZ-I B areas as under:

- (i) Land reclamation and bunding etc. shall be permitted only for activities such as;
- (a) Foreshore facilities like ports, harbours, Jetties, wharves, quays, slipway, bridges, hover ports for coast guard and sea links etc.
 - (b) Projects for Defense, strategic and security purpose;
 - (c) Road on stilts, provided that such roads shall not be authorized for permitting development on the landward side of such roads, till the existing High Tide Line:
 - (d) Provided that the use of reclaimed land may be permitted only for public utilities such as mass rapid or multimodal transit system, construction and installation of all necessary associated public utilities and infrastructure to operate such transit or transport system including those for electrical or electronic signaling system, transit stopover of permitted designs; except for any industrial operation, repair and maintenance.
 - (e) Measures for control of erosion.
 - (f) Maintenance and clearing of waterways, channels, ports and hover ports for coast guard.
 - (g) Measures to prevent sand bars, installation of tidal regulators, laying of storm water drains or for structure for prevention of salinity ingress and

freshwater recharge.

- (ii)
- (iii) Activities related to waterfront or directly needing foreshore facilities such as ports and harbours, jetties, quays, wharves, erosion control measures, breakwaters, pipelines, lighthouses, navigational safety facilities, coastal police stations, Indian coast guard stations and the like.
 - (iv) Power by non-conventional energy sources and associated facilities.
 - (v) Transfer of hazardous substances from ships to Ports, terminals and refineries and vice versa.
 - (vi) Facilities for receipt and storage of petroleum products and liquefied natural gas as specified in Annexure-II, subject to implementation of safety regulations including guidelines issued by the Oil Industry Safety Directorate in the Ministry of Petroleum and Natural Gas, provided that such facilities are for receipt and storage of fertilizers and raw materials required for fertilizers, like ammonia, phosphoric acid, sulphur, sulphuric acid, nitric acid etc.
 - (vii) Storage of non-hazardous cargo i.e. edible oil, fertilizers & food grains in notified Ports.
 - (viii) Hatchery and natural fish drying.
 - (ix) Existing fish processing units may utilize 25% additional plinth area for modernization purposes (only for additional equipment and pollution control measures) subject to the following:
 - (a) FSI of such reconstruction not exceeding the permissible FSI permissible as per prevalent town and country planning regulations.
 - (b) Additional plinth area is constructed only to the landward side.
 - (c) Approval of the concerned State Pollution Control Board or the Pollution Control Committee.
 - (x) Treatment facilities for waste and effluents and conveyance of treated effluents.
 - (xi) Storm water drains.
 - (xii) Projects classified or identified as strategic, Defence related projects and Projects of Department of Atomic Energy.
 - (xiii) Manual mining of atomic mineral(s) notified under Part-B of First Schedule of Mines and Minerals (Development and Regulation) Act, 1957 occurring as such or in association with one or other minerals in the inter-tidal zone by such agencies as authorised by Department of Atomic Energy, as per mining plan approved by the Department of Atomic Energy.
 - (xiv) Provided that the manual mining operations are carried out only by deploying persons using baskets and hand spades for collection of ore or mineral within the intertidal zone and as per approved mining plan, without deploying or using drilling and blasting or Heavy Earth Moving Machinery in the intertidal zone.
 - (xv) Exploration and extraction of oil and natural gas and all associated activities and facilities thereto;
 - (xvi) Foreshore requiring facilities for transport of raw materials, facilities for intake of cooling water, intake water for desalination plants etc., and outfall for

discharge of treated wastewater or cooling water from thermal power plants, in conformity with the environmental standards notified by Ministry of Environment, Forest and Climate Change and relevant directions of Central Pollution Control Board (CPCB) or the State Pollution Control Board (SPCB) or the Pollution Control Committee (PCC), as the case may be.

- (xvii) Pipelines, conveying systems including transmission lines.
- (xviii) Weather radar for monitoring of cyclones prediction ocean observation
- (xix) Platforms, movement and associated facilities.
- (xx) Salt harvesting and associated facilities.
- (xxi) Desalination plants and associated facilities.
- (xxii) Mining of sand for construction purposes:

Provided that the mining of sand shall be permitted by Andaman and Nicobar CZMA in identified non-eco sensitive and approved sites, as identified by Institute of Ocean Management (IOM), Chennai, subject to the following, namely:-

- (a) The mining plans shall stipulate sufficient safeguards to prevent damage to the sensitive coastal eco-system including corals, turtles, crocodiles, bird nesting sites and other protected areas.
- (b) Total quality of sand to be mined shall be fixed taking into consideration the order of Hon'ble Supreme Court, dated 7th May, 2002 in Writ Petition (Civil No.2002 of 1995).
- (c) The sand mining shall be monitored by a constituted Committee by the Lieutenant Governor of Andaman and Nicobar comprising of (1) Chief Secretary, Andaman & Nicobar, (2) Secretary, Department of Environment, (3) Secretary, Department of Water Resources, (4) Secretary, Andaman and Nicobar Public Works Department, (5) Representative from the Regional Office of Ministry of Environment, Forest and Climate Change, Bhubaneswar and (6) Representative of an NGO based at Andaman and Nicobar.

ICRZ-II

- (i) Activities as permitted in ICRZ-I B, shall also be permissible in ICRZ-II, as applicable.
- (ii) Construction of buildings for residential purposes, schools, hospitals, institutions, offices, public places etc. shall be permitted only on the landward side of the existing road, or on the landward side of existing authorized fixed structures; provided that no permission for construction of buildings shall be given on landward side of any new roads which are constructed on the seaward side of an existing road.
- (iii) Buildings permitted as in (ii) above, shall be subject to the local town and country planning regulations as applicable from time to time, and the norms for the Floor Space Index or Floor Area Ratio prevailing as on the date of this notification in the official gazette, and in the event that there is a need for amendment of the FSI after the date of publication of this notification in the official Gazette, the Urban Local Body or the Union territory Administration shall approach the Ministry of Environment, Forest and Climate Change

through the concerned Union territory Coastal Zone Management Authority (CZMA) and the concerned CZMA shall forward the proposal to the National Coastal Zone Management Authority (NCZMA) with its views in the matter, and the NCZMA shall thereafter examine various aspects like availability of public amenities, environment protection measures, etc. and take a suitable decision on the proposal and it shall be the responsibility of the concerned Town Planning Authority to ensure that the solid Wastes are handled as per respective Solid Waste Management Rules and no untreated sewage is discharged on the coast or coastal waters.

- (iv) Reconstruction of authorized buildings shall be permitted, without change in present land use, subject to the local town and country planning regulations as applicable from time to time, and the norms for the Floor Space Index or Floor Area Ratio, prevailing as on the date of this Notification. and in the event that there is a need for amendment of the FSI after the date of publication of this notification in the official Gazette, the Urban Local Body or the Union territory Administration shall approach the Ministry of Environment, Forest and Climate Change through the concerned Union territory Coastal Zone Management Authority (CZMA) and the concerned CZMA shall forward the proposal to the National Coastal Zone Management Authority (NCZMA) with its views in the matter, and the NCZMA shall thereafter examine various aspects like availability of public amenities, environment protection measures, etc. and take a suitable decision on the proposal and it shall be the responsibility of the concerned Town Planning Authority to ensure that the solid Wastes are handled as per respective Solid Waste Management Rules and no untreated sewage is discharged on the coast or coastal waters.
- (v) Development of vacant plots in designated areas for construction of beach resorts/hotels/tourism development projects subject to the conditions or guidelines at Annexure-III.
- (vi) Temporary tourism facilities shall be permissible in the beaches which shall only include shacks, toilets or washrooms, change rooms, shower panels; walk ways constructed using interlocking paver blocks and the like, drinking water facilities, seating arrangements, facilities associated for water sports activities etc. and such facilities shall however be permitted only subject to the tourism plan featuring in the approved ICRZ Plan as per this Notification, framed with due consultative process and public hearing etc. and further subject to maintaining a minimum distance of 10 meters from HTL for setting up of such facilities and environmental safeguards enlisted in the ICRZ Plans.
- (vii) Construction or repairs of infrastructure facilities for Marine Coastal Police Stations may be permitted on a case to case basis by CZMA.
- (viii) Mining of atomic minerals notified under Part-B of the First Schedule to Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957) occurring as such or in association with one or other minerals by such agencies as authorised by the Department of Atomic Energy, Government of India, as per mining plan by the Atomic Mineral Directorate for Exploration

and Research.

ICRZ-III:

- (a) Activities as permitted in ICRZ-I B, shall also be permissible in ICRZ-III, as applicable.
- (b) Regulation of activities in the NDZ: Following activities shall be permitted or regulated in the NDZ.-
 - (i) no construction shall be permitted within NDZ in ICRZ-III, except for repairs or reconstruction of existing authorized structure not exceeding existing Floor Space Index, existing plinth area and existing density; for permissible activities under the notification including facilities essential for activities and construction/reconstruction of dwelling units of traditional coastal communities including fisher folk, incorporating necessary disaster management provisions and proper sanitation arrangements.
 - (ii) agriculture, horticulture, gardens, pastures, parks, playfields and forestry.
 - (iii) construction of dispensaries, schools, public rain shelter, community toilets, bridges, roads, provision of facilities for water supply, drainage, sewerage, crematoria, cemeteries and electric sub-station which are required for the local inhabitants may be permitted on a case to case basis by CZMA.
 - (iv) construction of units or auxiliary thereto for domestic sewage, treatment and disposal with the prior approval of the concerned Pollution Control Board or Committee.
 - (v) facilities required for local fishing communities such as fish drying yards, auction halls, net mending yards, traditional boat building yards, ice plant, ice crushing units, fish curing facilities and the like;
 - (vi) wherever there is a national or state highway passing through the NDZ of ICRZ-III areas, temporary tourism facilities such as toilets, change rooms, drinking water facility and temporary shacks can be taken up on the seaward side of the road.
 - (vii) on landward side of such roads in the NDZ, Resorts / hotels and associated tourism facilities shall be permitted. Such facilities shall, however, be permitted only subject to the incorporation of tourism plan in the approved ICRZ Plans as per this Notification and the conditions / guidelines at **Annexure-III**, as applicable.
 - (viii) temporary tourism facilities shall be permissible in the NDZ and beaches in the ICRZ-III areas and such temporary facilities shall only include shacks, toilets or washrooms, change rooms, shower panels; walk ways constructed using interlocking paver blocks and the like, drinking water facilities, seating arrangements, facilities associated for water sports activities etc. and such facilities shall however be permitted only subject to the tourism plan featuring in the approved ICRZ Plan as per this Notification framed with due consultative process and public hearing etc.

- and further subject to maintaining a minimum distance of 10 meters from HTL for setting up of such facilities and environmental safeguards enlisted in the ICRZ Plans.
- (ix) mining of atomic minerals notified under Part-B of the First Schedule to Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957) occurring as such or in association with one or other minerals by such agencies as authorised by the Department of Atomic Energy, Government of India, as per mining plan by the Atomic Mineral Directorate for Exploration and Research.
- (c) For ICRZ–III Areas beyond the NDZ, activities shall be permissible and regulated as under:
- (i) development of vacant plots in designated areas for construction of beach resorts or hotels or tourism development projects subject to the conditions / guidelines at Annexure-III;
 - (ii) construction or reconstruction of dwelling units so long it is within the ambit of traditional rights and customary uses such as existing fishing villages etc. Building permission for such construction or reconstruction will be subject to local town and country planning rules with an overall height of construction not exceeding nine meters and with only two floors (ground + one floor);
 - (iii) the local communities including fishermen can be permitted to facilitate tourism through ‘home stay’ without changing the plinth area/ design or facade of the existing houses.
 - (iv) construction of public rain shelters, community toilets, water supply drainage, sewerage, roads and bridges etc.
 - (v) Construction or repairs of infrastructure facilities for Marine Coastal Police Stations may be permitted on a case to case basis by CZMA.
- (d) Drawing of groundwater and construction related thereto shall be prohibited within 200 meters of HTL except for the use of local communities in areas inhabited by them. In the areas between 200 meters - 500 meters of the HTL, groundwater withdrawal can be permitted only through manual means from ordinary wells for drinking, horticulture, agriculture and fisheries etc. where no other source of water is available. Restrictions for such drawal may be imposed by the designated Authority by UT administration in the areas affected by sea water intrusion.
- (e) Mining of atomic minerals notified under Part-B of the First Schedule to Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957) occurring as such or in association with one or other minerals by such agencies as authorised by the Department of Atomic Energy, Government of India, as per mining plan by the Atomic Mineral Directorate for Exploration and Research.

ICRZ-IV.- Activities shall be permitted and regulated in the CRZ IV areas as under:

- (i) Traditional fishing and allied activities undertaken by local communities.

- (ii) Land reclamation and bunding etc. to be permitted only for activities such as;
 - (a) Foreshore facilities like ports, harbours, Jetties, wharves, quays, slipway, bridges, sea links and hover ports for coast guard etc.
 - (b) Projects for Defense, strategic and security purpose including Coast Guard.
 - (c) Measures for control of erosion.
 - (d) Maintenance and clearing of waterways, channels and ports.
 - (e) Measures to prevent sand bars, installation of tidal regulators, laying of storm water drains or for structure for prevention of salinity ingress and freshwater recharge.
- (iii) Activities related to waterfront or directly needing foreshore facilities such as ports and harbours, jetties, quays, wharves, erosion control measures, breakwaters, pipelines, navigational safety facilities, and the like.
- (iv) Power by non-conventional energy sources and associated facilities.
- (v) Transfer of hazardous substances from ships to Ports.
- (vi) Storage of non-hazardous cargo like edible oil, fertilizers and food grains in notified Ports.
- (vii) Facilities for discharging treated effluents into the water course.
- (viii) Projects classified as Strategic and Defense related projects including coast guard coastal security network.
- (ix) Projects of Department of Atomic Energy.
- (x) Exploration and extraction of oil and natural gas and all associated activities and facilities thereto;
- (xi) Exploration and mining of atomic minerals notified under Part-B of the First Schedule of the Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957), occurring as such or in association with other mineral(s) and of such associated mineral(s).
- (xii) Foreshore requiring facilities for transport of raw materials, facilities for intake of cooling water and outfall for discharge of treated wastewater or cooling water from thermal power plants. Foreshore requiring facilities for transport of raw materials, facilities for intake of cooling water and outfall for discharge of treated wastewater or cooling water from thermal power plants, in conformity with the environmental standards notified by Ministry of Environment, Forest and Climate Change and relevant directions of Central Pollution Control Board (CPCB) or the State Pollution Control Board (SPCB) or the Pollution Control Committee (PCC), as the case may be.
- (xiii) Pipelines, conveying systems including transmission lines.
- (xiv) Weather radar for monitoring of cyclone prediction, ocean observation platforms, movement and associated facilities.

8. Preparation of Coastal Zone Management Plans

The ICRZP maps on 1:25,000 scale identifying and classifying the ICRZ areas were prepared in accordance with the guidelines given in Annexure-IVA of the ICRZ notification, 2019 and as per the guidelines issued by MoEF&CC, Government of India vide letter No. F. No. 12-1/2019-IA-III dated 26/06/2019. These are to be submitted to MoEF&CC,

Government of India for approval after public hearing. Based on the approved ICRZP, the local level ICRZ maps of 1:3960 cadastral scales need to be prepared for the use of local bodies and other agencies to facilitate implementation of the ICRZPs. The present study covers preparation of ICRZP on 1:25000 scale as per ICRZ notification, 2019.

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

As per the CRZ notification, the HTL is defined as “*the line on the land upto which the highest waterline reaches during the spring tide*”. 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 CRZ. The HTL requires specific definition since the 20, 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 may be taken as the LTL.

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 could be done by using aerial photographs/satellite data.

a) *Landward (monsoonal) berm crest for beaches*

In all the well-formed wide beaches, one or more berms (which are 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 do 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.

b) *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 majority of these are devoid of beaches. The waves impinge upon the seawall during the monsoon season, especially during the 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.

c) 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 plant normally follows the line of monsoon berm crest which is considered as the HTL.

d) Coastal sand dune / paleo-aeolian 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.

e) Mangroves

These are evergreen, tropical coastal tidal 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.

f) Rocks, Headlands, Cliffs

At the rock outcrops, headlands and cliffs the water is quite deep 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.

g) 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 (MoEF&CC, 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.

9. Methodology for Preparation of ICRZ Plans

9.1 Base data: HTL, LTL, ESAs, & CZMP:

High Tide Line (HTL), Low Tide Line (LTL), and Ecologically Sensitive Areas (ESAs), demarcated by NCSCM, Chennai, were used for preparation the ICRZPs, as required under the provisions of the ICRZ Notification, 2019. The ICRZP and Integrated Island Management Plan (IIMP) database 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.

9.2 ICRZ map preparation

The ICRZ map of South Andaman is prepared by updating the approved Island Coastal Regulation Zone Plan (ICRZP) framed under IPZ Notification, 2011.

10. Island Coastal Regulation Zone (ICRZ) plan for South Andaman Island of the South Andaman District as per ICRZ notification 2019

10.1 Location

The South Andaman Island is the southernmost island of the main archipelago of the Andaman Islands and is the home of majority of the population of Andaman Islands. It is located between latitudes $11^{\circ}25'00''$ to $11^{\circ}46'00''$ N and longitudes $92^{\circ}30'00''$ to $92^{\circ}46'00''$ E (Fig. 1). Total geographical area of South Andaman island is 1350.82 km² (Forest statistics, 2017). The capital of Andaman and Nicobar Islands is Port Blair which is located in this island. As per the 2011 census, the Island has a total population of 209597 which includes 111975 males and 97622 females.

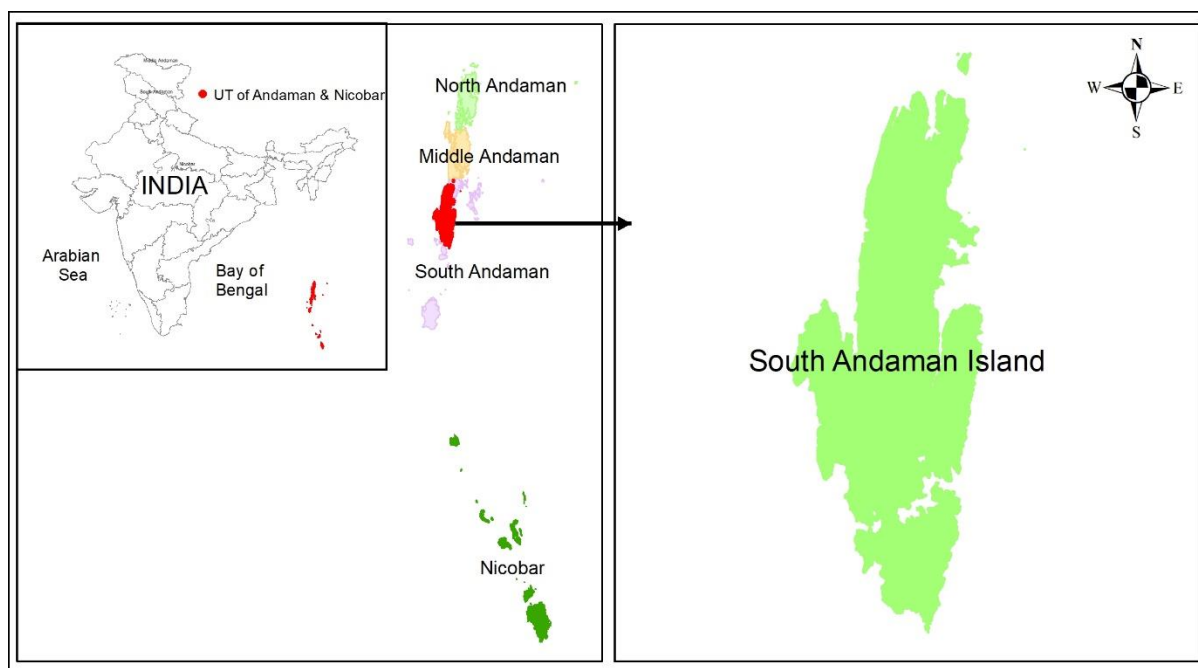


Figure 1. Location map of South Andaman Island

10.2 ICRZ Plan for South Andaman Island

1. As per Para 4(i) of ICRZ notification 2019, the South Andaman island fall under the Group-I Island.
2. The ICRZ for South Andaman Island has been classified into:
 - i. ICRZ – IA:

- a. The ICRZ-IA are those ecologically sensitive areas and the geomorphological features which play a role in maintaining the integrity of the coast. The total area of ICRZ IA is 301.05 sq km which include 27.23 sq km area of 20m mangrove buffer (the mangroves area greater than 1000 sq meter). The ESA of South Andaman island includes protected forest, reserved forest mangroves, mudflat, coral reefs, national park, wildlife sanctuary, turtle nesting ground,

20m Mangroves buffer zone is provided in areas where the mangroves area greater than 1000 sq km.
- b. The ICRZ -IB is area between Low Tide Line and High Tide Line. The total area of ICRZ IB is 148.49 sq. km which is reduced to 8.38 sq. km after erase ICRZ IA areas.
- ii. ICRZ II: 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.
The total ICRZ II area is 4.35 sq. km.
- iii. ICRZ III: No Development Zone, 100m to 200m from HTL. Total ICRZ III area is 53.03 sq km with out erased by ICRZ IA.
 - a. The total area of No Development Zone (NDZ - ICRZ III) is 6.68 sq km and the total area of 10m to 200m area from HTL (ICRZ III) is 3.24 sq km after erased ICRZ IA area.
- iv. ICRZ - IVA and ICRZ - IVB.
 - a. The ICRZ -IVA is water area up to 12 nm from LTL.
 - b. The ICRZ- IVB is 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. The total area of ICRZ IVB is 28.81 sq km

Table 1. Area statistics of ESAs of South Andaman Island

ICRZ Category	Classes	Area in sq.km	Total Area (sq km)
ICRZ IA	ESA		301.05
	Coral Reefs	87.27	
	Mangroves	133.49	
	Mangrove buffer	27.23	
	Protected forest	12.52	
	National park	19.82	
	Turtle nesting ground	0.12	
	Wildlife sanctuary	20.09	
	Reserved forest	34.25	
	Mudflat	2.51	
ICRZ IB	Intertidal Zone (after ICRZ IA erased)		8.38
ICRZ II	Developed area (after ICRZ IA erased)		4.35
ICRZ III	No Development Zone (after ICRZ IA erased)	6.68	9.92
	100 – 200m from HTL (after ICRZ IA erased)	3.24	
ICRZ IVA	From HTL to 12 NM	Not calculated	
ICRZ IVB	Tidally influenced water body		28.81
Total Area under ICRZ in South Andaman island			348.16

3. Total length of HTL of South Andaman island is 1128.41 km.
4. The major Bays present in the South Andaman island as per the NHO chart are Constance Bay, Breakfast Bay, Kalchwa Bay, Ike Bay, Bilap Bay in the western side and Napier Bay, Shoal Bay, Navy Bay, Sesostris Bay, North Bay, Molly Bay, Matla Bay, Minnie Bay, Flat Bay, Charlotte Bay, Mangrove Bay, Command Bay, Semiramis Bay and Phoenix Bay in the eastern side of the island.
5. Major turtle nesting ground area observed in Maduban bay beach, Corbyn's cove beach, Shoal bay beach, Ike bay beach.
6. Total area of tribal reserve within ICRZ boundary is 131.61 sq km.
7. Total area Jarawa reserve - 5km buffer area within ICRZ boundary is 15.57
8. The total land area of South Andaman Island is 1350.82 km² sq km, of which 348.16sq km is under ICRZ, (25.77%), which includes coral reefs (water area).
9. For computation of land area under ICRZ in South Andaman, the area under coral reef is excluded and only 1263.55 sq km falls under ICRZ within the land area, which is 19.31% of the total land area of South Andaman Island.
10. Coastal land use maps (i.e. land use map used to define ICRZP including Ecologically Sensitive Areas) were prepared on 1: 25000 scale.
11. There are 19 number of ICRZP maps on 1:25000 scale, covering South Andaman Island (Table 2).

Table2: List of Sheet/map number covering South Andaman Island

South Andaman		
S.no	Sheet number	Map number
1	C 46 C 9/SW	SA 8
2	C 46 C 9/NE	SA 12
3	C 46 C 13/SW	SA 10
4	C 46 C 9/SE	SA 9
5	C 46 C 14/SW	SA 4
6	C 46 C 14/NW	SA 7
7	C 46 C 10/SW	SA 2
8	D 46 U 12/SW	SA 14
9	C 46 C 13/NW	SA 13
10	C 46 C 11/NE	SA 1
11	C 46 C 10/NE	SA 6
12	C 46 C 10/NW	SA 5
13	C 46 C 10/SE	SA 3
14	C 46 C 9/NW	SA 11
15	D 46 U 12/SE	SA & BA 15
16	D 46 U 16/SW	SA & BA 16
17	D 46 U 12/NE	SA & BA 17
18	D 46 U 16/NW	SA & BA 18
19	D 46 U 15/SW	SA, BA & MA 21

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