29 Marine Protected Areas

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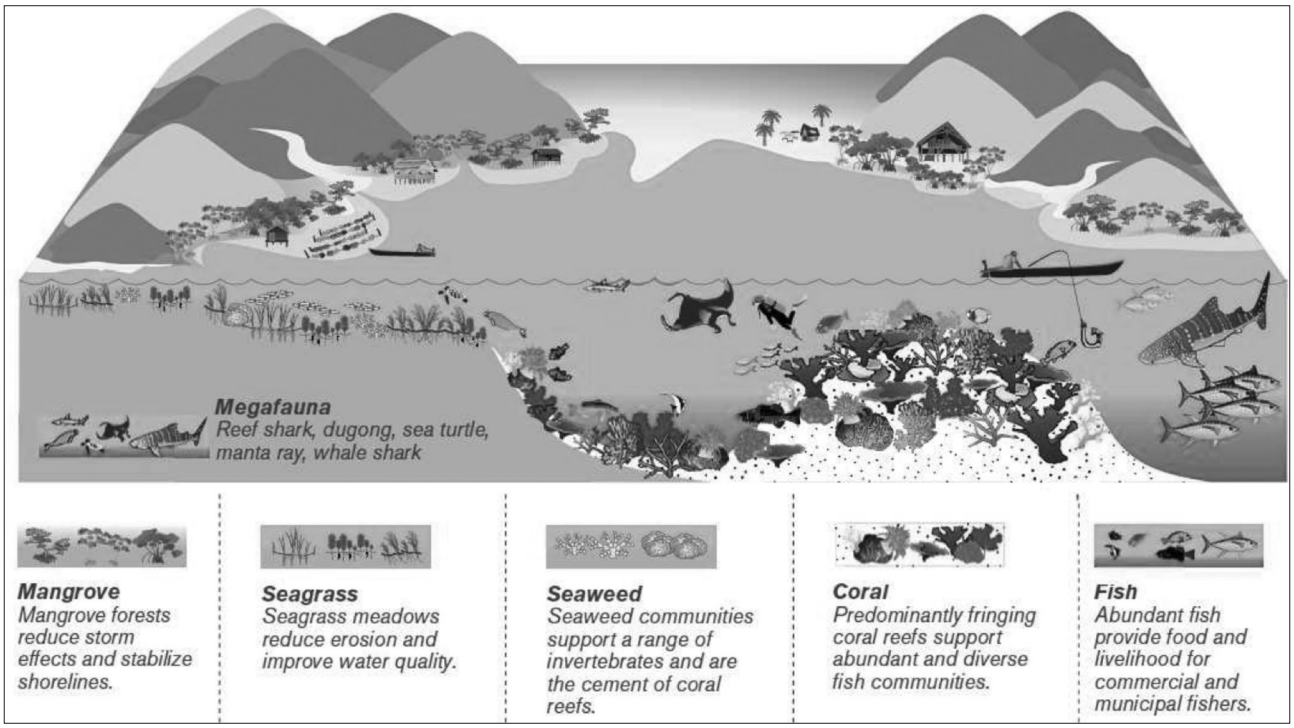
India has a coastline of 8,118 km, with an exclusive economic zone (EEZ) of 2.02 million sq km and a continental shelf area of 372,424 km^2, spread across 9 maritime States and seven Union Territories, including the islands of Andaman and Nicobar, and Lakshadweep. India represents 2.5 percent of the world's landmass and supports a population of over one billion people. India is also one of 17 mega-biodiverse countries in the world, with 7.8% of the recorded species of the world, including 45,500 recorded species of plants and 91,000 recorded species of animals. The marine ecosystem is extremely diverse, attributed to the geomorphologic and climatic variations along the coast. The coastal and marine habitat includes near shore, gulf waters, creeks, tidal flats, mud flats, coastal dunes, mangroves, marshes, wetlands, seaweed and sea grass beds, deltaic plains, estuaries, lagoons and coral reefs.

Why Marine Protected Area (MPA)?

Marine protected areas are essential to safeguard biodiversity and to sustain vibrant seas and can increase biomass and biodiversity in tropical and temperate ecosystems, as well as serve as insurance policies against the impacts of fishing and other destructive activities. If managed properly, they are an effective way of protecting marine ecosystems along with their cultural and historical heritage for us and future generations. They are important areas of conservation of marine biodiversity and maintain productivity of oceans and also the site-scale units and are therefore highly relevant for mitigating and avoiding the risks of loss of marine biodiversity.

All MPAs are designated for the purpose of conservation of



biodiversity or cultural heritage. The designation of MPAs and MPA networks is driven by a range of international, regional, and national obligations and initiatives. Types of MPAs vary widely across regions but names for these MPA types (e.g. marine reserve, strict marine protected area) are not consistent between regions. MPA types can be used to describe the specific habitats they aim to protect. More commonly, however, MPA types vary according to the protection being granted (e.g. no-access zones, no-take or no-impact zones). Although the legal designation of specific MPAs is done by national governments, communities may establish sites under their management, often termed Locally Managed Marine Areas (LMMAs), but these sites are not always officially recognized by their own national governments. An effective MPA system is needed to ensure that the oceans recuperate, continue to store carbon dioxide, that fish stocks recover and that coastlines are protected from harsh climatic conditions. It is no longer a technical question but a matter of survival for the planet and humankind.

MPAs provide a range of benefits for fisheries, local economies and the marine environment including: conservation of biodiversity and ecosystems; arresting and possibly reversing the global and local decline in fish populations and productivity by protecting critical breeding, nursery and feeding habits; raising the profile of an area for marine tourism and broadening local economic options; providing opportunities for education, training, heritage and culture; and providing broad benefits as sites for reference in long term research.

Marine Protected Areas (MPAs) are increasingly recognized as a critical management tool to protect, maintain, and restore natural and cultural resources in coastal and marine waters. A network of marine protected areas, elimination of destructive fishing practices, and the implementation of ecosystem-based management could help meet the global goal of maintaining or restoring fisheries stocks to levels that can produce the maximum sustainable yield.

What is Protected Area (PA)?

A protected area is a tool to manage natural resources for biodiversity conservation, for the well-being of people dependent on these resources. They are widely regarded as one of the most successful measures implemented for the conservation of biodiversity by drawing upon traditional and community-based approaches, governance regimes, scientific and traditional knowledge and contemporary practices of governments and conservation agencies (IUCN).

What is Marine Protected Area (MPA)?

One of the most effective means for protecting marine and coastal biodiversity is through the establishment and proper management of Marine Protected Areas (MPAs). Marine Protected Area is an umbrella term to describe a wide range of protected areas for marine conservation around the world. A global definition specifically for MPAs - as distinct from the general definition of a protected area - was first adopted by the IUCN in 1999. The definition was revised in 2012 and the distinction between a marine and terrestrial protected area was removed, aligning the definition of MPAs with the definition of a 'protected area' as "*a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values*".

It includes marine parks, nature reserves and locally managed marine areas that protect reefs, sea grass beds, shipwrecks, archaeological sites, tidal lagoons, mudflats, salt marshes, mangroves, rock platforms, underwater areas on the coast and the seabed in deep water. To be included within the World Database on Protected Areas, MPAs must be sites, located in the marine environment, that meet the most recent IUCN protected area definition Marine Protected Areas cover many different types of protection. Some are "no-take zones or protected zones" that are essential to enable fish stocks to recover while others allow multiple use of their resources.

Fish refugia which can be defined as areas managed to control fishing gear types and to protect vulnerable life history stages in order to improve fisheries sustainability. Recent years have also seen the introduction and growing use of the term 'Marine Managed Area' (MMA). 'MMA' is more inclusive than either 'Fish Refugia' or 'MPA', as it includes areas set aside for both conservation and sustainable use/fisheries purposes.

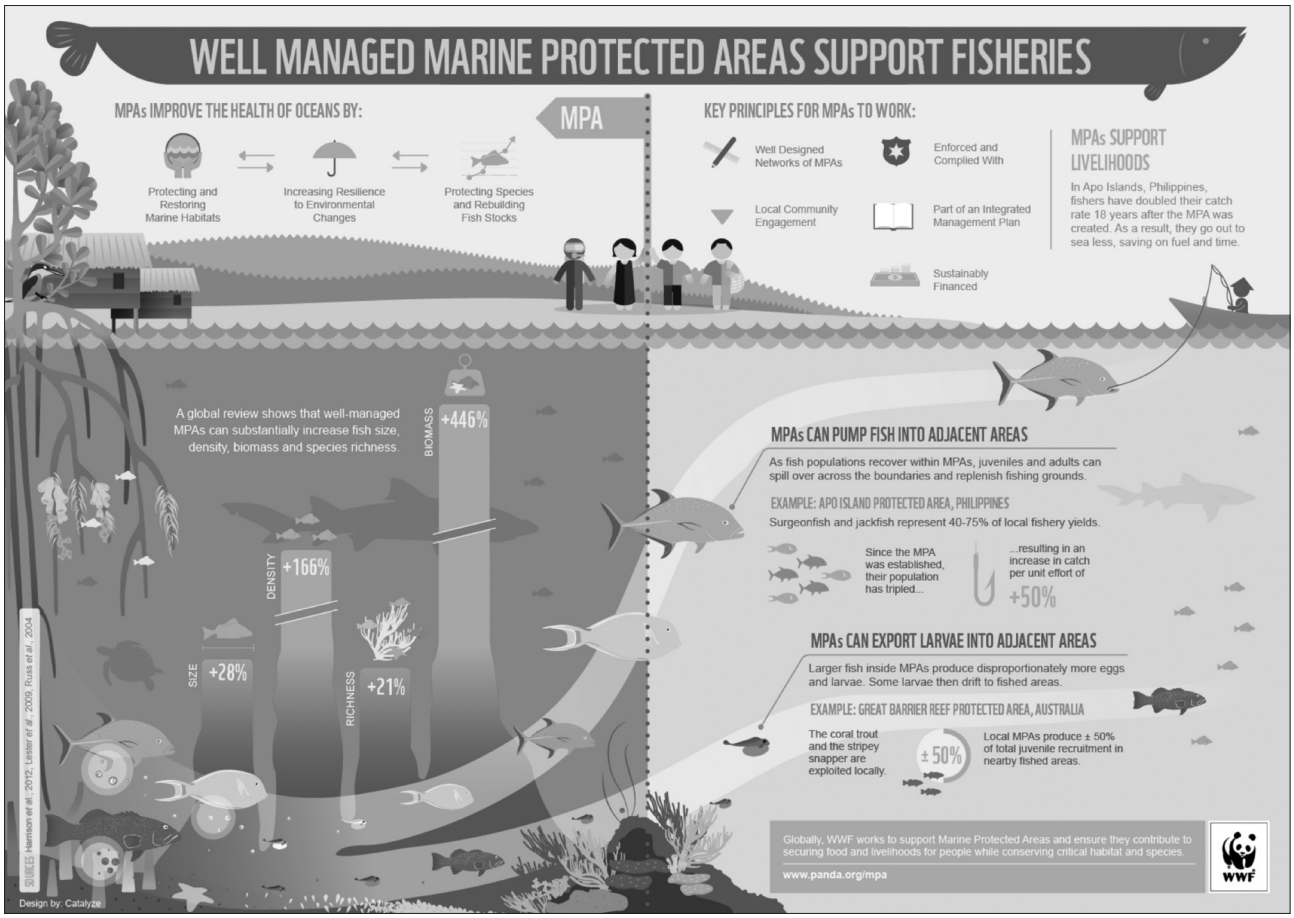
Marine Protected Areas cover many different types of protection. Some are "no-take zones or protected zones" that are essential to enable fish stocks to recover while others allow multiple use of their resources. MPAs protect key ecosystems such as coral reefs. Not only do they act as safe breeding grounds for fish, they also generate tourism, which in turn brings jobs. Creating more Community Managed MPAs would enhance the flow of benefits to local people.

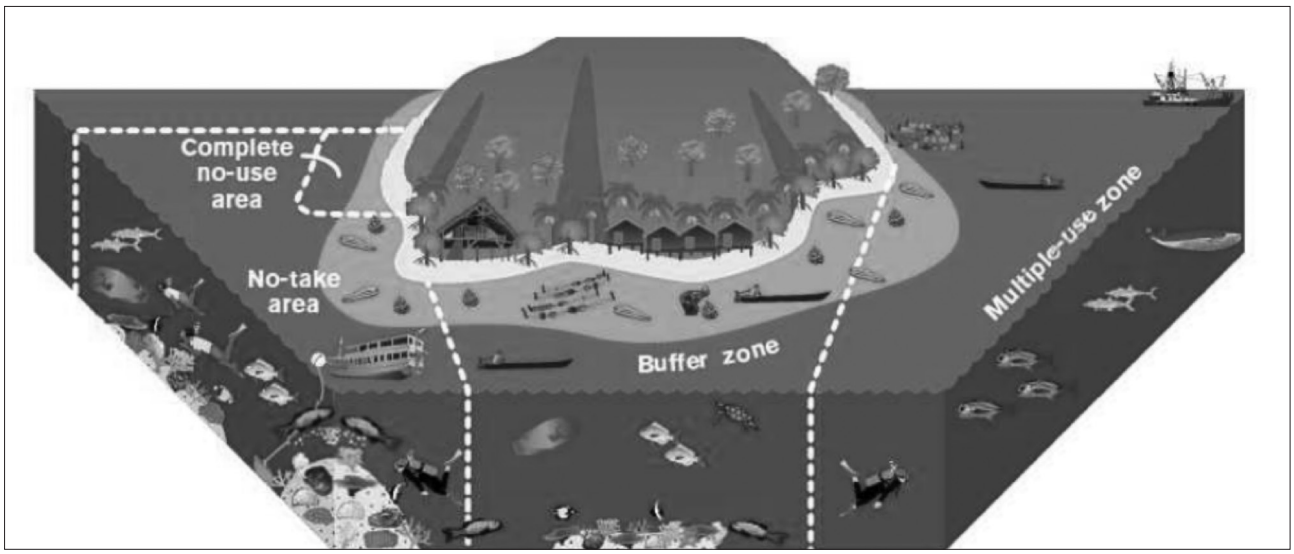
Climate change is posing a major threat to humankind as well as biodiversity. More than 90% of the world's carbon dioxide is stored in the oceans, and they remove 30% of the carbon dioxide released to the atmosphere. MPAs, which often encompass 'barrier or bioshield' ecosystems such as coral reefs or mangroves, can also reduce the impact of damage from natural disasters such as tsunami, hurricanes. Waves are slowed by the reefs while mangroves are effective windbreaks that reduce soil erosion.

Criteria for selecting MPAs

Biogeographic criteria:

Presence of rare biogeographic qualities or representative of a biogeographic "type" or types Existence of unique or unusual geological features





Ecological criteria

- Ecological processes or life-support systems (e.g. as a source for larvae for downstream areas)
- Integrity, or the degree to which the area, either alone or in association with other protected areas, encompasses a complete ecosystem
- The variety of habitats
- Presence of habitat for rare or endangered species
- Presence of nursery or juvenile areas
- Presence of feeding, breeding or rest areas
- Existence of rare or unique habitat for any species
- Degree of genetic diversity within species

Naturalness

- Extent to which the area has been protected from, or has not been subject to, human-induced change

Economic importance

- Existing or potential economic contribution due to protection (e.g. protection of an area for recreation,

subsistence, use by traditional inhabitants, appreciation by tourists and others, or as a refuge nursery area or source of economically important species)

Social importance

- Existing or potential value to local, national or international communities because of its heritage, historical, cultural, traditional, aesthetic, educational or recreational qualities

Scientific importance

- Value for research and monitoring

International or national significance

- Existence of any national or international designation , Potential for listing on a national or international system
- Practicality or feasibility
- Degree of insulation from external destructive influences
- Social and political acceptability, degree of community support
- Accessibility for education, tourism, recreation
- Compatibility with existing uses, particularly by locals

Distribution of MPAs in India

The coastal environment plays a vital role in India's economy by virtue of the resources, productive habitats, and rich biodiversity. India's coastline supports almost 30% of its human population. Coastal fisheries are immensely important, both economically and in terms of environmental health. India continues to be the 7th largest fishing nation in the world. Coastal vegetation habitats, such as mangrove forests, serve as buffers to protect the shore line from wind generated storms and support coastal ecology. It is an important part of a local ecosystem as it strongly modulates land-ocean interactions and the mixture of fresh water and salt water in estuaries provides many nutrients for marine life. Salt marshes and beaches also support a diversity of plants, animals, and insects crucial to the food chain. The coastal beaches prevent salt water intrusion into the ground water. Coastal beaches if properly maintained not only offer a rich and important natural environment but also promote sustainable economic development such as ports and tourism which generates significant source of foreign exchange.

In India, PAs that fall-in whole or in part-within swath of 500 m from the high tide line and to marine environment are included in the Marine Protected Area Network. There are a total of 128 marine Protected Areas in India.Out of these, there are four Marine National Parks, sixty-seven Marine Sanctuaries, National Parks and Wild Life Sanctuaries, three Marine Biosphere Reserves, three Ramsar Coastal Wetlands, one Tiger Reserve (Sunderbans), one National Mangrove Genetic Resource Centre and Gene Centre and the Coral Reefs of Lakshadweep (seventeen), thirty two Mangrove Notifies Forests. Four national parks (having area130 km^2) and 16 wild life sanctuaries (185 km^2) have been identified for conservation measures. Apart from this, 17 parks and 28 wild life sanctuaries have been proposed/ existing on the island territories of India. It is necessary to monitor these areas to assess impact of conservation measures, status of habitats within the protected areas, impact of development on the quality and quantity of the resources, etc. No such database exists for the Indian Marine Protected Areas (MPA's). The repetitive nature of satellite data helps in monitoring vital ecosystem areas as well as in assessing the impact of conservation measures.

Taking the global coverage, as of 2010, there are approximately 6800 MPAs. The New Caledonia MPA, created in 2014, is currently the largest protected area in the world at 1,300,000 km^2.

The Andaman and Nicobar groups of islands located in the southeast of the Bay of Bengal consist of 350 islands. The deeply indented coastline results in innumerable creeks, bays and estuaries and facilitates the development of mangroves. There are 60 species of mangroves making it the second most diversely rich area in the Indian sub-continent. Coral reefs are the important habitats housing diverse marine fauna, particularly in the western side of the Andaman Islands.

The Gulf of Kachchh in Gujarat has an assemblage of ecologically sensitive ecosystems, viz. Coral reefs, mangroves, sea grasses, algae/seaweeds, etc. it is the largest inlet of the Arabian Sea, about 60 km wide at its widest and 170 km long.

The Malvan Marine Sanctuary, Sindhudurg, forms a part of the Western Ghats is considered as one of the biologically rich regions along the Maharashtra coast. Sindhudurg is a low fortified island on the coastal reef, which is joined to the mainland by a reef. At Ratnagiri and Malvan, sandy beaches are interspersed with rock formation extending over a considerable distance into the sea and forming small bays. During low tide, the exposed area of the bay has large rock pools with rocks partially exposed and the corals are generally seen attached to the rocks. These corals are legally protected under the Malvan Marine Sanctuary. This Sanctuary, together with some adjoining areas also harbours mangrove vegetation.

The Gulf of Mannar, Biosphere Reserve, Tamil Nadu lying in the south of the Palk bay harbors 21 islands. The Gulf has a number of offshore platform reefs, patch reefs and coral pinnacles, which lie from south of the Pamban Pass to north-east of Tuticorin. The region is significant both ecologically and economically. Coral reefs comprise of 94 coral species under 37 genera, 10 species of sea grasses and high density of macro-algal species. Ninety species of sponges, 119 species of annelid fauna, 450 species of molluscs, and 22 species of bivalves have been reported from this region by earlier workers. This region harbors mangrove ecosystems. The region was declared as Marine National Park in 1980

comprising an area of 6.23 sq. km and was given the status of Biosphere Reserve in 1989 covering an area of 10,500 sq. km.

Bhitarkanika is a unique habitat of mangrove forests located in Kendrapara district of Orissa. In 1975, Bhitarkanika was declared a Sanctuary under the Wildlife Protection Act, 1972 and was declared the National Park in 1988. It comprises of Bhitarkanika, Kalibhanjadian and Gahirmatha mangrove areas and is fed by the Dharma River, the Maipura River and the Bhitarkanika River. It is the home to diverse flora and fauna intricately linked with each other. The floral diversity includes a total of more than 300 plant species with both mangrove and non-mangrove species belonging to 80 families. The diverse habitat ranging from mangrove forests to agricultural fields, rivers, streams, fresh water ponds, tidal rivers, creeks, estuaries, mudflats, fresh water and brackish water wetlands, riverine islands, off-shore islands, muddy and sandy coastlines etc. provides home to a varied and large number of animal species including the longest estuarine crocodile of the world, partial albino reptilian species, salt water crocodiles, three species of Indian monitor lizards, the python and various migratory birds.

Sunderbans Biosphere Reserve, West Bengal along with three other wildlife sanctuaries covers a total area of 1,73,645 sq km of coastal wetlands. Sundarbans biosphere reserve is a majestic natural region in the world which covers 102 swampy island, mangroves, estuaries, backwaters and waterways. The tidal swamps and the mangrove vegetation are responsible for the dynamic ecosystem with vigorous nutrient recycling-both terrestrial and aquatic.

Marine Protected Areas In India

S.no.	Name of MPA	State	Category	Area sq km	Year of establishment
1	Kadalundi Vallikkunnu Com R	Kerala	Community Reserve	1.5	2007
2	Marine (Gulf of Kachchh)	Gujarat	National Park	162.89	1995
3	Bhitarkanika	Odisha	National Park	145	1998
4	Gulf of Mannar Marine	Tamil Nadu	National Park	6.23	1980

5	Sundarbans	West Bengal	National Park	1330.1	1984
6	Coringa	Andhra Pradesh	Sanctuary	235.7	1978
7	Krishna	Andhra Pradesh	Sanctuary	194.81	1989
8	Pulicat Lake	Andhra Pradesh	Sanctuary	500	1980
9	Dadra & Nagar Haveli	Dadra & Nagar Haveli	Sanctuary	92.16	2000
10	Fudam	Daman & Diu	Sanctuary	2.18	1991
11	Chorao Island	Goa	Sanctuary	1.78	1988
12	Khijadia	Gujarat	Sanctuary	6.05	1981
13	Marine (Gulf of Kachchh)	Gujarat	Sanctuary	295.03	1980
14	Malvan Marine	Maharashtra	Sanctuary	29.12	1987
15	Bhitarkanika	Odisha	Sanctuary	672	1975
16	Chilka (Nalaban)	Odisha	Sanctuary	15.53	1987
17	Gahirmatha	Odisha	Sanctuary	1435	1997
18	Balukhand Konark	Odisha	Sanctuary	71.72	1984
19	Point Calimere	Tamil Nadu	Sanctuary	172.6	1967
20	Pulicat Lake	Tamil Nadu	Sanctuary	153.67	1980
21	West Sundarbans	West Bengal	Sanctuary	556.45	2013
22	Haliday Island	West Bengal	Sanctuary	5.95	1976
23	Sajnakhali	West Bengal	Sanctuary	2091.12	1976
24	Lothian Island	West Bengal	Sanctuary	38	1976

Total area: 8214.59 sq. km

Marine Protected Areas In Islands Of India

S. No	Name of MPA	State	Category	Area	
Sq km	Year of establishment				
1	Campbell	Andaman & Nicobar	National Park	426.23	1992
2	Galathea	Andaman & Nicobar	National Park	110	1992
3	Mahatma Gandhi Marine	Andaman & Nicobar	National Park	281.5	1983
4	Middle Button Island	Andaman & Nicobar	National Park	0.44	1987
5	Mount Harriett	Andaman & Nicobar	National Park	46.62	1987
6	North Button Island	Andaman & Nicobar	National Park	0.44	1987
7	Rani Jhansi	Andaman & Nicobar	National Park	256.14	1996
8	Saddle Peak	Andaman & Nicobar	National Park	32.54	1987
9	South Button Island	Andaman & Nicobar	National Park	0.03	1987
10	Arial Island	Andaman & Nicobar	Sanctuary	0.05	1977
11	Bamboo Island	Andaman & Nicobar	Sanctuary	0.05	1977
12	Barren Island	Andaman & Nicobar	Sanctuary	11.99	1977
13	Battimalv Island	Andaman & Nicobar	Sanctuary	5.03	1977
14	Belle Island	Andaman & Nicobar	Sanctuary	0.08	1977
15	Bennett Island	Andaman & Nicobar	Sanctuary	3.46	1977
16	Bingham Island	Andaman & Nicobar	Sanctuary	0.08	1977
17	Blister Island	Andaman & Nicobar	Sanctuary	0.26	1977
18	Bluff Island	Andaman & Nicobar	Sanctuary	1.14	1977

19	Bondoville Island	Andaman & Nicobar	Sanctuary	2.55	1977
20	Brush Island	Andaman & Nicobar	Sanctuary	0.23	1977
21	Buchanan Island	Andaman & Nicobar	Sanctuary	9.33	1977
22	Chanel Island	Andaman & Nicobar	Sanctuary	0.13	1977
23	Cinque Islands	Andaman & Nicobar	Sanctuary	9.51	1977
24	Clyde Island	Andaman & Nicobar	Sanctuary	0.54	1977
25	Cone Island	Andaman & Nicobar	Sanctuary	0.65	1977
26	Curlew (B.P.) Island	Andaman & Nicobar	Sanctuary	0.16	1977
27	Curlew Island	Andaman & Nicobar	Sanctuary	0.03	1977
28	Defence Island	Andaman & Nicobar	Sanctuary	10.49	1977
29	Dot Island	Andaman & Nicobar	Sanctuary	0.13	1977
30	Dottrell Island	Andaman & Nicobar	Sanctuary	0.13	1977
31	Duncan Island	Andaman & Nicobar	Sanctuary	0.73	1977
32	East Island	Andaman & Nicobar	Sanctuary	6.11	1977
33	East Of Inglis Island	Andaman & Nicobar	Sanctuary	3.55	1977
34	Egg Island	Andaman & Nicobar	Sanctuary	0.05	1977
35	Elat Island	Andaman & Nicobar	Sanctuary	9.36	1977
36	Entrance Island	Andaman & Nicobar	Sanctuary	0.96	1977
37	Gander Island	Andaman & Nicobar	Sanctuary	0.05	1977
38	Girjan Island	Andaman & Nicobar	Sanctuary	0.16	1977
39	Goose Island	Andaman & Nicobar	Sanctuary	0.01	1977
40	Hump Island	Andaman & Nicobar	Sanctuary	0.47	1977
41	Interview Island	Andaman & Nicobar	Sanctuary	133.87	1977
42	James Island	Andaman & Nicobar	Sanctuary	2.1	1977
43	Jungle Island	Andaman & Nicobar	Sanctuary	0.52	1977
44	Kyd Island	Andaman & Nicobar	Sanctuary	8	1977
45	Landfall Island	Andaman & Nicobar	Sanctuary	29.48	1977
46	Latouche Island	Andaman & Nicobar	Sanctuary	0.96	1977
47	Lohabarrack	Andaman & Nicobar	Sanctuary	22.21	1977
48	Mangrove Island	Andaman & Nicobar	Sanctuary	0.39	1977
49	Mask Island	Andaman & Nicobar	Sanctuary	0.78	1977
50	Mayo Island	Andaman & Nicobar	Sanctuary	0.1	1977
51	Megapode Island	Andaman & Nicobar	Sanctuary	0.12	1977
52	Montogemery Island	Andaman & Nicobar	Sanctuary	0.21	1977
53	Narcondam Island	Andaman & Nicobar	Sanctuary	6.81	1977
54	North Brother Island	Andaman & Nicobar	Sanctuary	0.75	1977
55	North Island	Andaman & Nicobar	Sanctuary	0.49	1977
56	North Reef Island	Andaman & Nicobar	Sanctuary	3.48	1977
57	Oliver Island	Andaman & Nicobar	Sanctuary	0.16	1977
58	Orchid Island	Andaman & Nicobar	Sanctuary	0.1	1977
59	Ox Island	Andaman & Nicobar	Sanctuary	0.13	1977
60	Oyster Island-I	Andaman & Nicobar	Sanctuary	0.08	1977
61	Oyster Island-II	Andaman & Nicobar	Sanctuary	0.21	1977
62	Paget Island	Andaman & Nicobar	Sanctuary	7.36	1977
63	Parkinson Island	Andaman & Nicobar	Sanctuary	0.34	1977

64	Passage Island	Andaman & Nicobar	Sanctuary	0.62	1977
65	Patric Island	Andaman & Nicobar	Sanctuary	0.13	1977
66	Peacock Island	Andaman & Nicobar	Sanctuary	0.62	1977
67	Pitman Island	Andaman & Nicobar	Sanctuary	1.37	1977
68	Point Island	Andaman & Nicobar	Sanctuary	3.07	1977
69	Potanma Islands	Andaman & Nicobar	Sanctuary	0.16	1977
70	Ranger Island	Andaman & Nicobar	Sanctuary	4.26	1977
71	Reef Island	Andaman & Nicobar	Sanctuary	1.74	1977
72	Roper Island	Andaman & Nicobar	Sanctuary	1.46	1977
73	Ross Island	Andaman & Nicobar	Sanctuary	1.01	1977
74	Rowe Island	Andaman & Nicobar	Sanctuary	0.01	1977
75	Sandy Island	Andaman & Nicobar	Sanctuary	1.58	1977
76	Sea Serpent Island	Andaman & Nicobar	Sanctuary	0.78	1977
77	Shark Island	Andaman & Nicobar	Sanctuary	0.6	1977
78	Shearme Island	Andaman & Nicobar	Sanctuary	7.85	1977
79	Sir Hugh Rose Island	Andaman & Nicobar	Sanctuary	1.06	1977
80	Sisters Island	Andaman & Nicobar	Sanctuary	0.36	1977
81	Snake Island-I	Andaman & Nicobar	Sanctuary	0.73	1977
82	Snake Island-II	Andaman & Nicobar	Sanctuary	0.03	1977
83	South Brother Island	Andaman & Nicobar	Sanctuary	1.24	1977
84	South Reef Island	Andaman & Nicobar	Sanctuary	1.17	1977
85	South Sentinel Island	Andaman & Nicobar	Sanctuary	1.61	1977
86	Spike Island-I	Andaman & Nicobar	Sanctuary	0.42	1977
87	Spike Island-II	Andaman & Nicobar	Sanctuary	11.7	1977
88	Stoat Island	Andaman & Nicobar	Sanctuary	0.44	1977
89	Surat Island	Andaman & Nicobar	Sanctuary	0.31	1977
90	Swamp Island	Andaman & Nicobar	Sanctuary	4.09	1977
91	Table (Delgarno) Island	Andaman & Nicobar	Sanctuary	2.29	1977
92	Table (Excelsior) Island	Andaman & Nicobar	Sanctuary	1.69	1977
93	Talabaicha Island	Andaman & Nicobar	Sanctuary	3.21	1977
94	Temple Island	Andaman & Nicobar	Sanctuary	1.04	1977
95	Tillongchang Island	Andaman & Nicobar	Sanctuary	36.43	1977
96	Tree Island	Andaman & Nicobar	Sanctuary	0.03	1977
97	Trilby Island	Andaman & Nicobar	Sanctuary	0.96	1977
98	Tuft Island	Andaman & Nicobar	Sanctuary	0.29	1977
99	Turtle Islands	Andaman & Nicobar	Sanctuary	0.39	1977
100	Kwangtung Island	Andaman & Nicobar	Sanctuary	0.57	1987
101	West Island	Andaman & Nicobar	Sanctuary	6.4	1977
102	Wharf Island	Andaman & Nicobar	Sanctuary	0.11	1977
103	White Cliff Island	Andaman & Nicobar	Sanctuary	0.47	1977
104	Galathea Bay	Andaman & Nicobar	Sanctuary	11.44	1997
105	Cuthbert Bay	Andaman & Nicobar	Sanctuary	5.82	1997
106	Pitti	Lakshadweep	Sanctuary	0.01	2002

Total area: 1569.63 sq km